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"Impatto delle raccomandazioni dell'Intelligenza Artificiale sul processo decisionale"

"Kuidas tehisintellekti soovitussüsteemid mõjutavad inimeste otsuste tegemist"

TESI PRESENTATA DA: **Daria Arkhipova**

TUTORS: **Prof. Massimo Leone, Prof. Talis Bachmann, Prof. Kalevi Kull**

COORDINATORE DEL DOTTORATO: **Prof.ssa Paola Cifarelli**

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To Federico,

and our son Massimiliano.

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Chapter one -
Introduction: Towards semiotics-in-the-loop

Information and Communication Technology (hereafter ICT) has revolutionised almost all aspects of our everyday lives, from acquiring knowledge and learning to interacting with each other. Numerous inquiries continue to emerge daily concerning the use and integration of Artificial Intelligence (hereafter AI) into our daily lives. Users are presented with a diverse array of AI systems with which they can interact, and this diversity undergoes constant evolution, introducing fresh capabilities of AI tools, addressing users' necessities and even giving rise to novel ones. Furthermore, there exists a multitude of methodologies aimed at enhancing AI and enhancing its comprehensibility for end-users. By the time this thesis is written, AI-based tools and services are used on a daily basis at all levels. Nevertheless, numerous concerns arise regarding the functionality of AI tools, encompassing human-centred performance, explainability, policies governing the involved elements and the individual, social and cultural impact and significance.

Alongside the research trajectory examining the advancements in ICT and AI, arises the inquiry into their integration and social reception. Most of the technologies developed today are meant to solve specific problems that are incorporated within their design. However, the impact these technologies have on their direct and indirect users is yet to be fully understood at different levels. The integration and reception of ICT, encompassing AI and AI recommendation systems (hereafter AI recommendations or AIRS), as the focal point of this thesis, can be illuminated through the framework of Latour and Woolgar (2013), who suggest viewing it from two primary perspectives: first, examining how professionals, such as researchers, scrutinise the object within presumed conditions and second, exploring its reception in the communication process between individuals and society, emphasising social interpretation. Actor-network theory, rooted in Latour's seminal work (1987), posits that an empirical approach offers insight into the integration and reception dynamics within networks comprising both human and non-human actors.

There is a clear difference between algorithmic and human decision-making processes. Algorithmic decision-making tools are created to augment, facilitate and support human decision-making. However, these processes are not equal nor interchangeable. The algorithmic decision-making process is logic, statistics and computation-based. The human decision-making process is complex and includes various systems of the human organism, like the unconscious, e.g. the impact of hormones on the reactions, and conscious reasoning based on axiological context and socio-cultural dimensions. On the other hand, algorithmic decision-making is necessary to align with human needs and provide a clear understanding of how AI as a tool can aid and impact users' decisions, actions and behaviours.

This thesis aims to explore the influence AI can have on their users, particularly the impact of AI recommendations on the users of digital platforms like social media, which have become an integral part of the lives of billions. It looks at the influence daily interactions with AI can have on individuals, at their cognitive and physiological, emotional, axiological and pragmatic dimensions, later to understand how it impacts social practices and culture. Fields such as digital semiotics, computational semiotics, technosemiotics and others have emerged as novel domains and theories that grapple with the multifaceted nature of communication and delve into the realm of AI-facilitated decision-making. A central question that emerges is whether something can be employed effectively without undergoing explication, particularly in the context of comprehending the symbiotic relationship between a tool and its operator.

This chapter introduces the context in which this research developed and the reasons to approach the topic of AI's impact on their users. It highlights the importance of a multidisciplinary approach through the perspective of semiotics as an umbrella science in the field of AI research and development. First, it aims to provide a historical perspective on the development of the problem explored through this research, specifying cultural narratives and current stages of development of AI tools, shortly touching digital environments like social media. It also briefly introduces current dominant strategies on measuring the effectiveness of Human-computer interactions (hereafter HCI). Second, it describes in detail the chosen research settings, theoretical and empirical aims, research design and methods, including case studies. Finally, it briefly argues the importance of introducing semiotics as a part of the research in the field of AI development. The terminology used in this thesis can be found at the end of this chapter.

1.1. From the Internet to AI and assisted decision-making: an historical introduction

Historical progress in technology development can be seen from different perspectives. This research focuses on how the development of technology, in particular AI, influences their everyday users. The trajectory of technological advancement has ushered in a plethora of new tools over recent decades. Technologies that were not integral to daily routines just a year ago become a part of daily practices for a significant part of the world population, sometimes even without being acknowledged as such by their direct users. The changes during last two decades, such as the introduction of Artificial Intelligence tools like GPTs (Generative Pre-trained Transformers) and recommendation systems, have swiftly emerged as focal points for the discussions regarding implementation, capabilities, ethics, morality, regulations, individual and societal practices. For the sake of simplicity, below there are the key milestones in technological development according to the popular narrative:

- 1980-1990: introduction to the market of the Internet, PC and laptop, microprocessor, MS-DOC, available for non-professional users (Overby & Audestad, 2018);
- 1995-2000: invention and introduction to the market of Wi-Fi, Bluetooth, Google and other search engines;
- 2000-2005: invention/ introduction to the market of digital services such as Wikipedia, Skype, Facebook, YouTube, LinkedIn and other digital platforms;
- 2005-2010: invention and introduction to the market of digital devices and operational systems such as Android, iPhone, iOS and digital platforms such as Twitter (today X), Netflix and other data exchange and data sorting tools;
- 2010-2019: invention and introduction to the market of new wave of digital platforms like Instagram, TikTok and Snapchat, with use of AI recommendations and AI-based filters;
- 2020-2023: introduction to the market AI-based tools like ChatGPT 3.5, FaceApp, etc.

Information and communication technologies and the Internet have promoted changes in many areas, from professional fields and institutions to personal interactions, causing exponential tripling growth (Lucin & Mahmutefendic, 2013). Focusing on personal use, the development of ICT and the Internet provided new tools for interpersonal communication with other individuals and groups, mediated computer-based agents and users' self-identity and auto-communication practices (Baruah, 2012).
It is important to note that technology development should go along with digital literacy, which can be understood as following the ideological component of the general definition of "Literacy", means "knowing how to read and write" (Cambridge Advanced Learner's

Dictionary & Thesaurus, 2024), but is also more than just encoding and decoding skills. It is also "knowledge of a particular subject, or a particular type of knowledge" (idem). Martin and Grudziecki (2006) delineated three interconnected levels that underscore the distinctiveness of digital literacy compared to other forms of literacy. Their classification is founded upon: (1) digital competencies, encompassing skills, knowledge, attitudes and awareness pertaining to digital technology; (2) digital usage, emphasising the adept utilization of appropriate digital tools to locate, process information and solve problems; and (3) digital transformation, wherein individuals harness digital tools to generate new knowledge, activities or innovations. In this work, digital literacy is presumed to be the process of integrating and adapting technologies to users' practices. In other words, for technology to be used and have an impact on their users, users should find the affordances offered by these tools that correspond to their needs at a precise moment of time. The main criteria for technology to be adopted and used rely on:

- time, users have to contribute a certain amount of time to find out how to use it;
- stimuli, e.g. curiosity and needs, users should be looking for a solution to their needs, existing or introduced;
- borders or regulations can impact how users can interact with the technology, what tools are available to them in a specific time, political, economic and geographical area;
- opportunity or accessibility or affordability, including the price of technology in relation to the possibility of affording it.

Taking these points into account, it becomes apparent that despite the portrayal of ICT as experiencing exponential growth over the past three decades, various demographic categories (such as social, age, geographical factors, etc.) may have cultivated distinct digital literacy skills. Introducing the concept of digital literacy to the popular narrative of technology development outlined above could potentially yield different perspectives, particularly when considering issues such as the digital divide and market disparities, e.g. during the 1980s to the 1990s, while the Internet was invented earlier, its introduction to the market was hindered by the high cost of devices like personal computers, limiting access for many non-professionals until the mid-90s. From 2005 to 2010, there was a notable decrease in technology prices, making them accessible to a wider population and diverse social groups. This era saw an exponential increase in online content exchange as every user could contribute, with minimal regulations in place. Users, with increased time and access, found themselves delving deeper into technology, learning about its nuances and discovering new applications beyond initial designs. From 2010 to 2019, social media platforms such as Facebook, X, Instagram and TikTok gained prominence, transforming individual and social practices, particularly emphasised during events like the COVID-19 pandemic. Despite the proliferation of tools and devices, from 2020 to 2023, regulations aimed at ethical, moral and safety concerns, coupled with intuitive user interfaces, potentially limited users' exploration of technology, influencing digital literacy and its representation in individual and social practices.
Transitioning to AI, its widespread use and recognition have predominantly occurred in the past decade, although certain elements of AI have been integrated into technologies since the 2000s. There are various ambitious and sometimes misleading definitions, like "Artificial Intelligence is the study of how to build or program computers to enable them to do what minds can do" (Boden, 1996). A more accurate definition of AI as a methodological approach in ICT engineering is to emulate or supplement human intelligence by leveraging rational and logical reasoning capabilities, alongside learning from provided datasets to make informed decisions and execute assigned tasks effectively (Verma & Sharma, 2020). The term "AI" permeates not only professional domains but also social discourse, yet the prevailing representations and

narratives often lean towards Boden's definition from 1996 rather than the nuanced perspective offered by Verma and Sharma (2020). This discrepancy can lead to confusion for individuals seeking comprehension of this phenomenon via online resources or readily accessible materials.

This thesis regards AI as a toolkit for processing extensive datasets to enhance the decision-making process and furnish users with valuable insights. However, within the framework illustrated in Figure 1, it is crucial to acknowledge that AI encompasses a spectrum of approaches utilised across various computing domains, such as Machine Learning (hereafter ML) and Deep Learning (hereafter DL), applied in diverse fields like assisted decision-making and computer vision. Each facet of AI software research possesses intricacies tailored to specific developmental needs and supported by requisite tools, including hardware. These diverse algorithmic methodologies rely on training data and additional elements often overlooked but pertinent to our discussion herein. For instance, AI applications in self-driving vehicles are intricately linked to specific hardware configurations, with some sophisticated AI systems necessitating quantum computing capabilities. Moreover, it's noteworthy that many contemporary AI approaches have origins in problem-solving within machine perception and computer vision, shaping the logic and structures of algorithms in current use. The intricacies of reasoning within AI and AI recommendations are thoroughly explored in Chapter Two.

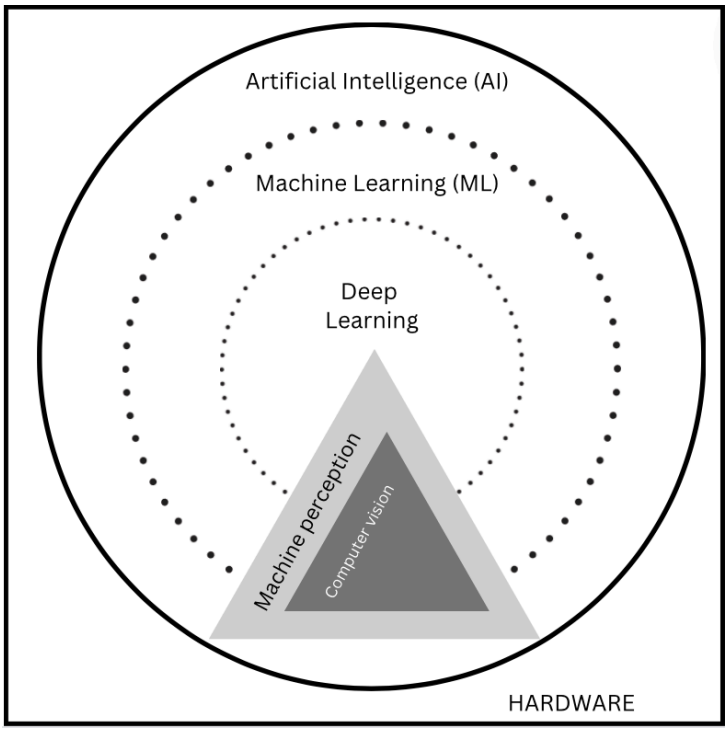


Figure 1 - Nilsson (2009) offers a unique perspective on the components of AI through what he terms the “Onion Model”, which delineates the foundational elements at the core, surrounded by successive layers representing the applications built upon them.

AI relies on extensive datasets for training, with Big Data serving as the primary source of these datasets. Big Data is a method that refers to techniques and technologies used to collect, process, analyse and make sense of large and complex datasets. They involve datasets that are too large, too complex or too fast-moving for traditional data processing techniques to handle. Big data methods leverage advanced technologies such as distributed computing and machine learning to extract valuable insights from these datasets. Big Data methods are used in various fields and industries, including finance, healthcare, transportation, retail and more. They are used to identify patterns, trends and relationships in data that can inform decision-making,

improve operational efficiency and drive innovation. For example, on social media Big Data methods can be used to analyse users' behaviour and preferences, identify fraud and security threats, optimise element distribution and applied to develop new products and services. Some common Big Data methods include data mining, natural language processing, predictive analytics and machine learning. These methods rely on algorithms and statistical models to process and analyse large volumes of data quickly and accurately, based on specialised software tools and infrastructure to store, manage and process large datasets. The use a top-down strategy, where pre-selected categories are offered to users through a Big Data-based approach, has become increasingly common. However, such an approach is constrained in its potential to offer profound insights to designers, users or businesses who engage with the system (Grover et al., 2022; Hancock et al., 2020). In this regard, the use of Big Data only quantifies a portion of the interaction process while neglecting behaviours and practices that are not explicitly stated online, not to mention their impact on behaviours in other digital and physical environments (Keles et al., 2020).

To overcome the constraints of a technocratic approach, there is a need to develop more holistic methods of data collection and analysis of the HCI. A holistic semiotic-driven approach may aim to capture the practices and behaviours of users at various levels, including perception, recognition, categorisation, interpretation, practices and transformation into social norms for specific groups. Highlighting the main general lines of individual, social and cultural practices that influence users' behaviours in digital environments, which can provide valuable insights for designers, users and institutionalised actors. By moving beyond the constraints of a top-down approach of Big Data and utilising qualitative data collection methods, a more nuanced understanding of the complexities of digital practices and behaviours can be achieved.

This approach is crafted and used in this research to the influence AI can have on their users, particularly the impact of AI recommendations on the users of social media. The beginning of this research in 2020 coincided with the onset of the global pandemic, a period characterised by significant shifts in individual and societal reliance on digital tools. Over the ensuing three years, there has been a discernible evolution in global discourse, transitioning from a predominant focus on the algorithmic advancement of AI to a heightened awareness of the implications of integrating these technologies into everyday life. It is essential to underscore that this research refrains from delving into the economic, commercial and political underpinnings driving AI and social media. Instead, it pivots towards the users' perspectives, scrutinising decision-making processes and their broader societal and cultural implications.

The focal point of this research revolves around AI recommendations deployed within digital environments, particularly social media platforms. While acknowledging the influence of AI tools like Large Language Models (hereafter LLMs)[1], grammar and spelling correctors and beautifying AI tools, which may partly impact users' decision-making processes and interact with their structure and usage, the theoretical framework primarily centres on providing a comprehensive understanding of these tools in comparison to human reasoning. However, the central objective remains to approach AIRS as pivotal tools shaping and influencing the elements with which users engage during their online interactions.

[1] Large Language Models (LLMs) are a type of artificial intelligence model designed to process and generate human-like text. They are trained on vast amounts of text data and use deep learning techniques to understand and generate natural language. Certain variants such as ChatGPT-4 are exclusively trained on textual data, lacking sub-symbolic interactions, such as with images. Language, seen as a non-dynamical system, exhibits predictability limits that can be leveraged by these models, evident in functions like probability prediction for the next word in AI text autocorrection tools. Such models depend on textual inputs rather than environmental cues, which may possess predictable attributes.

1.2. Research object, aims and questions

This thesis aims to explore the impact of AI recommendations on the users of social media, while addressing the gap in the research regarding this topic. So far, AI research has primarily relied on quantitative methodologies and statistical analyses, deeply rooted in dataset frameworks, despite various concerns have arisen regarding dataset parameters, including data policies restricting access, designers' pre-selection of datasets leading to homogeneity or limited diversity, all of which influence AI model training. This becomes particularly critical when AI models are deployed in high-stakes decision-making processes concerning societal issues. Today, a line of AI research is exploring methodologies that propose a more qualitative perspective (Sambasivan et al., 2021), placing a significant emphasis on data quality, characterised by representativeness and diversity. This research goes in this direction looking at how AIRS influence decision-making processes.

The decision-making process is an inherent aspect of life, where individuals navigate the action possibilities and behavioural opportunities. Every decision is made in an environment, spatial and time context. The decision environment, including the dominant beliefs associated with specific outcomes, plays the role of the boundaries for decision-making and establishes opportunities and preliminary results. The influence of contextual factors and other involved agents may create boundaries that shape the decision-making process. This thesis delves into the intricacies of the decision-making process, positioning it as a fundamental aspect of life comparable to the semiotic process resulting from various forms of communication. This thesis delves into the decision-making process, conceptualised as a cognitive endeavour where actions are chosen based on a set of beliefs with the intention of achieving desirable outcomes. It posits that this process is inherently semiotic, involving the interpretation and assignment of meaning to various signals and symbols within a given context. Most of the life situations apply to multi-criteria decision-making processes (Taherdoost & Madanchian, 2023). The decision-making process is usually classified in various fields to provide descriptive tools for modelling of problem-solving. Economy, different fields of cognitive studies, including psychology, heuristics and behaviouristics, lately neuroscience approach the topic differently but often agree on main division between rational or irrational and often study it with reference to factors such as physiological, biological, cultural, social, etc. that can influence it (Meshi et al., 2015). All these aspects together impact the complexity of a decision-making process at various levels. Decision-making processes, whether at the individual level, such as budget planning or seeking relevant services or at higher levels involving high-stakes decisions in banking, finance and governance, increasingly involve the use of computer devices. These devices employ mathematical equations, diverse statistical methods, economic theories and other mathematical tools to calculate and estimate potential solutions, thereby automating the decision-making process. In understanding decision-making, it is imperative to consider the interplay between meaningful and physical spaces, emphasising the relationships, communication and interactions between actors and artifacts.

In aiming to create suitable descriptive tools on how AI can influence the decision-making process, this thesis poses a crucial question: can AI be conceptualised as an actor or recognised as an artifact with features like affordances within the decision-making? To address this, a semiotic and biosemiotic perspective is employed, highlighting the profound attachment of human users to non-essential artifacts, as noted by Heersmink (2021). Computers and their AI

components are regarded as synthetic artifacts[2], amalgamating various qualities aligned with the intentions of their designers. This synthesis is embodied in devices ranging from personal computers to wearable technology like Google Glass, enabling human interaction through sensory modalities such as vision, touch and voice.

Various regulatory frameworks are being established with the objective of integrating AI into society, recognising its role not merely as a tool or artifact, but as a social actor (Crompton, 2021). Efforts in this direction are evident in the policies being developed by the European Union (hereafter EU), the United States of America and Japan, aimed at shaping AI to enhance societal well-being (European Parliament AI Act, 2023). Specifically, the EU Parliament prioritises the establishment of AI systems that are safe, transparent, traceable, non-discriminatory and environmentally sustainable. It advocates for human oversight of AI systems to mitigate potential adverse outcomes (European Parliament News, 2023). Furthermore, alongside the predominant approaches to AI regulation in Europe and the USA, Japan and China are also exploring the educational applications of AI tools.

This thesis focuses on the impact of AI recommendations on social media, specifically exploring how they influence human-user decision-making processes and cognition. The primary emphasis lies in dissecting the interaction and communication processes between AI algorithms in digital spaces representing human communities and the human-users themselves, with a particular focus on the pragmatic, axiological, cognitive and emotional dimensions of the latter. Finally, this thesis contributes to the broader understanding of the decision-making process by structuring the role of AI in shaping human cognition within the dynamic landscape of social media. The nuanced exploration of AI as an artifact, coupled with its implications for decision-making, adds depth to the discourse surrounding the interplay between technology and human agency.

Conceptually, this thesis endeavours to elucidate three pivotal insights into AI-assisted decision-making:

- To furnish readers with a comprehensive understanding of the contemporary capabilities of AI recommendations and AI as a tool.
- To elucidate the pivotal role played by digital environments, encompassing digital devices, applications and platforms, in facilitating the application of AI, harmonised with physical circumstances.
- To underscore conceptual frameworks that can illuminate the intricacies of AI-assisted decision-making, offering avenues for enhancing existing technologies.

This research endeavours to delineate the discourse and research findings from the commercial aspect inherently intertwined with design, despite its undeniable presence. This commercial dimension, while not always perceptible to users, stands apart from the primary research aims

[2] The term “artifact”, as employed by Heersmink (2021), encompasses material objects or structures created with specific aims and distinctive features. The functional capacity of an artifact extends beyond its intended use, involving both proper and improvised functions. Consequently, the implementation of artifacts becomes a manifestation of human agency, a product of decision-making processes that are not exclusively cognitive or rational. Heersmink (2021) categorises computers as cognitive artifacts, emphasising their role in motor, perceptual and affective functions. These artifacts, embedded in a contextual framework, possess the capacity to influence individuals' axiological, pragmatic, emotional and cognitive states through interpretations. Society, acting as an agency itself, contributes to shaping interpretational models. The two prevailing philosophical approaches to computers and AI—viewing them either as cognitive artifacts or extensions of the user's mind—underscore the importance of understanding their impact on identity and decision-making processes. Following the thesis of Heersmink, within digital environments, AI-mediated texts, including digital representations, can be considered as cognitive artifacts. Important to note, Irvine offers “the cognitive-semiotic artefact” view to design of computer systems, highlighting conceptual apparatus of design (Irvine 2022, p. 208)

and inquiries. Nevertheless, it constitutes a topic meriting independent investigation, as it garners increasing interest and necessitates regulatory attention spanning institutional policies, regulations and business practices. The primary research questions are:

- How can semiotics enhance current research in Human-Computer Interaction, specifically regarding the communication process facilitated by AI-based recommendation systems?
- How can a semiotic approach reshape the AI-mediated decision-making process, thereby advancing the practical applications of AI research?

Before delving into theoretical and empirical research questions, the following paragraph introduces the conceptual framework of AI, AI recommendations and social media as conceptualised within the thesis.

1.3. AI, AI recommendations and social media in this thesis

1.3.1. AI in this thesis

There is a long and open discussion on how AI is designed by humans, engaging in conversation in fields like ethics, data policies and protection, technology improvement. However, it is important not to overlook a crucial aspect: what humans learn from their daily interactions with AI agents and how it changes their life online and offline. Today, 59% of EU citizens utilise social media daily (Eurostat, 2024). As of January 2024, 5.04 billion individuals, comprising 62.3 percent of the global population, are active on social media platforms (Kemp, 2024). The impact of ICT on our thoughts, beliefs and behaviours cannot be ignored since our knowledge about the world is today mediated through digital media. Among the primary means of communication on digital platforms today are AI recommendation algorithms, which play a critical role in shaping our online experiences. This research focuses on how AI, specifically AI recommendations used on digital platforms as social media, can impact decision-making process. In this investigation the main focus comes not on how humans or machines make their decisions, but rather how their communication process leads to changes in individuals, groups, societies and culture. The aim is to explore the aspects of communicative mechanisms that impact practices and lead to change in the interpretation and valorisation processes.

The concept of Artificial Intelligence is deeply intertwined with the notion of algorithm. An algorithm is a set of instructions that manipulates data structures to solve a specific problem. Data structures are the methods used to organise and store data, primarily using mathematical and logical models. AI has significant implications across various fields, including healthcare, finance, education and entertainment. It has been applied, for example, to assist in the diagnosis and treatment of diseases, financial risk management, personalised education and recommendation systems for entertainment. Its potential for revolutionising industries is vast and continuously expanding.

AI algorithms are designed to mimic human intelligence and are often based on logistic or linear regression. These algorithms analyse data to identify groupings or categorisations, which are then used to develop a formula or model that can be applied to new data to create further categorisations. AI recommendations utilise the capabilities of AI algorithms to create these models with linear or logistic regression, applied to a new input of data, which then produces an output of categories. The powerful capabilities of AIRS enable the production of personalised results for each user. In other words, AIRS is a tool that collects data about users'

activities and based on the analysis of this data selects further elements and strategies to which users will be exposed, incentivising the engagement.
Designers and users heavily rely on algorithmically mediated content as both a product and producer of many social narratives. Industry mainly uses AIRS to provide a personalised experience to their users and increase engagement. AIRS are the primary tool of most digital platforms used to sort the contents and provide their users with highly personalised selections of products. Social media and content platforms use AIRS in their interactions with users. The same time users seek to engage with the algorithms as a tool to increase their own digital representation or satisfy their own needs.

1.3.2. AI recommendation in this thesis

AI recommendations are a form of machine learning that uses algorithms to suggest user content based on their previous behaviour, interests and other data points. These recommendations can be found on various content platforms, including social media, e-commerce sites and streaming services. This research delineates AIRS as algorithmic instruments employed to suggest, navigate, guide and incentivise user engagement within digital realms such as social media, drawing upon previous conceptualisations posited by both scholarly inquiry and industry experts (NVIDIA). Rooted in machine learning methodologies, AIRS frequently adopt a Big Data approach to offer suggestions to users, drawing from diverse data sources such as posts and digital representations of online personas (profiles, potential connections), leveraging a variety of techniques like collaborative filtering and considering multiple criteria including past interactions, demographics and other pertinent factors. These recommendations serve as navigational aids, prioritising and exposing users to personalised selections within the digital milieu.
Current AIRS are used almost everywhere in digital space and therefore they are involved in every user's search, discovery and information consumption experience, as identified in various studies (Kantor et al., 2010). The consumerist approach to AIRS as well to users' behaviours in HCI involving AIRS often highlighted at all the stages: design (UX/UI), performance and effects. However, this research delves into the dynamics of how social media users interact with AI-driven systems that offer recommendations for their day-to-day decision-making. For example, individuals aged 18 to 26 years opt to spend 2 to 3 hours daily engaging with algorithmically recommended content on social media platforms (Eurostat, 2020b). The research is therefore to delve into the reasons behind this behaviour and assess its implications for daily routines and behaviours, potentially exerting influence on more consequential decisions. In this context, the pivotal inquiries revolve around: how does exposure to AI-curated content, derived from machine learning methodologies, foster online engagement and influence behaviours, practices and beliefs in the offline physical realm? Furthermore, what shifts occur in user perceptions, self-identification and interpersonal dynamics as a result of such interactions?
To effectively cater to user preferences, AI designers must anticipate the repercussions of AI-user interactions and possess a deep understanding of their users' decision-making processes. Making a variety of little choices daily might be considered as workings of heuristics, so-called System 1 (Kahneman, 2013), in comparison to more complex decision-making requires analysis and selection of the most optimal strategy for desired outcomes, performed by System 2. AI recommendations, as projected by designers, are supposed to perform an automation role for both types of decision-making. It is challenging to draw the line between these two types of decision-making in online engagement. On social media, one of the primary functions of AIRS is to order the information (posts) to which a user, will be exposed. However, the other function of AIRS is the frequency of a user's exposure to a piece of syntactically repetitive

information (posts), exposing only to a specific selection of data (posts, people, news), keeping a chooser in a loop, but with the presumption that this loop is the best-personalised experience created uniquely for them. The decision-making becomes more complex and high stakes when an individual aged 18 to 26 years from the previous example decides not to pursue a college degree and start a career in one of the fields exposed in the posts highly manipulated by AIRS within digital platforms. It comes to an important social change when this selection of texts creates a cultural narrative that is adopted as dominant within the behaviours and practices of larger groups.

Hence, arises the question of whether AI recommendations serve as mere tools augmenting human decision-making or function as independent agents executing tasks on behalf of users. This raises ethical concerns regarding whether these recommendations consistently act in users' best interests or have the potential to manipulate and engage in malpractice. The primary role of most AIRS lies in streamlining user options to the most relevant ones, a vital function in a digital space inundated with a constant influx of information.

While AI recommendations can provide a personalised browsing experience, there are concerns about their impact on users. For example, they can create an echo chamber and filter bubbles effect (Bruns, 2017; Wolfowicz et al., 2021), exposing users to content that reinforces their pre-existing beliefs and biases. This can lead to a lack of exposure to diverse viewpoints and contribute to societal polarisation and division. Additionally, there are concerns about the ethics of using personal data to make recommendations, particularly regarding sensitive topics like health, politics, banking and education systems. Despite these concerns, AIRS have become an integral part of many online experiences and their use is only expected to grow in the future. As such, it's important for both users and companies to be aware of their potential benefits and drawbacks. To address these concerns, some companies are taking steps to make their recommendation algorithms more transparent and to give users more control over what they see. For example, some social media platforms now allow users to view and edit their interests and preferences, which can help to ensure that their recommendations are more diverse and inclusive. Therefore, the future of AIRS will depend on how they continue to evolve and how they are regulated. As more and more data are collected and analysed, it will be important to strike a balance between personalisation and privacy and to ensure that the algorithms are being used in ways that benefit users and society.

In current research on AI recommendations, two primary perspectives are under scrutiny. Firstly, researchers strive to enhance digital tools by devising more intricate and effective methods for gathering and processing information. AIRS have undergone extensive study, primarily focusing on their functionality and architecture. At the core of these systems lie data-driven methodologies that organise categories and labels using various sorting techniques, with collaborative filtering emerging as the most prevalent method. This technique involves assigning numerical values to elements within datasets based on specific criteria selected by developers or statistical analyses. Most AI recommendation algorithms employ semi-supervised machine learning strategies, wherein a mathematical formula categorises and manipulates data. This formula, reliant on human developers, identifies similarities among data, with higher-value data more likely to be presented to users. Conversely, unsupervised machine learning algorithms analyse data to discern commonalities for categorisation and devise a formula applicable to new data. The algorithm's performance is gauged using a reward chosen by the designer, pivotal to its operation. AIRS serve as a “structuring device” for digital platforms (Bankov, 2020, p. 263), dictating the placement of data within the platform. Secondly, the focus shifts to enhancing users' digital experiences by refining AIRS. According to Duan et al. (2019), AI recommendations deployed in digital platforms primarily aim to augment human decision-making processes. However, there are concerns regarding the potentially manipulative nature of AIRS on social media platforms (Kramer et al., 2014). While

it is not assumed that automated decision-making processes executed by AI should supplant human cognitive processes entirely, AI recommendation algorithms are predominantly employed for narrow tasks requiring logical and mathematical processing of vast datasets. Nonetheless, this approach raises questions regarding more complex tasks, such as selecting valuable information for individual learning practices and adapting to diverse environments. This research proposes to focus on the role of users' sense-making processes as pivotal to the digital transformation of various practices, adopting a qualitative and semiotic approach to AIRS. The role of AIRS can be likened to Juri Lotman's concept of a centre and periphery (Lotman, 2005), wherein outputs of higher value are considered the centre and subject to closer examination to either augment or diminish their value. Outputs with lower values are progressively moved away from the centre until they are excluded from algorithmic processing.

1.3.3. Social media in this thesis

The term “social media” encompasses a broad spectrum of Internet-based and mobile services facilitating user participation in online exchanges, contribution to user-generated content and membership in virtual communities. They are “Internet-based applications that build on the ideological and technological foundations of Web 2.0 and allow the creation and exchange of user-generated content” (Kaplan & Haenlein, 2010). Examples include blogs, wikis, social networking sites and applications, virtual world platforms and media sharing platforms, each characterised by distinct activities and interaction patterns. This research focuses specifically on social networking sites and applications.

Social media platforms serve as digital arenas facilitating both direct and mediated communication, allowing users to share and receive digital representations of information, opinions and facts. Within these platforms, the formation and nurturing of social groups are encouraged, necessitating the development of a digital persona to facilitate engagement. According to Eurostat (2024b), 59% of EU citizens utilise social media daily. This research primarily examines the usage patterns of prominent social media platforms including Instagram, Facebook, TikTok, YouTube, Pinterest and X. Additionally, it explores to a lesser extent other platform such as Reddit, Quora, Twitch, BeReal, Telegram and various digital environments depicted in Figure 2. While these digital platforms encompass all communicative functions typically associated with social media, they are categorically designated as “other” due to their presumed differing purposes. For instance, online dating apps like Tinder and Bumble, as well as content sharing platforms like Spotify and Netflix, fall under this category. These platforms enable users to curate their digital personas through content either assigned by them or recommended by AI algorithms.

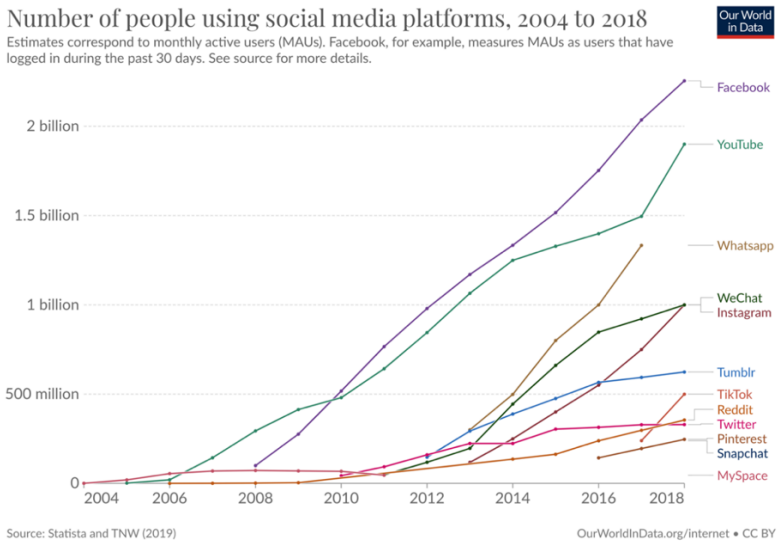


Figure 2 - Growth of social media users (Esteban Ortiz-Ospina, 2019).

Instagram, a social media platform launched in October 2010 and currently owned by Facebook Inc. boasts a staggering 1.13 billion users worldwide, with 71% of its user base aged under 35 years old, positioning it as the fourth most prominent platform. Initially, Instagram offered users the ability to share images accompanied by short text comments (up to 1000 characters) and engage via comments. Over time, Instagram expanded its features to include direct messaging, video content sharing and live video communications. In 2022, Instagram introduced to users a myriad of functionalities, including the ability to share images and videos accompanied by short text in various formats such as posts, stories or reels. Users can engage with content through comments, exchange private direct messages, initiate video calls and even utilise the platform as a marketplace to buy or sell goods and services. Leveraging AIRS, Instagram optimises content sorting to enhance user experiences and boost engagement. A core communication strategy employed by Instagram is centred on enabling users to share visual representations of their life experiences with friends. This approach fosters a sense of intimacy in communication, with primary interactions typically occurring between individuals already acquainted with one another. Instagram operates primarily as a mobile phone application, constituting both a digital platform and a wearable device application. Historically, its functionality has been predominantly tailored for mobile devices, with limited support for other types of digital platforms. The platform's structural design imposes constraints on hyperlink usage, primarily facilitating access through user mentions (@username) and hashtags (#keyword). External hyperlinks are limited to specific areas, such as the profile header, which accommodates a single link and within “stories” content, which are restricted to a maximum duration of 15 seconds and available for 24 hours after upload.

Facebook is a social media developed first with intention to provide inner communication to university students and later released to the market for broad audiences. With its inception in 2004, Facebook has amassed a colossal user base, currently around 2.9 billion monthly active users, spanning various age demographics and geographic locations. Initially conceived as a platform for connecting individuals and sharing personal updates, Facebook has evolved into a multifaceted platform offering various features and services. From status updates and photo sharing to instant messaging and event coordination, Facebook provides users with diverse tools for communication and interaction. In recent years, Facebook has expanded its offerings to include features such as Marketplace, Watch and Gaming, catering to users' evolving needs and preferences. Leveraging advanced algorithms and user data, Facebook continually refines its platform to enhance user experiences and engagement. Despite facing scrutiny over privacy

concerns and algorithmic transparency, Facebook remains one of the most influential and widely used social media platforms globally, shaping online communication and societal interactions on a monumental scale.

TikTok, emerging onto the social media scene in 2016, has swiftly become a cultural phenomenon, captivating audiences worldwide with its short-form video content. With a user base surpassing 1.218 billion, TikTok has established itself as a dominant force in the realm of social media, particularly among younger demographics (Zhang & Liu, 2021). Originally launched as Douyin in China, TikTok gained global traction after merging with Musical.ly. The platform enables users to create and share engaging videos ranging from lip-syncing performances to comedic sketches and dance challenges, fostering a vibrant community of content creators and consumers. TikTok's algorithm-driven “For You” page aims to provide a personalised content discovery, enhancing user engagement and retention (Bhandari & Bimo, 2022). Beyond entertainment, TikTok has also become a platform for social activism, education and creativity, empowering users to express themselves and connect with others in unprecedented ways. TikTok continues to reshape digital culture and influence online discourse on a global scale, influencing structure of other digital platforms like YouTube and Instagram.

YouTube, founded in 2005, has evolved from a simple video-sharing platform into a global powerhouse of digital media. With over 2.7 billion users worldwide, YouTube has become synonymous with online video consumption, offering a vast array of content spanning diverse genres and interests. Initially conceived as a platform for individuals to share homemade videos, YouTube has grown to encompass professional content creators, media organisations and independent filmmakers. The platform's user-friendly interface and robust recommendation algorithms enable seamless content discovery and engagement, keeping users entertained and informed for hours on end. From music videos and tutorials to vlogs and documentaries, YouTube caters to virtually every niche and preference, fostering vibrant communities and subcultures within its ecosystem. As the go-to destination for video content, YouTube changed the practices towards media consumption, allowing easier access to content creation and distribution.

Pinterest, a social media network launched in January 2010 and owned by Pinterest Inc. boasts a user base of 431 million, ranking as the 14th largest platform globally. Users can share their own photos or short videos or reshare content from other digital sources, accompanied by brief text descriptions. The platform's structure has remained relatively consistent since its inception, maintaining its core functionality. A key communication strategy of Pinterest is to enable users to share visual representations of their life experiences with a broad audience and save them online in personalised collections. Pinterest is accessible both as a digital platform and a wearable device application, catering to users across various devices. Leveraging AI recommendation algorithms, Pinterest facilitates image search by analysing structural similarities and meaningful content, enabling users to discover similar images effortlessly. Many images and videos featured on Pinterest are originally sourced from platforms like Instagram and others. The platform supports hyperlinks, allowing users to trace the origins of shared content.

X, formerly Twitter launched in 2006, has emerged as a leading platform for real-time communication and information sharing. With millions of active users worldwide, X facilitates rapid dissemination of news, opinions and conversations across various topics and interests. Originally designed as a microblogging platform, X allows users to post short messages, known as tweets, limited to 280 characters. Over time, X has evolved to accommodate multimedia content, including images, videos and polls, enriching the user experience and diversifying content formats. The hashtags enable users to categorise and discover tweets related to specific topics or events, fostering community engagement and online discourse. X's timeline algorithm

prioritises relevant and timely content, promising to users a way to stay informed and engaged with the latest developments in their areas of interest.
This thesis delves into the communication tools utilised on digital platforms, recognising AI recommendations as integral tools that augment and enhance daily activities. Social media platforms have democratised the creation and sharing of information, facilitating communication among individuals, groups and communities. Built upon communication principles, social media platforms enable users to exchange audio-visual information in the form of text messages, images and videos. Research by Mikhaeil and Baskerville (2019) highlights the influence of syntactic structure on message construction and its contextual reference within digital environments, emphasising the role of AIRS in shaping syntactic relationships between texts. Building from this, AIRS used on social media directly impact the syntactic relationships between texts, platforms and users by processing, categorising data and providing users with a selection of texts that can be perceived separately or as connected by some similarity.
Social media designers often describe users as sharing messages with each other. However, AI recommendations serve as the primary recipients of these messages, processing them before they reach other users. Operating within various primary and secondary languages, AIRS translate messages into mathematical values grounded in Shannon's "A Mathematical Theory of Communication" (1948), searching for common elements to efficiently categorise them. Some users strategically craft messages to align with AIRS' categorisation, perceiving them as their primary audience for message dissemination. Thus, two distinct communication processes on social media emerge: one where AIRS act as the primary message receiver, decoding and categorising posts and another where communication occurs between AIRS and users, with posts presented as a selection of categorised content ordered based on data processing outputs.
In contemporary society, digital environments wield significant influence over user practices, blurring the boundaries between online and offline life. Luciano Floridi's concept of Onlife (2015) encapsulates this hyper-connected experience, where the Internet and social media shape self-perception, interactions and understanding of reality. Social media platforms provide spaces for users to share experiences and practices associated with natural and built environments, thereby shaping collective realities and introducing new meanings and patterns. These shared representations and practices can transform other users' realities by introducing new meanings, practices and patterns. The notion of "postdigital" (Cascone, 2000), implying to the merge of the perception of reality between digital and physical, "can be used to describe either a contemporary disenchantment with digital information systems and media gadgets or a period in which our fascination with these systems and gadgets has become historical" (Cramer, 2014, p. 12). In other words, in the bigger part of the world digital interactions are presumed as natural and inherent part of everyday life, availability and response-ability via digital medium 24/7 and digital self-representation is considered as an inherent p act art of an individual, largely institutionalised in many countries (e.g. HR often verifies the presence of the candidates on social media before the interviews).
Over the past 15 years, social media has evolved from a representation function to a structured meaning-making dimension, enabling users to assign value to objects through their digital extensions. It serves not only as an extension of reality but also as an environment that can augment or diminish the capacities and features of objects within a given context. These digital interactions foster the adoption of new behavioural patterns shared via platforms and AI recommendations, highlighting social media representations as multimodal communicative tools. As social media continues to grow and evolve, its usage will only increase, with dynamic shifts in platform popularity and usability. This data is of interest not only to professionals but also to common users, emphasising the pervasive impact of social media in contemporary society. Figure 3 provides additional insights into this phenomenon.

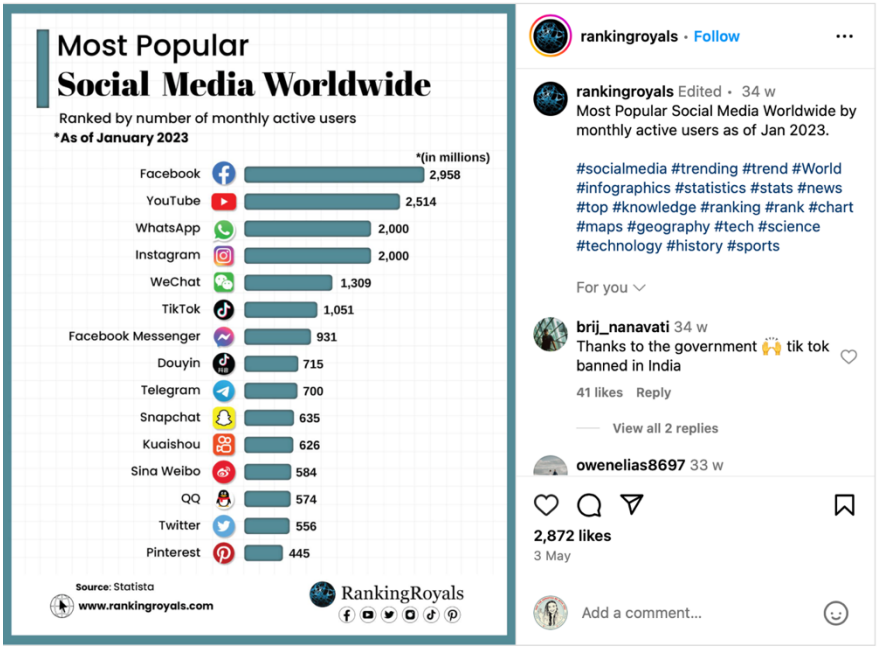


Figure 3 - Social media user statistics oost (Source: @rankingroyals, Instagram, accessed on December 28, 2023)

The post provides insights into the categorisation of collaboration platforms, offering a definition of social media and showcasing the relative popularity of different platforms. It garnered a positive response, evident in its high number of likes, highlighting the social reception and engagement with the content.

1.4. Theoretical and empirical aims

1.4.1. Theoretical aims

This research is based on a semiotic approach to address the communication between humans and AI recommendations from cognitive, axiological, emotional and pragmatic points of view (Greimas & Courtés, 1982). This research elaborates on multidisciplinary research bringing together the knowledge in different areas of HCI expertise under semiotics as an umbrella science. Semiotics can bring the light on signification, meaning and communication in natural and artificial systems and identify the role of AI in human decision-making process today (Nöth, 1995), how users communicate through its means and what potential impact it can have on their decisions.
Grounding on the semiotic theories elaborated through lower levels of semiosis, as proposed in the biosemiotics approach based on the definition of Umwelt (Uexküll, 1982 [1940]) and bio-psycho-social and cognitive models (T. von Uexküll & Wesiack, 1976; Paolucci, 2021) up to higher levels on social and cultural levels, as explained by Lotman (1990, 2005, 2009) and Eco (1979, 1990, 1992), this research aims to provide a theoretical framework to address communication between humans and AI and the role of AI in the human interpretation process. At a theoretical level, the primary research questions are:

- How can semiotics enhance current research in Human-Computer Interaction, specifically regarding the communication process facilitated by AI-based recommendation systems?

- How can a semiotic approach reshape the AI-mediated decision-making process, thereby advancing the practical applications of AI research?

These research questions are analytically broken down into a series of aims and objectives that can be regarded as a sequence, one building on the other. Research aims and objectives are listed below, as divided into theoretical and empirical, to provide an indication of how this thesis will address the primary research question. The structure of the thesis to follow is presented as building on the sequence of the research aims and objectives, first offering theoretical investigation (Chapters Two, Three and Four) and then addressing empirical applications (Chapters Five to Nine). This framework is elaborated from theoretical studies and framed by case study analyses. This multidisciplinary research uses relevant concepts from cultural studies, social and cognitive sciences and machine learning research.

1.4.2. Empirical aims

Empirical contribution is provided through an analysis of multiple interpretations of social media users and their behaviours, collected during fieldwork in Italy, Estonia and the Netherlands in 2022-2023. Chapters Six, Seven and Eight analyse each case study according to the theoretical framework, providing the necessary background to the data collected onsite. Chapter Nine provides a comparative analysis of the findings explained in the case study chapters. At the empirical level, the primary research aims are:

- To employ a theoretical framework and methodology, supported by data collected during fieldwork, to analyse how AI-mediated environments can influence users' decision-making processes.
- To examine existing and emerging approaches aimed at comprehending users' decision-making processes and behaviours.

Based on the theoretical framework, presented in Chapters Two, Three and Four and methodology described in the Chapter Five, the empirical part of this thesis provides the analysis through the appropriate case studies, that used semi-structured interviews and digital ethnography. This enriched empirical findings that support the theoretical basis for the introduction of semiotics to HCI studies.

1.5. Methodology: Towards Semiotics-in-the-loop

The concept of “Human-in-the-loop”, reframed as “Semiotics-in-the-loop” to underscore its emphasis on meaning-making and interpretation, is introduced with the intention of redirecting attention away from AI's mimicry of human interactions towards the meaning-making process, which complements human decision-making. Introducing semiotics into computer science Andersen (2002) emphasised the perspective that a computer system can be conceptualised as a sign system. He argues that various authors have advocated and applied semiotic methods in research on computer processing. Andersen refers to Goldkuhl and Lyytinen (1982) as well as Winograd and Flores (1986), who view computers as tools capable of executing speech acts such as promising and requesting, primarily interpreting signs as behavioural cues. Additionally, Rasmussen (1986) stands out as a proponent of the “signs as knowledge” perspective, employing semiotics to comprehend the correlation between the types of signs required by control room operators and the cognitive processes they engage in. Declés (1989) examines machine architecture through a semiotic lens and Targon (2018) suggests semiotics applications to AI, Boland (1991) introduces hermeneutic methodologies for discerning users'

interpretations of interfaces, while Nadin (1988) explores applications of semiotics for interface design.
Semiotics proposes various tools for modelling and descriptive approaches to understand better underlying communication processes. This thesis aims to introduce the semiotics theories and methodologies which can be applied to the processes of AI-mediated decision-making. Previously, the concept of decision-making has been explored through approaches in computer science and cognitive sciences, notably psychology, which are crucial for this research. However, this thesis views decision-making as an integral component of the process of semiosis and approaches it from a semiotic perspective.
Peirce's work on semiotics shares a robust foundation in logic and mathematics, akin to the current research landscape in computer science. Peirce defined sign as a primary element of communication:

> A sign ... (representamen) is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects but in reference to a sort of idea, which I have sometimes called the ground of the representamen. (Peirce 1931-1958).

As previously mentioned, the decision-making process, explored across various disciplines, is understood as a cognitive phenomenon and often categorised as rational or irrational. Its investigation frequently considers factors spanning physiological, biological, cultural and social realms. Given the intricate and multi-faceted nature of decision-making, it necessitates the integration of diverse perspectives, each focusing on specific aspects of decision-making modelling.
Cognitive sciences and psychology delve into the internal states and conditions that influence decisions, while biology and neuroscience investigate the brain mechanisms underlying decision-making and subsequent behaviours. Economics and computer sciences, on the other hand, rely heavily on mathematical, logical and statistical models to understand decision-making processes. Semiotics emerges as a unifying framework capable of synthesising these disparate lines of inquiry. By harnessing various semiotic approaches, such as Peircean, structural, cultural, social, textual, biosemiotics and ecosemiotic, modelling capacities within semiotics can be leveraged to integrate existing knowledge and contribute to the theoretical framework surrounding decision-making. This synthesis holds relevance in the contemporary landscape of AI research, addressing both individual and societal needs.
Semiotics has extensively investigated Information and Communication Technology and the digital realm. The endeavour of applying semiotic theories to computation traces back to the works of Juri Lotman, particularly in relation to cybernetics and artificial intelligence (Lotman, 1990; Jegorov & Lotman, 1995). Another important research in application of semiotics (Nadin, 1988), describing the modelling process behind an interface. In his work on semiotic engineering, the author states that “without the underlying semiotics, design and engineering remain mere problem-solving activities and therefore will fall short of achieving their formative function”. The line of research aiming to bring semiotics into modern computation strategies have proceeded already for more than a decade (Sousa, Machado & Mendes, 2012; Dos Santos Coelho & Chaim, 2014). However, they are rather directed to use semiotics as a tool to suggest the improvements in computation rather than offering new perspectives on understanding the processes behind HCI. The works of De Souza (2005) are mainly targeted at designers of digital tools allowing them to use the knowledge available in semiotics.

Bankov (2022) critically reviews recent literature on the main semiotics approach to the digital culture, defining textual approach and enunciation, with the reference to the methodological framework rooted in the French school, Greimas (1970) and Eco (1984). Bankov (2020) refers to the difficulty of working in dynamic, fast-changing environments as a digital culture. He offers to approach the phenomenon as a system, proposing a notion Platfosphere, based on Lotman' theory on the semiosphere.

In 2021-2022, two works dedicated to incorporating semiotics into computer sciences came out almost simultaneously, Martin Invine's "Semiotics in Computation and Information Systems" (Irvine, 2022) and Jean-Guy Meunier's "Computational Semiotics" (Meunier, 2021). Both introduce how semiotics tools can be adopted and used to improve computational functionality. Leone (2023) reviews the process of value of AI and their capacities in respect to a user, which sheds light on semiotics aspects of communication tools between agents within the digital sphere.

To this extent, semiotics can fill the function of umbrella science, which would help to understand the differences and similarities between human and algorithmic decision-making processes, providing a holistic approach and calling for an explorative model of the communication process in digitally mediated environments. Multifaceted aspects of semiotics research, such as cognitive semiotics, biosemiotics and semiotics of culture, can connect existing knowledge in the field of Human-Computer Interactions, bringing various aspects together.

The representations and practices may become integrated into the Umwelten of other users, reshaping them through new meanings, practices and patterns. Umwelt is a concept that describes the perceived world, "subjective universe" (Uexküll, 1957), the frame of existing elements that are perceived and recognised and, therefore, meaningful to one. Maran (2020) contends that signs can unite living organisms, serving as a clue to enable them to function together and embody enormous ecosemiotic potential. Consequently, social media digital representations are multimodal communicative tools that facilitate interaction and action within a given environment. Social media is characterised by constant change, encouraging users to provide novel representations of the environment and its practices. This change leads to adopting new behaviour patterns shared through digital platforms and AI recommendations. Digital interactions are gradually losing their gamification aspect and they are increasingly influencing not only users' practices in physical environments but also their body's responses to stimuli received via digital texts. The use of social media via digital devices can enhance our Umwelt's natural capabilities to access various experiences. Thure von Uexküll (1972, p. 419) describes the human Umwelt as a symbol-system with an ego and controlled by language. According to him, individuals live in subjective worlds that influence their behaviour and bodily responses. As a result, social media environments can be considered one of these worlds for modern humans. Even though observers cannot access these worlds, individuals' actions express them to some extent.

1.6. The rationale for a semiotic study of AI recommendations

The use of AI-mediated digital environments, like social media, can augment our natural capacities, from access various experiences to communication practices. AI recommendations can manipulate the amount, frequency and selection of information users receive about the world, augmenting their natural perceptual capacities. For example, through videos shared on social media, users can experience events happening in real time that they cannot see physically. However, the experiment conducted by Facebook (Kramer et al., 2014) demonstrated that different selections of information provided by social media could affect users' perception of audio-visual stimuli, such as text, image and video contents and their

interpretations. AIRS for digital platforms involve collecting information about users, processing data into categories and providing users with categories suited based on assigned values. Instagram and Pinterest are some platforms that propose AIRS to provide users with better personalised experiences.
Following the above, it appears clear that AI's impact can be understood through user experiences that can be expressed through their online and offline decision-making process. In 2023 it is difficult to draw a clear threshold between the impact of online, the world of meanings and digital representations and offline, the physical world, calling for integrated experiences and indeed, these notions are almost out of the thesaurus. Therefore, this research aims to refer to the descriptive tools of semiotics, approaching the multifaceted effects of AI-human interactions on different levels. First, starting from the biosemiotics perspective and pre-cognitive dimension, introducing the notion of Umwelt. Second, the interpretation process of the users at the various levels of individual and social interpretations and practices will be analysed and its possible crystallisation on the cultural level will be examined.
Semiotics can provide a wide range of descriptive tools to help users understand the role of This thesis investigates the impact of AIRS on the decision-making process from multiple perspectives, including:

- Providing an in-depth examination of the primary algorithmic decision-making methods currently utilised, focusing on user experiences.
- Exploring approaches from cognitive sciences to HCI, emphasising the communication dynamics shaped by AI-mediated digital environments.
- Employing a semiotic perspective as a comprehensive framework to support theoretical analysis, which will be further validated through case study analysis.

1.7. Research design

This research situates Human-Computer Interaction within the realm of social media, focusing on users' perceptions, interpretations, responses and behaviours, which shape practices within AI-mediated environments. It operates under the premise that communication among individuals on social media constitutes an interaction with a corpus of texts mediated by AIRS agents. From this perspective, embodied semiosis is significantly influenced by both users' actions and the context provided by AIRS. In essence, this research aims to develop methodologies for data collection that account for the holistic characteristics of users' perceptions, influenced by both AIRS and user interactions.
The approach here presented presumes that users' behaviour is expressed online and offline, guided by certain social norms, which cannot be traced just by online interactions. Various organisations, including the leaders in social media platforms, use various tools to understand how practices and personal and social values shift over time. This approach is mainly based on statistics and Big Data, when users' interactions are followed and used to predict and fulfil their needs (Bello-Orgaz et al., 2016; Duan et al., 2022; Trabucchi & Buganza, 2019; Zhang et al., 2022). There is a significant scope of the narratives and cultural texts connected to the perception of Big Data performance in society on personal and social levels. They describe a variety of attitudes, from fear and terror to a positive belief in the possible substitution of human agency in decision-making (Leone, 2023). This thesis includes a line dedicated to social narratives that are present within the repetitive texts and are culturally important for selected social groups. Various research suggests that AIRS can impact individual and group decision-making processes, enclosing their beliefs based on texts provided and contextual relations (Kubin & von Sikorski, 2021; Yao & Ling, 2020), impacting their online and offline behaviours (Tuten & Mintu-Wimsatt, 2018).

This research uses a case study strategy (Yin, 2009) to answer the main research questions presented above and to analyse the AI's influence on human processes of cognition and decision-making. A comparative analysis of data collected on users' experience can help to provide a better understanding of how AI may influence the decision-making process. It mainly focuses on the most used AIRS-based photo and video-sharing services, which users define as social media, but not strictly limited to them. These spaces use AI to improve user experience in sorting contents and influence the communication, interpretations, interaction and, therefore, cognition process. Specifically, it concentrates on interpretation and decision-making. Qualitative research can better deal with the multiplicity and the ambiguity of interpretations. A multi-method approach is preferred to collect data further qualitative analysis. Quantitative data provided by social networking services will be considered.

Semi-structured interviews and digital ethnography are methods used for data collections. Semi-structured interviews investigate the users' opinions, beliefs and emotions, describable as the cognitive, axiological and emotional dimensions of users. They are an appropriate method that allows respondents significant freedom in self-expression that supports the chosen theory behind the aims of data collection. Digital ethnography is used to gather insights into users' online behaviours aiming to explore the use of AI recommendations and how they influence people, which is seized through users' posts, interactions and other traces expressed online. It investigates how individuals navigate and interact within digital environments, discerning their usage patterns and adaptations to meet their specific needs through the texts and digital representations and other contents they generate and share online. Moreover, digital ethnography underscores the dynamic interplay between users and designers, illustrating how their input shapes digital environments and AIRS, introducing novel structures and elements into the communication landscape of social media platforms. Finally, digital ethnography together with semi-structured interviews focus on the behaviour and interactions of users online and offline, i.e. the pragmatic dimension of users. They offer valuable insights into how individuals engage with social media across various contexts and devices. The multi-method approach of this thesis aims to offer insights that contribute to a comprehensive understanding of emerging practices within social media, emphasising the importance of a bottom-up approach for grasping the potential impact of AIRS. The comparison of the interviews, digital ethnography and available quantitative data from social networking services allowed for gaining a better understanding of AI recommendations' impact on human cognition. The subject samples for data collection will include users of a broad spectrum of ages, genders, cultural origins, educational levels and professions.

The rationale for doing qualitative research is based on the benefits of contributions offered through fieldwork. Fieldwork with three case studies of EU countries Italy, Estonia and the Netherlands aims to support theoretical findings and give application to semiotics-based methodology in HCI. These three countries, forming a geographical triangle, represent South Europe (Italy), Eastern Europe (Estonia) and Western Europe (the Netherlands). However, united with the same legislation under EU regulations (Smits, 2021). Respectfully to their geographical location, all three countries represent a unique history of digitalisation, the introduction and use of AI, which aligns with economic and political needs. Each country has its own unique culture and system of social relationships, formed during centuries of political, geographical and economic development, which are very different from each other. These factors confirm the specific contribution each case study can bring to this research on the influence AI recommendations have on digital environments like social media and their users.

1.8. Structure of the thesis

This thesis is intended for larger audiences who may not be proficient in one of the aspects of this research, whether ICT and AI development specifically, semiotics research or HCI. The scope of this research lies in between these fields and aims to lead a reader through the complexity of individual and cultural changes that follow the deep integration of AI tools into our society. Therefore, this thesis will first introduce to a reader a perspective on AI within digital platforms, then shift to a user's perspective and later revise the findings through the fieldwork designed to map a potential influence of AI recommendations through their users' behaviours and practices.
This thesis provides a novel holistic theoretical framework for digitally mediated communication and a bottom-up approach to data collection on human decision-making online. The two main research questions will be addressed throughout the book in a total of ten chapters.

- Chapter Two offers an in-depth exploration of AI's role in decision-making processes, adopting a semiotic perspective. It elucidates the workings of AI, theoretical models and prevalent challenges within the field, particularly focusing on AI recommendations. Its primary aim is to establish a foundational understanding of the research issue and advocate for a semiotic approach.
- Chapter Three delves into the integration of semiotics within Human-Computer Interaction, emphasising the human-user perspective. It examines various angles to elucidate the position of human agency in contemporary AI research, shedding light on the potential impacts of AI recommendations on decision-making processes.
- Chapter Four bridges the theoretical framework with empirical methods, discussing data collection strategies and approaches for coherent analysis.
- Chapter Five outlines the rationale behind data collection methods, such as semi-structured interviews and digital ethnography, detailing their relevance and potential insights.
- Chapters Six, Seven and Eight delve into individual case studies, presenting data analysis methodologies and discussing the selection criteria for countries like Italy, Estonia and the Netherlands. They provide initial results and insights derived from the analysis.
- Chapter Nine aims to synthesise research findings and offer an overview of how AI recommendations influence user interpretations and decision-making processes. It presents conclusive results, evaluating the efficacy of the theoretical framework in addressing the main research question.
- Finally, Chapter Ten consolidates research findings and proposes avenues for further investigation.

1.9. Main terminology

Artificial Intelligence (AI) –a general term that refers to the simulation of human intelligence in machines that are programmed to carry out logical operations and perform pattern recognition by learning from given datasets. It encompasses a wide range of capabilities, such as problem-solving, recognition, language processing, discover general patterns and make predictions from data.
AI-assisted decision-making process – a type of decision-making process that is supported or augmented by artificial intelligence. AI can analyse large volumes of data, recognise patterns and provide insights or recommendations, which can help humans make more informed and efficient decisions.

AI-based social media are platforms that employ AI recommendation algorithms to provide users with personalised experiences by suggesting content, products, services or other relevant information based on their interests, preferences, behaviour and usage history. AI recommendations have become fundamental to the functioning of such digital platforms, as they allow information available to users to be organised and presented in a coherent and relevant manner.

Algorithm - a set of rules or a step-by-step procedure used to solve a problem or perform a computation. In computer science, algorithms are used to manipulate data, make calculations or automate decision-making processes.

Algorithm-user - term can refer to an automated system or bot that uses algorithms to interact with digital platforms, often for tasks like data analysis, content generation or pattern recognition.

Arousal – a physiological and psychological state of being awake or reactive to stimuli. It involves the brainstem and is important for regulating attention, information processing and decision-making.

Big Data – a type of extremely large data sets that may be analysed computationally to reveal patterns, trends and associations, especially relating to human behaviour and interactions. It is characterised by its volume, variety, velocity and veracity.

Data Structures - ways of organising and storing data in a computer so that it can be accessed and modified efficiently. Examples include arrays, linked lists, trees and graphs. They are crucial for creating efficient algorithms and handling large amounts of data.

Decision-making process – a cognitive process determining which course of action is chosen from among alternatives. It often involves weighing the pros and cons of different choices, assessing the likely outcomes and making a final decision based on reasoning and judgment.

Designer - in the context of this work, a designer is someone who plans and creates digital environments, experiences or algorithmic structure that guide users' experience on digital environments. This includes back-end (developers, software engineers, etc) and front-end (web designers, graphic designers, User Experience designers, etc), based on businesses needs for their customers, e.g. users.

Digital communities - groups of people who interact and build relationships primarily through digital platforms such as social media, forums or online games. They share common interests, goals or activities.

Digital representations - a depiction or a model of objects, systems or phenomena that are created and stored in a digital format, varying from simple data representations like graphs to complex simulations.

Deep Learning (DL) - is a subset of machine learning that uses neural networks with many layers to learn from large amounts of data. It's particularly effective for tasks like image and speech recognition and it's a key technology behind many advanced AI applications.

Explainability in AI – methods and techniques used to explain why an AI system reached a particular decision, recommendation or prediction. Use of complex algorithms and models of AI aims to be transparent to human (users), this requires understanding how AI models operate and what types of data used to train it.

Follower – in the context of social media, a follower is an individual who subscribes to a digital profile of another individual or community updates, allowing them to see and interact with their posts.

Human-user - a human-user specifically refers to a real person who uses a digital system or service. This distinguishes them from automated users or bots.

Influencer - a person who can affect the decisions of others because of their authority, knowledge, position or relationship with their audience, typically on social media platforms.

Interpretation – a process of understanding the environment and own experiences that involves attaching meaning to sensory-perceptual information, coming after early-level perception and initial recognition of stimuli. Interpretation can change how the same sensory information is perceived.
Latent structures – in data analysis and machine learning, latent structures refer to patterns or features that are not directly observable in the data but can be inferred or identified through analysis. For instance, latent variables in statistical models represent underlying factors that affect the observed variables.
Machine Learning (ML) - is a subset of AI that focuses on the development of computer programs that can access data and learn for themselves. It involves the creation of algorithms that can modify themselves without human intervention to produce desired outputs by processing and learning from data.
Perception – a process by which sensory information is interpreted and understood by the brain, it involves recognising organising and interpreting sensory input from the environment, such as sights, scenes, objects, sounds, smells and textures.
Post – a piece of content shared on a digital platform, such as a social media site (text update, photo, video or link to other content.)
Recognition – a cognitive process of identifying a familiar object, person or situation based on previous experiences or knowledge. It is a part of perception where the brain applies existing knowledge to make sense of incoming stimuli.
AI recommendation systems (AIRS or AI recommendations) are software tools that suggest useful elements to users (Kantor et al., 2011). AI-based recommender systems, such as Recommendations AI, the term proposed by Google or AIRS, the term proposed by *Naver*, use Machine Learning to show users more relevant information based on various criteria, such as previous interaction history, geographical origin, etc. The aim is to simplify search and personalise the online experience. These systems are often studied in the context of e-commerce and consumption (e.g. Necula & Păvăloaia, 2023) as well as in science information services and research focuses mainly on improving recommendations to meet users' needs better (McNee et al., 2006). This work uses AIRS as a term in reference to Artificial Intelligence recommender systems.
Saving a post – the act behaviour online of bookmarking or storing a digital content item (like a social media post) for later reference or personal use, without necessarily sharing it publicly.
Share/ repost –the act behaviour online of distributing someone else's content to your own followers or friends on a digital platform, thus amplifying its reach.
Social media - a general concept used to refer to digital platforms that allow users to search, create and share digital representations, such as images, videos, audio and natural language texts, in order to communicate a specific identity (Aichner et al., 2021). This identity, constantly negotiated, is perceived and valued as the result of a complex interaction between the user's intention, the materiality of the digital medium and the dynamics of other user communities (Leone, 2021). In this thesis used as social media.
Stimuli - external factors or changes in the environment that evoke an external or only internal response from an organism. These can be physical (like light, structured image or sound), chemical (like taste or smell) or any other factor that causes internal information processing (e.g. cognitive interpretation or arousal) and a response.
User - in a digital context, a user is any individual who interacts with a software system, website or digital platform. This term is broad and can refer to anyone from a casual browser to a dedicated member of a digital service.

Chapter two -
Examining key approaches to AI-mediated decision-making processes

This chapter embarks on a comprehensive exploration of decision-making concepts, drawing from insights in cognitive sciences, philosophy and logic and evaluating their impact on algorithmic modelling approaches. It proceeds to delve into an analysis of how AI can enhance human-user decision-making processes. Additionally, it directs its attention to AI recommendations within mediated communication on digital platforms, aiming to uncover the underlying syntax of digital environments through the lens of users. To achieve this, the chapter furnishes descriptive tools for comprehending the syntactic nuances in communication between actors and elements within digital environments, such as social media. It also introduces key concepts applicable to both human-users and AIs, such as recognition and categorisation.
One significant gap in current research, as elucidated in this chapter, lies in the ambiguous threshold delineating user-centred AI tools designed to assist human decision-making from AI tools deemed effective based on productivity indicators that align with other AI tools in use. This chapter aims to clarify this by exploring the distinction between AI-centred decision-making process and user-centred AI-mediated decision-making. Therefore, it includes the discussion on some AI tools used on digital environments like social media, like AI beautifying tools, LLM and language correction AI tools, filters and face recognition (Leone, 2019a, 2019b) that play role in how AIRS operate.

2.1. Understanding and modelling of AI-based decision-making

Decision-making is a fundamental aspect of human cognition that embodies the intricate process of selecting one option among several based on subjective evaluations of their value. Its multifaceted nature has garnered extensive attention across disciplines such as economics, psychology, neuroscience and management. Decision-making, as inherent to human behaviour, has captivated the interest of scholars across various disciplines. The distinct definitions of decision-making processes vary in different disciplines.
Numerous descriptive models strive to unravel the complexities of decision-making. Edwards' seminal work in 1954 introduced the Subjective Equivalent Utility (SEU) model, suggesting that individuals aim to maximise subjectively expected utility by weighing the utilities of consequences with their subjective probabilities (Vaidya & Fellows, 2017). The evolution of this model led to Kahneman and Tversky's psychological Prospect Theory in 1979, which acknowledged deviations from the SEU model and became influential in fields such as economics and medicine (Chick et al., 2017). Contemporary conceptualizations of decision-making highlight psychological aspects, particularly individual differences (Malecek & Schonberg, 2015), which now play a crucial role in shaping modern understandings of the decision-making process.
Neuroscience, converging with economics and psychology in the emerging field of neuroeconomics, offers a promising avenue to illuminate the underlying mental processes of decision-making. Meanwhile, prescriptive theories within management science establish normative guidelines for rational decision-making (Chick et al., 2017). Rooted in principles like transitivity, these theories delineate formal rules and procedures, aiding informed choices in complex situations. However, the actual decision-making process often deviates from these prescribed norms due to cognitive limitations.
Economic decision-making primarily revolves around choices concerning monetary rewards amid varying potential outcomes. The burgeoning field of neuroeconomics amalgamates

insights from economics, psychology and neuroscience, bridging normative decision-making theories with observed brain activity and behaviour.
The intricacies of decision-making are meticulously explored through carefully tailored settings, particularly evident in clinical environments. Decision-making in these contexts assumes a multifaceted nature, encompassing processes such as information processing, evidence evaluation and the application of knowledge to ensure optimal care standards (Miller et al., 2020). Within the realm of clinical practice, decision-making spans a spectrum ranging from intuitive to analytical approaches, grappling with challenges arising from the ever-expanding body of clinical knowledge and the complexities of available care options. Embedded within the workings of the brain, decisions are pivotal components of everyday life (Müri & Nyffeler, 2008). Supported by working memory, decision-making involves the retention of crucial information necessary for navigating through sensory data and anticipating potential actions.
Decision-making can be extended beyond individual cognition, venturing into the domain of group processes (Hogg, 2001). Group decision-making settings present interactive contexts where divergent factions converge to achieve consensus. Nevertheless, inherent challenges, including intransigence and deadlock, often impede these deliberations, necessitating interventions expert mediation or arbitration. Perceptual decision-making constitutes the amalgamation of sensory information influencing behaviour (Philiastides & Heekeren, 2009). Investigative studies delving into this realm shed light on the spatiotemporal dynamics underlying human perceptual decision-making processes.
In understanding decision-making, human individuality plays a significant role. Our distinct decision-making styles are intertwined with our personalities, creating a diverse tapestry of cognitive approaches (Musek, 2017). Decision-making is a complex amalgamation of general cognitive, individual psychological and basic neurological processes. Its study across disciplines unfolds the intricate layers of human choice, paving the way for a comprehensive understanding of this fundamental human endeavour. This exploration of decision-making processes across diverse fields and research focuses on highlighting the multifaceted nature of decision-making. From neuropsychology to neuroeconomics and from clinical settings to group dynamics, decision-making emerges as a complex phenomenon shaped by cognitive, psychological and environmental factors.

2.1.1. Modelling decision-making: From philosophy and logic to biology, psychology and neuroscience

Exploration of the decision-making process and its modelling unfolds among different disciplines. For a long time, the decision-making process has been a prerogative to living beings at different levels of complexity, from lower organisms to higher, like humans. In recent decades, there have been more studies on how the decision-making process can be automated and delegated to non-living actors like machines and in particular AI. However, to discuss how AI can imitate, assist, complement or even substitute decision-making performed by living beings, including humans, it is crucial to revise the main decision-making models that are considered relevant up to today.
Biology, cognitive and behavioural sciences and even neuroscience provide a variety of explanations for our decisions and behaviours based on the reasons found within our own bodies today. These findings shed light on how we make our decisions, mainly as individuals. Philosophy suggests a significant scope of reflection on the ethical and moral side of decision-making that can be applied in different fields, from judgment in daily life to law regulations (Danziger et al., 2011, Bublitz, 2020). Several ethical problems discussed from a philosophical point of view become applied questions in the process of implementing AI in decision-making.

An example of a mental experiment, often used in the field of philosophy, raises a dilemma named “The trolley problem”, raised in a 1967 work of Philippa Foot and dubbed “the trolley problem” by Judith Jarvis Thomson (2008). In short, the problem discusses the decision-making process. It describes a situation when a trolley is on course to collide with and kill several people (traditionally five) down the track, but a decision-maker can intervene and divert the vehicle to kill just one person on a different track. There are various scenarios for this philosophical dilemma, but their importance as ethical and moral solutions arises together with similar situations in which AI might assist or substitute a human decision-maker, as in the case of autonomous vehicles like Tesla (Smith, 2018).

A solution to this and similar philosophical, ethical and moral dilemmas can be found through ethics and moral reasoning in decision-making. Kohlberg (1971) delineated three tiers of moral development. The first, 1) the pre-conventional reasoning, representing the decision-making approach, is applied as a) obedience orientation to avoid punishment or b) instrumental relativist orientation, when all decisions serve to own self-interests, in other words, prioritise own objectives above all. The second is 2) the conventional level, when individuals seek external cues to determine their actions. They a) either aspire to meet the expectations of esteemed figures in their lives, such as parents, siblings and friends, esteeming concern for others and respect or b) adopt a somewhat broader outlook, seeking societal guidance. They advocate for adhering to workplace regulations and the legal system. The third level is characterised as 3) the post-conceptual level in reasoning, which epitomises the pinnacle of ethical contemplation. In the case of a) the social-contract legalistic orientation (generally with utilitarian overtones), individuals operate under utilitarian principles, prioritising the collective needs of the community and striving to ensure that rules and laws serve the greater good. At the same time, other individuals are governed by the universal ethical principles’ orientation, equality and human dignity. These principles consistently steer their conduct, prevailing over the statutes of any specific society.

Analytic philosophy, mainly representing western philosophical approaches and give significant impact on the development of logic and cognitive science. Philosophy research on decision-making represents a more general level of the processes underlying reasoning and actions compared to biology, neuroscience and cognitive studies, which often look at the details in data that can shed new light on its modelling. In fact, a significant scope of findings in neuroscience and behavioural sciences have presented enough findings to challenge existing law and order systems, approach to criminal judgement and how this judgement is performed through authorised decision-making institutions (Kyriazis, 2015).

The role of inner processes, like the work of the hormonal system, can compromise the rational component in the decision-making process that lies in approaches like logic and statistics reasoning. Biology and Neuroscience share a common approach to the decision-making process, prioritising an organism’s capacities over the external environment and stimulation. This focus reflects the intrinsic mechanisms and neural pathways that organisms employ to navigate their surroundings and make decisions. In biology, decision-making is often studied at the cellular and molecular levels. Decision-making process occur on the cellular level based on internal genetic programming and external cues. For example, during cellular differentiation, cells decide their fate (e.g. muscle, nerve or blood cells) based on genetic factors and environmental stimuli. This process is guided by a complex interplay of gene regulation, signalling pathways and cellular interactions, emphasising how internal capacities dictate responses to external stimuli. This level of decision-making important in descriptive approaches that focus on behavioural decisions as mediated by the neuroscientific brain processing mechanisms.

In neuroscience, decision-making is viewed as a process primarily driven by neural mechanisms within the brain. The brain integrates sensory information, past experiences and

cognitive processes to make decisions. This integration occurs in various brain regions, such as the prefrontal cortex, which is crucial for executive functions and decision-making. Neuroscientists study how neural circuits process information, weigh different options and execute decisions. This approach often involves examining how different brain areas communicate and how neurotransmitters and neural networks influence decision-making processes. Both fields recognise the importance of external stimuli but emphasise how internal systems interpret and respond to these stimuli. This perspective aligns with the concept of 'neurobiological determinism,' which posits that an organism's internal neurobiological state significantly influences its decision-making processes.

The intersection of biology and neuroscience has given rise to fields like neuroethology, which studies how neural mechanisms underpin behaviour in natural contexts. This interdisciplinary approach combines insights from both fields to understand how organisms make decisions in complex, dynamic environments. It highlights how internal neural and biological mechanisms are finely tuned to process external information efficiently and make adaptive decisions. Though external environmental factors have an essential role in the development of an organism, biology and neuroscience predominantly focus on the inherent capacities of organisms in the decision-making process. This approach underscores the complexity of internal mechanisms and networks in guiding behaviour and responses to external stimuli. All human decision-making works through brain neural mechanisms of signal processing, whether influenced by genetics, life-long individual learning, cultural shaping of behavioural styles or organismic bodily states. Neuroethology applied fields, like computational neuroethology, helps to clarify animal behaviour, create artificial agents (simulated and robotic) capable of flexible, autonomous behaviour and develop new insights into the nature of cognition and intelligence (Chiel & Beer, 2009).

The distinction between the role of the external environment and the inner organism's capacities is crucial in the scientific process of finding the casualty of the events and their causes. Decision-making is a cognitive process of selecting a set of actions that are meant to lead to the predicted result based on the knowledge available from decision environment. According to Daniel Kahneman and Amos Tversky and their work on judgement and prediction bias (Tversky & Kahneman 1974), most people rely on a heuristic approach in their decision-making in their model of System 1 and System 2 (Kahneman, 2000). This model describes heuristics or mental shortcuts, that people use in decision-making, which can lead to systematic biases. For example, the availability heuristic makes individuals overestimate the probability of events they can easily recall, while the representativeness heuristic leads to misjudging the likelihood of an event by comparing it to an existing prototype in their minds. This dual-system approach provides a framework to understand human-centred decision-making process which often overlooked when augmented by AI. It illustrates how users intuitive and often emotional responses (System 1) can dominate our more logical and thoughtful processes (System 2), leading to decisions that deviate from rationality. Following aforementioned, a bias in decision-making can be present as a part of the cognitive process, which relies on the information perceived from the environment. The biases identified by Kahneman and Tversky often persist in the data on which algorithms later trained and can create human-like biases as computing output.

Nudge theory stands as a highly relevant field in decision-making research, focusing on the design and structure of decision environments to influence the behaviour of individuals and groups (Thaler, 2018). Widely applied across disciplines such as consumer behaviour, behavioural economics, social psychology and behavioural policy, nudges are psychologically informed tools aimed at fostering behavioural change. From enhancing health and well-being (Lin, Osman & Ashcroft, 2017) to various forms of manipulation, including political and

commercial strategies, nudges have raised debates about potential infringements on basic human rights and freedoms, such as control over media usage or access.

With the pervasive integration of digital technologies into everyday life, the concept of digital nudging or choice architecture has emerged (Weinmann et al., 2016). This entails deliberately shaping user-interface design elements to steer individuals' behaviour in digital choice environments, ranging from passive tools to automated assistants and AI integrations within organizational contexts. Despite its utility, nudge theory has faced criticism for its perceived paternalism and normativity in guiding individual and collective decision-making processes (Sugden, 2009).

Research on decision-making allows us to model this process and implement it as a functional tool for individuals and social groups. To analyse the role of different factors that may impact decision outcomes in the field of this research interests, HCI and AI, it is crucial to highlight the core principles of decision-making through an algorithmic approach. In other words, what components of the decision-making process can be successfully performed and prioritised in design and application.

Logic and mathematics, in particular statistics, are the foundations of computer science and algorithms, serving as the cornerstone for the development and analysis of algorithms and computational processes. Applying logical reasoning and mathematical principles in computer science enables the formulation of algorithms that systematically approach decision-making tasks, where "the most general sense, an algorithm is simply a procedure for achieving a particular mathematical end-paradigmatically computing the values of a function or deciding whether a given mathematical object has a particular property" (Dean, 2016). In computer science, algorithms are step-by-step computational procedures for solving problems or making decisions. The design of these algorithms heavily relies on mathematical concepts such as complexity theory, graph theory and probability. Complexity theory, for instance, helps in understanding the efficiency and feasibility of algorithms, categorising them based on the time and space resources they require. This understanding is crucial for making decisions about which algorithms are practical for specific applications.

The implementation of logic in computer science is also fundamental. Logical frameworks like propositional and predicate logic are integral in developing algorithms that involve decision-making, particularly those related to artificial intelligence and automated reasoning. These logical systems provide a basis for algorithms to process information, draw inferences and make decisions based on logical rules and principles (Reeves & Clarke, 1990; O'Callaghan, 2023). Logic and mathematics are not only foundational to computer science and algorithms but are also essential in modelling decision-making processes within this field. Integrating these disciplines leads to creating algorithms that are considered efficient, reliable and capable of making informed decisions in various complex scenarios.

The approaches to decision-making process are highly rely on various factors and studied through different disciplines. Psychology and philosophy yet are the most relevant and present within other disciplines, including behavioural studies, behavioural economics, as well as modelling of decision-making process to aid to algorithmically. All these approaches, to a different extent, are implemented in algorithmic approaches used today, whether through design or data they trained. For example, the first level of the pre-conventional approach of "punishment avoidance" and the second, the conventional approach of compliance, as discussed in Leone (2023) on the principles of Generative Adversarial Nets, as introduced by the research group working with Ian J. Goodfellow:

> "The production scheme of artificial intelligence imagined by Goodfellow consists in an opposition between two instances; the framework of structural semiotics can therefore contribute to its intelligibility. Two main actants appear in the abstract architecture of GANs.

> The first is an actant generator that examines a data configuration and produces a text which could be issued from this very configuration; the second is an actant discriminator that examines the text thus produced and evaluates whether it comes from the data configuration or from the generating actant. From an epistemic point of view, therefore, the generating actant aims 'to make appear' and therefore 'to pass as true' what is not, while the discriminatory actant aims 'to make appear' and therefore 'to unmask as false' what is not true". (Leone, 2023, p. 1)

2.2. From theory to practice: Algorithmic approaches to decision-making and problem-solving

The main task of an algorithm in AI-assisted decision-making is to augment or substitute human decision-making. The theories discussed above, mainly from logic and mathematics, find their implementations in application to the various fields. This chapter discusses the existing approaches and how they can impact the decision-making process at the personal, social and cultural levels. In the recent work "Algorithms for Decision Making", Mykel Kochenderfer et al. (2022) uncovered how various algorithmic approaches can be implemented under uncertainty. The notion of *uncertainty* is a term used to explain states when two or more variables that can prevent a successful solution to a problem are unknown. Machine learning (ML) is one of the most used approaches in these conditions. ML can be differentiated to:

- Supervised learning: a type of ML where the algorithm learns from labelled training data, meaning the input data is paired with the correct output.
- Unsupervised learning: a type that involves training algorithms using data with no labelled responses or outcomes; an algorithm explores the data and tries to find patterns or relationships without explicit guidance dealing with uncovering hidden patterns or intrinsic structures in the input data.
- Reinforcement learning: a type of ML where an agent learns to make decisions by taking actions in an environment to achieve a certain goal, it learns through trial and error, receiving feedback through rewards or penalties.

Big Data is one of the primary methods used today to collect and analyse users' interactions with digital tools. Their analysis methods mainly approach the length of interactions, frequency and category of the content displayed in the given time. Notwithstanding the position that experimental approaches may be too narrow to get an accurate picture of the HCI's multifaceted subjective nature, experimental studies still provide valuable facts. Various experiments address how users interact with data selections and what role AIRS may play in this process.
The experiment conducted by Facebook (Kramer et al., 2014) confirmed that different selections of information provided by social media networks as media in communication could affect users' perception of audio-visual stimuli, such as text, image and video contents and their interpretations. During several weeks in 2012, Facebook randomly selected a group of users (N=689,003) who would be active at least once a week, sharing information on the platform. Participants were divided into four groups, the first group received a selection of positive news, the second selection of negative news, the third one received a chronologically ordered selection and the fourth group received a random selection. During the experiment, users who received a selection of negative news tended to post a negative message to represent their perception of the world. This experimental method for data collection does not highlight the opinions and practices of the users that did not commit to expressing themself online for different reasons. One of these reasons can be the ethics users follow in different communities. However, the study did make conclusions based on the missing data taken as a variable. For

example, the claim that the users do not feel wrong about social comparison (Kramer et al., 2014). A similar study was conducted by Dutceac Segesten et al. (2022). The users were exposed to the selections of news on the laboratory computer. To address their reaction, the eye tracking device Tobii used to grasp on-screen movement and timing of focus. The study confirms that users spent more time on the news with negative connotations than positive ones, following extended disagreement and discussion in the comments. This can imply the augmentation of perception of the negative scope of contextual information in proportion to the positive. However, these studies only partly address the processes of users' communication within digital environments, their interpretation process and their reasoning in decision-making. To address the effect of social media and AI recommendations, the research should consider how human perception, recognition, interpretation and decision-making work concerning the algorithmic one. Moreover, even though this process for human-user can be described in its parts, it is necessary to consider a holistic aspect of it. Biosemiotics and Cognitive Semiotics can be proved particularly useful in this expedient.

2.2.1. Types of reasoning models in decision-making algorithms

Numerous narratives exist in contemporary society, representing diverse perspectives on the functioning of AI in problem-solving and its capacity to enhance human decision-making. This chapter aims to elucidate the ongoing dynamics inherent in predominant AI technologies, specifically focusing on AIRS employed within the realm of social media. Furthermore, it seeks to illuminate the potential impacts of AI on the collaborative relationship between humans and computers in the decision-making process.

This part aims to provide a revision of the four most used strategies for an algorithmic approach to assisted decision-making with data used today. In this section, I will employ knowledge from semiotics research to describe the decision-making process employed in 1) Multi-armed bandits, primarily can be used as in Collaborative Filtering algorithms, 2) Reinforcement learning, 3) Decision Theory and the less used 4) Markov's Decision Process. These four algorithmic approaches to recommendations can be divided into memory-based and model-based (Pham et al., 2010).

Multi-armed bandits are an algorithm used in recommendation systems, but they are not typically used as a form of collaborative filtering. Rather, they are often used in A/B testing and online advertising to determine which ads or content to display to users. It is used as collaborative filtering, an algorithm that uses trial and error to decide which items to recommend to users. The algorithm assigns a "reward" or "score" to each item based on how often it has been recommended and how often users have selected it. This information is then used to determine which items to recommend to users in the future. While multi-armed bandits can be effective in certain situations, they may be less accurate and effective than other types of recommendation algorithms, particularly for larger datasets or more complex user behaviours.

This type of algorithmic reasoning can work well when for tasks like electing optimal options among various that do not have data on their value provided for an algorithm. For example, when one is in a new city and needs to pick the best restaurant to eat every day for lunch. As one of the practices commonly adopted by users worldwide to refer to digital platforms like Google and Tripadvisor to solve similar problems, these platforms do not use Multi-armed bandits methods, though it is clear that this approach can be considered equally.

Decision Theory is a branch of mathematics that deals with making decisions in the face of uncertainty. While it can be used in developing recommendation systems, it is not applied largely in algorithms used on digital environments today.

Reinforcement learning is a type of algorithm that can be used in recommendation systems, but it is not typically used as a form of collaborative filtering. Rather, reinforcement learning algorithms learn to make decisions based on a reward signal, which can be used to optimise recommendations over time. While reinforcement learning has shown promise in certain applications, it can be challenging to implement and requires a significant amount of data to train effectively. In current approached to data mainly used on AIRS on social media includes mainly interactions, like time users spend with the element and other algorithmically quantifiable interactions, however with involvement of user or designer agents it can also be data mining tools like wording used in comments, symbolic elements of digital representations and other tools, like sentiment analysis.
Markov Decision Process is not typically used as a form of collaborative filtering but can be used for AI-assisted decision-making. Markov Decision Process is a mathematical framework for modelling decision-making in situations where outputs are partially random and partially controlled by a decision-maker. While it can be a powerful tool for making personalised recommendations, it can also be computationally expensive and may require a significant amount of data to train effectively. There are many factors to consider when choosing an algorithm for a AIRS. However, a thorough explanation of this approach is optional to this work or regarding state-of-the-art AI recommendations' research. A more detailed explanations can be found in Appendix (Markov Decision Process, based on Kochenderfer, M. J. Wheeler, T. A. and Wray, K. H. (2022). *Algorithms for decision making*. MIT press).
Markov Decision Process is a complex approach which can be beneficial in various cases of high-stakes AI-assisted decision-making, like in self-driving cars, healthcare or finances. However, this method is currently not applied in AIRS on digital platforms such as social media for two main reasons. First, because of its complexity, and second, because of the implementation of complex algorithms by various teams, which is often the case of the designer moderation of AIRS in such big digital environments as social media, can lead to unwanted errors and problems in performance. Moreover, users' interactions on social media are not considered high-stakes decision-making, as well as similar platforms, are mainly subject to Multi-armed bandits, Reinforcement learning and rarely Decision theory as models for collaborative filtering.
In collaborative filtering, commonly used for AI recommendations, the algorithm makes predictions about a user's interests based on the interests of other users with similar behaviour. This can be done using various techniques, including user-based, item-based, matrix factorisation and deep learning-based approaches. Each approach has its own strengths and weaknesses and the choice of algorithm will depend on the specific use case and available data.

2.2.2. Types of recommender algorithms models

AI recommendations is a term commonly applied to a type of sorting algorithm. In other words, the function of this type of algorithm is to provide users with selections of elements from datasets that most accurately correspond to their needs, defined whether by the designer, formula based on their own interactions or interactions of users with similar interests. AIRS are not commonly considered decision-making algorithms. One of the reasons for this can be a presumption that users do not heavily rely on their outputs in making high-stake decisions in comparison to healthcare (e.g. in diagnostics and interventions), finances (e.g. in decisions for loan allowances qualification) or self-driving cars (e.g. in case of accidents and mistakes on the road). However, they can (1) contain elements common to the algorithms that are used to make high-stakes decisions, (2) impact the perception of reality and (3) impact users' day-to-day decisions. AIRS offer a personalised browsing experience. Therefore, various concerns arise regarding their impact on users, such as the creation of effects like "echo chambers" and

“filter bubbles” (Bruns, 2017; Wolfowicz et al., 2021), wherein a user is exposed only to information aligned with their interests, reinforcing their beliefs and biases (Guess et al., 2018). This can lead to a lack of exposure to diverse viewpoints and contribute to the polarisation of opinions on social media. Here's a brief overview of how filter bubbles are formed. AI recommendations are commonly employed across various content platforms, including online shopping markets like Amazon, entertainment platforms like Netflix, user collaborative platforms such as Facebook and Instagram and dating applications like Tinder and Grindr (Vuzharov, 2019). Even sites offering digital representations of physical objects, such as Tripadvisor or digital libraries like Google Scholar, utilise AIRS. In all these instances, AI plays a crucial role in assigning value to elements and recommending them to users based on their preferences. This value is often determined algorithmically and can be influenced by previous user interactions. Consequently, the social value attributed to digital representations may impact real-world perceptions. Users then tend to gravitate towards certain elements over others, often making decisions based on information curated by AIRS. However, these recommendations may prioritise specific criteria, potentially overlooking certain aspects. Over time, these daily decisions can evolve into habitual practices, reinforced by recurring elements within the digital environment that hold social and cultural significance.
These presumptions appear aligning to a phenomenon of “echo chambers” and “filter bubbles”, which can profoundly affect users’ decision-making process at the three levels mentioned above: 1) level of AIRS used to sort elements on digital platforms, 2) level of online practices and 3) level of offline practices employed from online dimension. Most AIRS used today are often based on Collaborative filtering. Collaborative filtering is a technique used in recommendation systems where the algorithm makes predictions about a user's interests based on the interests of other users with similar behaviour. These algorithms can be based on either user-item interactions or item-item similarities. Recommendations often rely on collaborative filtering and the most commonly used on social media, a technique in which the algorithm predicts user interests by using the behaviours and interests of similar users (Zhang et al. 2021). There are various types of algorithms used in collaborative filtering based on four main approaches:

- User-based approach, used when there is a wealth of user data available. The algorithm seeks users with similar interests and makes recommendations based on their preferences.
- Data element-based approach, effective when there are many known data elements and relatively few users. The algorithm uses data attributes to make recommendations.
- Matrix factorization approach, common for large datasets based on predefined categories. The algorithm attempts to identify relationships between users and data elements through matrix decomposition.
- Deep learning-based approach, capable of capturing complex patterns and relationships in the data. It employs deep neural networks to learn intricate representations and make precise recommendations.

User-based collaborative filtering is a type of collaborative filtering algorithm that makes recommendations based on the behaviour of similar users. It works by finding users with interests and preferences similar to the target user’s and then recommending items that those similar users have liked. This approach can be effective when there is not a large amount of data available on each user, but it can also suffer from the “cold start” problem when new users join the system.
Item-based collaborative filtering is a type of collaborative filtering algorithm that makes recommendations based on the similarity between items. It works by finding items that are

similar to the ones that a user has liked in the past and then recommending those similar items to the user. This approach can be effective when there are many items but relatively few users, but it can also suffer from the "new item" problem when new items are added to the system.
Matrix factorisation collaborative filtering is a type of collaborative filtering algorithm that works by decomposing the user-item interaction matrix into two lower-dimensional matrices. These matrices can then be used to make recommendations based on the predicted ratings for each user-item pair. This approach can be effective for large datasets, but it can also be computationally expensive and may require a significant amount of data to train effectively.
Deep learning-based approaches in collaborative filtering involve using neural networks and other deep learning techniques to make recommendations based on large amounts of data. These approaches can effectively capture complex patterns and relationships in the data. Still, they can also be computationally expensive and may require a significant amount of data to train effectively.
Each approach has its strengths and weaknesses and the choice of algorithm will depend on the specific use case and available data. For example, user-based algorithms work well when there is a large amount of user data available. In contrast, item-based algorithms may be more effective when there are many items but relatively few users. Matrix factorisation is a popular approach for large datasets, while deep learning-based approaches can effectively capture complex patterns and relationships in the data. In addition, hybrid approach and content-based filtering can be used based on the objectives of designers and needs of the users. Content-based filtering is a recommendation algorithm makes recommendations based on the properties of the items themselves. It works by analysing the features and attributes of each item and then recommending items like the ones that a user has liked in the past. This approach can be effective for addressing the cold start problem and for making recommendations in domains with a lot of item-specific information available. Hybrid approaches can combine Collaborative filtering and content-based filtering are becoming increasingly popular because they leverage both the user-item interactions and the properties of the items themselves to make recommendations. They can be effective for addressing the cold start problem and the sparsity problem and for providing more diverse and inclusive recommendations.
The choice of algorithm depends on the specific use case and available data, as each approach has its strengths and weaknesses. While collaborative filtering is a powerful tool for creating personalised recommendations, it also has some limitations. For instance, the cold start problem occurs when the algorithm struggles to make recommendations for new users or items with limited available data (Gope & Jain, 2017). Additionally, data sparsity (Wang et al., 2018) poses another challenge where the algorithm lacks sufficient data for accurate predictions.
While collaborative filtering proves effective in providing personalised recommendations, it grapples with inherent limitations. The cold start problem (Figures 4-5) is a notable challenge, wherein the algorithm struggles to generate recommendations for new users or items lacking sufficient data. To illustrate, consider two types of images: 1) preference-neutral content, such as nature photos and 2) statistically valued content, exemplified by users with substantial digital engagement, including Selena Gomez (429 million followers), Cristiano Ronaldo (617 million followers), Beyoncé (319 million followers) and Khaby Lame (161 million followers and 2.4 billion likes).

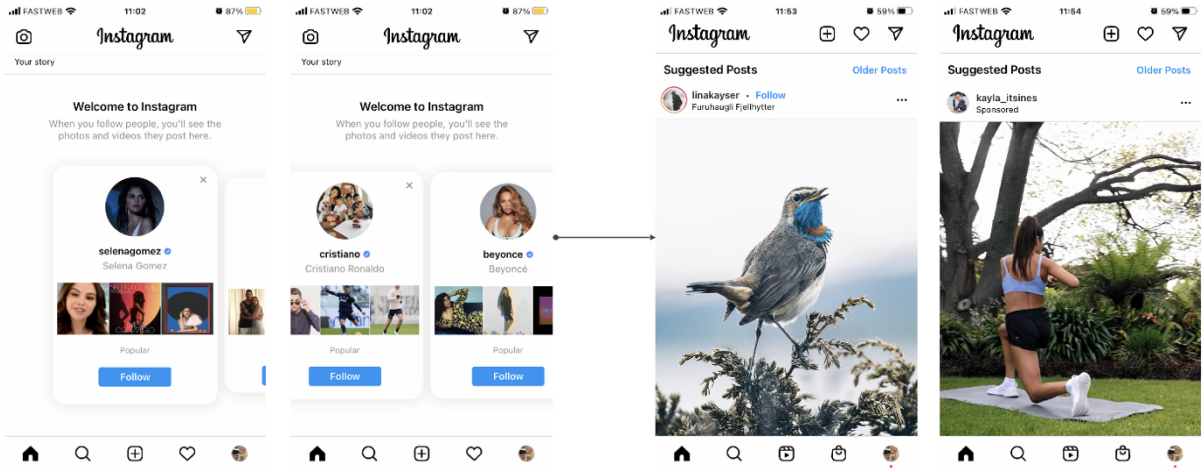


Figure 4 - Example of AIRS cold start for a new user on Instagram.

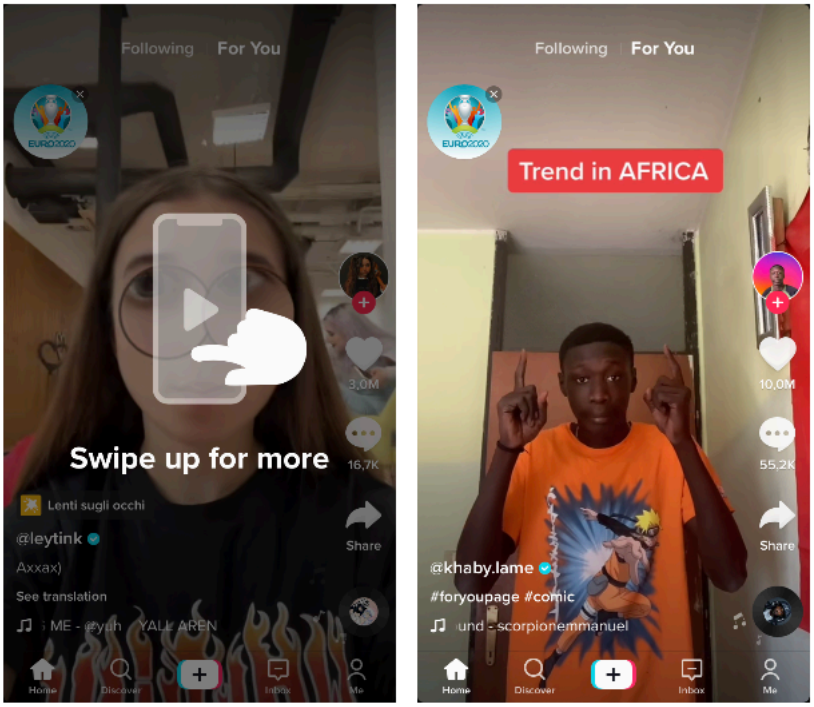


Figure 5 - Example of AIRS cold start for new a user on TikTok.

One of the new approaches to recommendation systems is content-based filtering, which leverages information about the properties of the items to make recommendations. Hybrid approaches combining Collaborative and content-based filtering are also becoming increasingly popular. The field of recommendation systems is constantly evolving and new approaches and techniques are being developed to address the challenges and limitations of existing methods. As companies collect and analyse more user data, the potential for personalised recommendations will only grow. However, it is frequently raised to question regarding the ethical and societal implications of these recommendations and to work towards solutions that prioritise both personalisation and privacy while promoting diversity and inclusivity. Even though privacy regulations and ethics and morals of AI implications are not the direct interest of this research.

2.2.3. How AIRS work on different social media platforms

The field of recommendation systems is constantly evolving and new approaches and techniques are being developed to address the challenges and limitations of existing methods. As companies collect and analyse more user data, the potential for personalised recommendations is supposed to increase. However, it is crucial to consider the ethical and societal implications of these recommendations and to work towards solutions that prioritise both personalisation and privacy while promoting diversity and inclusivity.

AI recommendations have their affordances for their users based on the digital environment they are applied. Each social media platform, like Instagram, Facebook, YouTube, Pinterest and TikTok, uses platform-specific AIRS developed to suit the design intentions, mainly the platform structure and interactions ways and accommodate users' needs. The algorithms underlying AIRS are unavailable to the public. Social media users and researchers can only guess the designers' main intentions, the logical and mathematic task-solving strategies applied to the data and the resulting recommendations. However, based on the social media environment design structures and general user experience, it is possible to draw presumptions about their AIRS' algorithms.

Instagram uses AIRS to suggest content to users on their Explore page and in their feed. The platform's AI algorithm analyses users' past behaviour, such as the posts they have liked and the accounts they have followed, to suggest similar content that might interest them. Instagram's AI also considers factors like the timeliness of posts, the number of likes and comments and the relevance of hashtags to determine what content to show users.

Facebook uses AIRS to personalise users' News feeds by showing them content most relevant to their interests. The platform's AI algorithm considers factors like users' past behaviour, such as the posts they have liked, shared or commented on, as well as their demographic information, location and the pages they follow. Facebook's AI also considers the type of content that users engage with the most, such as videos or articles and the time of day that users are most active on the platform.

YouTube uses AIRS to suggest videos to users based on their viewing history, search queries and other data points. The platform's AI algorithm analyses users' past behaviour to recommend videos most likely to interest them, such as videos on similar topics or by similar creators. Additionally, YouTube's AI considers the length of videos, the number of views and likes and the relevance of keywords and tags to determine what videos to suggest to users.

Pinterest uses AIRS to show users personalised content on their home feeds and search results. The platform's AI algorithm analyses users' past behaviour, such as the pins they have saved and the boards they have created, to suggest similar content that might interest them. Additionally, Pinterest's AI also considers factors like the relevance of keywords, the quality of images and the popularity of pins to determine what content to show users.

TikTok is one of the last social media in this list to appear and the majority of its users refer to its recommendation algorithm as highly sophisticated. Its algorithm recommends content to users based on their interests, behaviour and engagement patterns. The algorithm analyses various data points, such as videos a user has liked, shared or commented on and the types of videos they watch and interact with the most. TikTok's AI also considers other factors, such as location, language and user device type, to personalise their recommendations. Additionally, the platform's AI algorithm also considers the performance of a particular video, such as the number of likes, shares and views it has received, as well as the engagement rate and feedback from other users, to determine how relevant and engaging the video is to other users. TikTok's AIRS are designed to keep users engaged and entertained by showing them content they are most likely to enjoy and interact with and are considered one of the most successful in the

digital space (Zhao, 2020). This way, AIRS perform a personalised decision-making process for a user based on the value assigned according to collaborative filtering strategies.

2.3. AI recommendations in mediated communication

Each recommendation system exhibits specific characteristics depending on the digital environment in which it is implemented. Every social media platform employs a recommendation system specially developed to adapt to the platform's structure, interaction modes and user requirements. The algorithms underlying the recommendations are not accessible to the public. Suppositions can only be made regarding the intentions of the designers, the logical and mathematical strategies used to process data and the resulting recommendations. Despite the lack of direct access to recommendation algorithms, it is possible to formulate hypotheses based on the design features of social media environments and general user experiences. Analysing the platform's design characteristics and observations on interactions with recommendations can aid in understanding and formulating hypotheses about the operation of recommendation algorithms.

AI recommendations execute a personalised to a user decision-making process based on the value assigned through collaborative filtering strategies. In social media, recommendations result from a combination of AI and human moderators to ensure that recommended content is safe, appropriate and aligns with the respective community guidelines. Collaborative filtering strategies can be considered as a semiotic mechanism defining a common ground in categories or elements selected by the designer or the algorithm.

The way a user sees the order and the selection of information on their social media is a work of AI recommendations. AIRS are mathematically evaluating what information a user would likely prefer to receive based on the previous interaction of this user or other selected users based on regional, background and similar interests of other principles usually selected by AI designers. All the types of user interactions collected by AI are called data. Data is based on the HCI (human-computer interactions); therefore, more interactions are required to improve the models.

According to Duan et al. (2019) the main function of AIRS used today on digital platforms is to augment human intelligence in decision-making. In most cases, there is no presumption that the automated decision-making processes performed by AI should substitute human cognitive processes. AIRS are applied to very narrow tasks requiring logical and mathematical processing on a large amount of data. However, this approach can be questionable in more complex tasks like decision-making in selecting valuable information for individuals in their learning practices and fitting in an environment. The research on AIRS concerning users' needs from the point of view of two main perspectives. First, from the point of view of improving the tools, creating more complex and effective methods for collecting and processing information. Second, from the point of view of improving the AIRS as tools to augment users' experiences with digital devices. This research proposes to focus on the role of the users' meaning-making process as central to the digital transformation of various practices connected with AI recommendations.

Previous research on HCI mainly focused on purpose and architecture. The core is data-driven methods for creating the categories and labelling based on other sorting methods (Ziegler et al., 2004). The general name for most methods used is collaborative filtering (Bobadilla et al., 2020), meaning the core operation is based on rating the value of elements within datasets. Elements within datasets are assigned a mathematical value based on the criteria selected by the designer or statistical analysis logic. The reward selected by the developer evaluates the performance of an algorithm. A reward has a central value for an algorithm (e.g. Figure 6). At this point, AIRS “operate as a structuring device” for digital platforms (Bankov, 2020, p. 263).

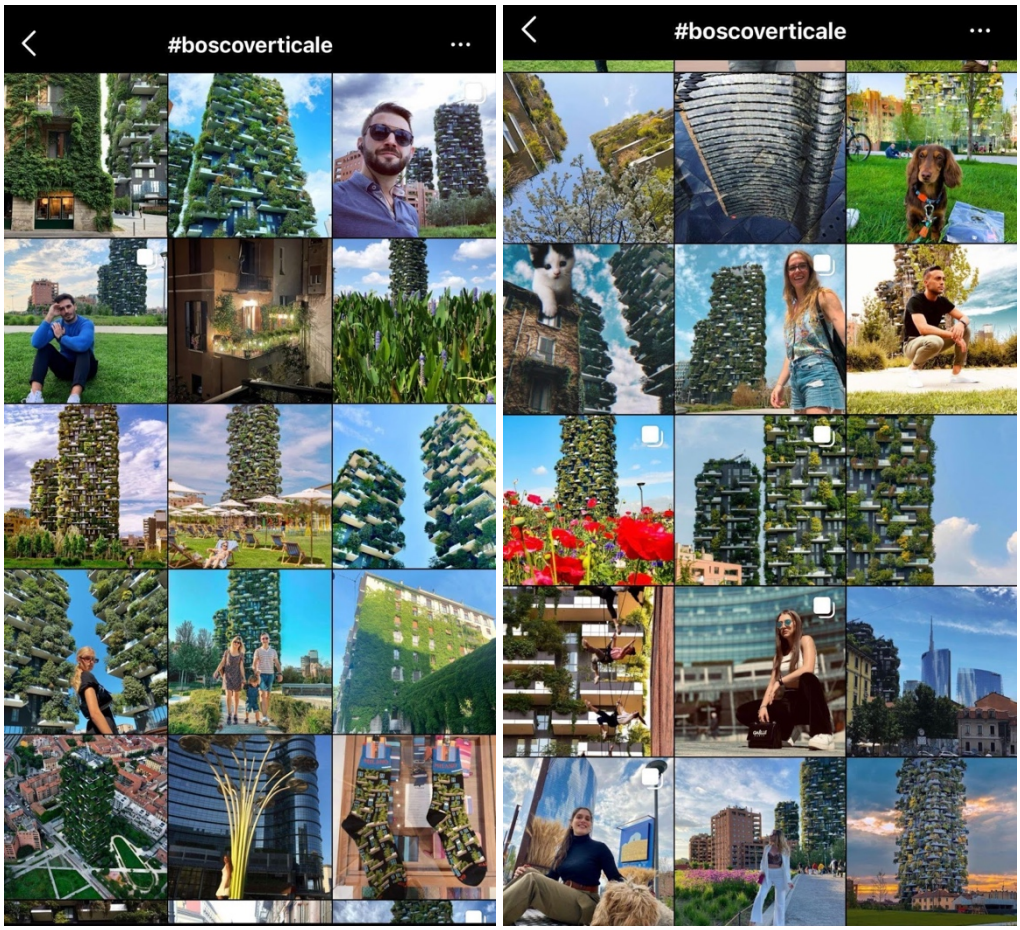


Figure 6 - The selection of AIRS is based on the #hashtag search “Bosco verticale” (eng. Vertical Forest), source: www.instagram.com

2.3.1. Semiosphere and platfosphere

Bankov (2020) proposes the concept of platfosphere - user-generated content shared on digital platforms, shaped by algorithms. Laddering up Bankov's (2020) application of the notion of semiosphere to digital platforms and introduction of the notion of platfosphere, the role of AIRS can find a heuristic analogy with Juri Lotman's concept of a centre and periphery (Lotman, 2005) to describe the process of data processing in the algorithm: higher value outputs can be defined as the centre and would be examined more to increase or decrease their value. The smaller the value output, the further it will be moved from the centre until it is left out of algorithmic processing. The example presented in Figure 6 sorts the upper images as more relevant to the images placed lower on the displayed page, based on the criteria selected by a designer, e.g. users’ interactions such as visualisations, time spent, likes, follows, shares, etc.
Some digital platforms and the structures of their digital environments significantly influence the communication practices of their direct and indirect users. There, users find affordances that can later be scaffolded into categories that can be recognised through language constructions used outside the original platform. For example, the platform and mobile application Strava (since 2009), which is officially recognised as an Internet service for tracking physical exercise, incorporates social network features, but main functional structures remain with the focus on self-e (self-experimenting and monitoring through digital platforms and applications with a purpose to self-improvement (Daskalova et al., 2021). This platform introduced “kudos” as an alternative to Like (an element of the structure used to interact with

texts of other users to demonstrate (enunciate) positive approval button used on other social media) in indexical meaning of points for achievements from physical exercises that users monitor through the app. In 2023 the expression “giving kudos” as a way to express approvement and congratulate someone of their achievements is often used on other platforms as well, like LinkedIn (a social media platform for professionals) and as a linguistic construction in everyday situations just using word “Kudos!” in meaning “congratulations!”, making it part of the encyclopedia (see Eco, 1990) , for direct users of Strava, as well as those who do not use the app but interact with users and semiosphere.

2.3.2. Translation and filtering process in AI recommendations

Bankov (2020) employs the term “platfosphere” based on Lotman's semiosphere model (2005 [1984]), to describe the complex phenomena within the contemporary digital and social culture (texts, practices, relationships, etc.). Within the platfosphere, recommendations play a role in managing communicative processes on social media, akin to semiosphere translation mechanisms. AI recommendations significantly shape content and communicative processes, serving as intermediaries between users and the presented content.

The goal of every algorithm is to provide the desired optimal solution by the designer in the fewest possible steps. Both conditional and cycle algorithms used in collaborative filtering aim to find a “true” value within a minimum number of steps and time (Sannemo, 2018, p. 5).

The logic basis of “true” value within algorithmic processing can be compared to the process of translation between centre and periphery, defined within the algorithmic structures, e.g. the algorithmic model used and selected dataset(s).

To illustrate how this process can be explained through the concepts of the semiosphere centre and periphery, we can hypothesise that N represents a central value that the algorithm must reach, with the maximum value. The output with the greatest weight will be *NX*, where *N* represents the central value and X represents the first optimal output with a higher value. Other outputs will be classified as *NX+Xy*, where *Xy* represents the value of the next best result with a weight lower than the previous one, located *y* steps away from the optimal value *NX*, moving toward the periphery of algorithmic processing (Hofmann & Puzicha, 1999). Thus, result options are classified by an algorithm with priority based on the quantity of recognised repetitive elements by models and the reinforcement of categories (Figure 7).

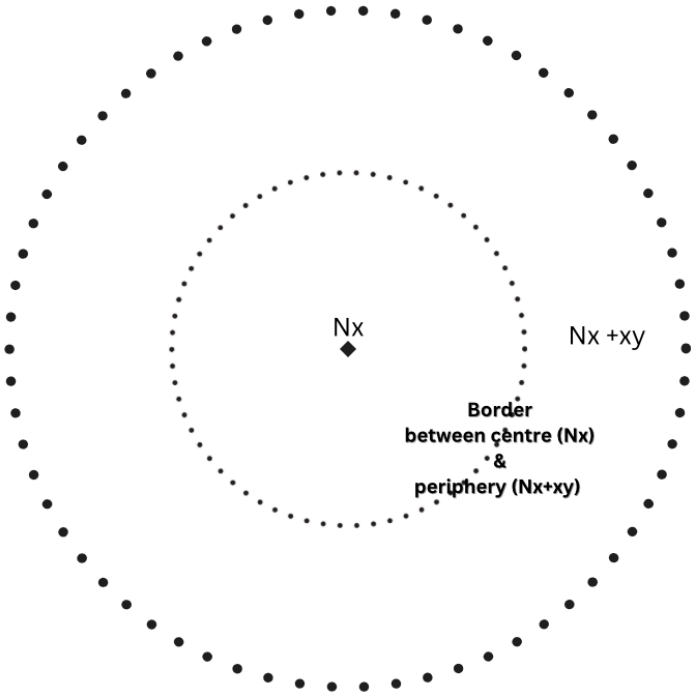


Figure 7 - Semiosphere model applied to the centre-periphery relations in algorithmic output.

Algorithms mainly operate within a syntactic structure, meaning they define one or more key elements within a data set to provide user-matching categories that are semantically assumed to align with user interests. This principle also applies to algorithms used in collaborative filtering, such as AI recommendations. An algorithm's capabilities are evaluated based on a reward selected by the designer, playing a central role in the algorithm's operation.

AI recommendations act as “structuring devices” for digital platforms (Bankov, 2020, p. 263), determining the position of data within the platform. The role of AIRS can be likened to Lotman's centre and periphery concept, where outputs with higher values are considered the centre and are examined more closely for value augmentation or reduction. Outputs with lower values progressively move away from the centre until they are excluded from algorithmic processing.

AI recommendations primarily serve the function of recognising selected elements within the data and providing users with models like previous choices that hold greater value. We can apply the concept of the “platfosphere” (Bankov, 2020) to describe the processes occurring within the semiosphere (Lotman, 2005), which can be seen as a “semiotic space” (Lotman, 1990, p. 126) representing the environment. Communicative processes within this type of environment involve the translation process between the centre and periphery (Lotman, 2005). Therefore, AIRS conduct a modelling process of the semiotic environment of social media through mathematical and logical algorithmic elements and subsequently apply this translation process to data (content shared and received by users), sorting data between the centre and periphery. All elements of this system are dynamic correlations that continually change (Lotman, 1990, p. 127). Social media has been created to resemble natural communication processes within society, such as the semiosphere. However, social media is an artificial system that may possess only some of the qualities defined through Lotman's hypothetical modelling in The Universe of the Mind (Lotman, 1990). Nevertheless, for it to function correctly, it must demonstrate the primary mechanism that characterises a system like the semiosphere, namely the structural definition of the semiotic space as the centre and periphery, connected through the translation process. According to Lotman, translation within the semiosphere ensures

binarism, asymmetry and heterogeneity. Heterogeneity refers to the diversity of elements and their various functions, which presumably do not have a single encoding structure but are represented by a set of interconnected yet different systems. In the case of AI recommendations, all data and languages used and available to human users from a semantic perspective are translated through algorithmic processing into a system of categories, making the system more homogeneous and causing echo chamber and filter bubble effects, various biases as result of algorithmic processing or even model collapse.

2.3.3. Text and context on social media: An algorithmic perspective

AI recommendations rely on binary code, which assumes a highly structured syntax rooted in classical logic. These recommendations, referred to as AIRS, function as a conceptual framework within social media platforms, aligning with Nadin's (1988, p. 63) syntax framework. Essentially, they interpret user interactions, such as binary code, as their language. Consequently, users' messages undergo inevitable translation into data input, conforming to binary system syntax. In the realm of data processing, AIRS assign binary values (0 or 1) to each piece of data, thereby influencing their significance within the social media structure. Operating across various primary and secondary languages, these recommendations convert linguistic inputs into mathematical values, drawing from Shannon's seminal work, "A Mathematical Theory of Communication" (1948). However, this mathematical model bears little resemblance to human communication dynamics, representing a dynamic system where elements continually shift in value based on algorithmic assessments. In this dynamic, objects sharing greater similarity possess a higher likelihood of being assigned similar values and categorised accordingly. Consequently, when users share messages with each other, they predominantly communicate with the algorithm as the primary audience, in line with Jakobson’s communication model (Jakobson, 1961). Adhering to the algorithm as the primary recipient, users instinctively adjust their practices to ensure that their digital representations, such as images, videos or texts, are valued by algorithmic categorisation models first and then exposed to other users (Figure 8).

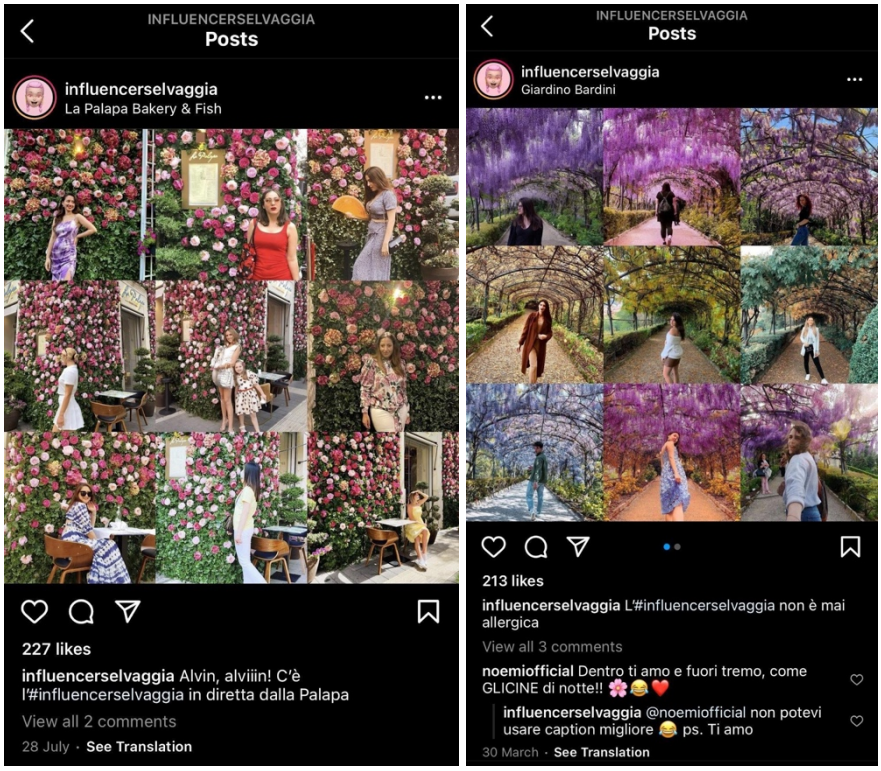


Figure 8 - Users on social media Instagram sharing similar photos.

2.3.4. Syntaxis, semantics and pragmatics of AI recommendations: From text to environment

Algorithms operate mainly within a syntactic structure, which means that they define one or several key elements within a data set to provide matching categories to a user, which are supposed to correspond to the user's interests semantically. However, a user agent defines the semiosis process behind AI recommendation outputs.

AI recommendations highly influence the pragmatic aspect of social media mediated communication. The semantic aspect of social media cannot be described without considering the aspect of users' perception, recognition and interpretation process. The categorisation process is the next step to the low-level perception process and part of recognition and interpretation. In an environment mediated by AI, this process is highly imposed by a digital platform and its tools over human cognition. A categorisation is a tool for sorting, an important cultural tool for interpretation; however, it does not acknowledge holistic human perception (Klinkenberg, 2015). This is unlike AI recommendation algorithms trained to recognise elements based on the input selection done by a designer or algorithmic formula.

On the contrary, human perception addresses reality holistically (Mitchell et al., 1995). Reaction in the form of arousal does not separate each stimulus, producing feedback according to each, but is contextually bound. This fact is confirmed by various research on a non-priority stimulus that significantly influenced human behaviours and decision-making despite its irrelevance to the focus of reasoning (Hsu, Anen & Quartz, 2008; Russell & Giner-Sorolla, 2013; Wang et al., 2018). For example, if considered pleasant or disgusting, irrelevant smells may influence how pro-collaborative behaviours can be expressed (Horberg et al., 2009). Therefore, the conditions of a body, like hunger, can influence the perception of the moral qualities of other individuals and force decisions (Danziger et al., 2011). Moreover, on social media, users may experience ensemble perception (Whitney & Leib, 2018). In other words,

they may perceive digital representations, e.g. images and other texts created by individual users, not as unique separate messages but as a part of a general message created by AIRS.
The foundation of algorithmic categorisation lies in the realms of logic and statistics. In communication processes driven by algorithms, the processed sign predominantly assumes an iconic and indexical nature within the triadic taxonomy proposed by Peirce (1974). However, within symbolic systems primarily governed by interpretants, such as natural language in spoken form or human communication in general, algorithmic processing encounters limitations. Human users possess a remarkable capacity for perception, recognition and interpretation, enabling them to engage with AI recommendations at more nuanced levels of semiosis. Research conducted by Mikhaeil and Baskerville (2019) underscores that the syntactic structure of data shapes the construction of messages and their interrelation within digital environments, considering the context of use and users' affordances. AIRS wield direct influence over the syntactic relationships between texts within platforms and users by processing, categorising data and presenting users with a selection of texts that may be perceived individually or as interconnected through similarities. The efficacy of AIRS is gauged through users' online behaviours, with increased interactions signalling algorithmic "reward". Designed to amplify users' engagement with platform content, AIRS typically measure effectiveness through metrics such as time spent and active behaviours, such as clicks, follows, redirects and other categories delineated by designers, manifestations of users' pragmatic dimension expressed through online interactions.
Users' practices do not operate in isolation. Luciano Floridi (2015) delves into the conceptual evolution of the online versus offline dichotomy, arguing that interactions with digital tools have converged into a seamless blend of the two realms. Presently, digital platforms have woven themselves into the fabric of human existence, extending users' cognitive dimensions into the online sphere and exerting tangible effects on their physical selves. Social media, alongside other digital manifestations, transcend their intended roles as mere augmentations of reality. They are perceived as instruments of communication among individuals, carrying significant social weight. Presence on the Internet equates to a meaningful existence within the cultural narrative. The absence of an online presence or the way one presents themselves online, can profoundly influence their social standing and inclusion in the semiosphere. In today's landscape, most services are sought online before any physical interaction occurs and familiar entities are evaluated based on changes in their online representations (Bellentani & Arkhipova, 2021). For instance, consider the Uffizi Gallery in Florence, Italy, which experienced a remarkable 27% increase in visitors under the age of 30 after Italian social media influencer Chiara Ferragni posted a photo from her museum visit and an image subsequently reposted by the museum itself (Figure 9).

Figure 9 - Post on Instagram by the Uffizi gallery.

The perception of digital representations as physically existent objects and part of the environment is significant for human Umwelt. This aspect of the perception of digital representations enhances users' Umwelten, expanding the reach of time and space, alternate social networks influencing the social hierarchy status and intended arousal thanks to selected stimulation, etc. The state of Umwelt largely depends on the information an organism can receive about the outside world through the perceptual organs, the process of recognition and interpretation (Kull, 1998). AIRS can be crucial as they directly affect how users' Umwelten access digital representations. AIRS can manipulate the amount, frequency and selection of the information users receive.

The role of AI recommendations, highlighted through users' semantic and pragmatic dimensions, is complex and can be analysed from various perspectives. Users' interpretations, decisions, actions, behaviours and practices can be conditioned by AIRS and other mediating tools in communication where digital platforms are involved and accessed in various ways.

One of the modelling tools that can help describe the role of AI on digital platforms for their users is to consider them, digital platforms, as environments that provide users with affordances (e.g. Gibson, 1977). They are created to resemble the semiosphere (Bankov, 2022) and the process of human cognition (Sharov, 2002). However, their mechanism of self-regulation of platfosphere based on AIRS. The interpretation process they impose on their users is based on categorisation, which (1) is limited to their designers' inputs and (2) does not address the quality of holistic perception of the human interpretation process**.** (More about this approach and others in the next Chapter Three).

2.4. When algorithmic loops exclude a human-user

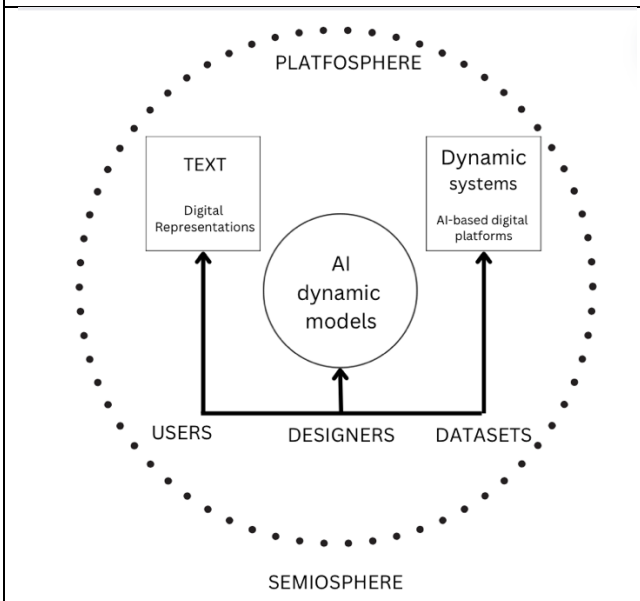
AIRS is a tool that helps to navigate in the infinite number of ever-growing elements within digital environments. It is a tool that aims to helps a human user to reach from a point A to point B in the shortest period with maximum output. However, often AIRS caught up in the loop of elements that can create patterns that centred not on user but on the other algorithms used to create and adjust digital representations. The mechanism behind creation of the connections between texts to order a unique environment for a particular user can lead to different algorithm reinforce biases which can be also adopted by users.

2.4.1. Algorithmic and human bias in the loop: AI recognition and human interpretation

Social media gained significant relevance as digital platforms between 2005 and 2015, with the emergence of the first social media platforms that primarily involved users who knew each other personally (such as Facebook) or desired to express the emotional aspects of their personalities in a safe environment (Benrouba & Boudour, 2023). Subsequently, the number of digital connections and followers began to impact the offline environment, becoming a reference point for influencers. However, social media as digital platforms brought with them the characteristics of diaries and interpersonal communication, imitating various forms of correspondence, such as the epistolary genre closely related to the personal sphere. This approach is closely tied to the personal sphere and aims to mimic narratives that allow users to perceive digital representations as life experiences of the narrator. Connections are thus created between facts and opinions, to create a sense of closeness and engagement with the lives of other users.AI recommendations, users were able to create online engagement through their digital representations primarily based on content that had to cater to user preferences. With the integration of AI recommendations, the primary criterion that determines the engagement of content on the platforms is the recognition by algorithmic processing as valid, corresponding to existing categories and patterns or generating new ones. One of the central goals of the algorithm is to promote online interaction between users and content. To achieve this, users adopt various communication strategies in which the key aspect is to address the message more syntactically while targeting the recommendation algorithm, rather than semantically, directed at human users in the digital space, as is the case on social media.
Algorithmic recognition, as a function of AI recommendations, serves to sort elements with which users interact. Within the concept of algorithmic recognition, this research presumes a process of element analysis to find similar or different elements and classify them accordingly. Looking deep into the task of algorithmic recognition, the algorithm aims to determine a pair from the elements from the library based on the designers' request. When the algorithm verifies two elements as a pair, these elements are assigned a value "true" and then it moves to the next element to identify whether it matches a selected element or pair image output. Applying metaphorically an idea of the semiosphere to this process, the centre/periphery relations can be described within two crucial aspects:

- translation between centre and periphery
- categorisation based on the selected elements

The processes that are present within social media with AIRS is instead a model of a segment of a selected part of the semiosphere, as shown in Figure 10, though may present all the qualities of the whole. This can be visualised through this Table 1, algorithmic recognition and categorisation process on an example of a simple algorithm written in Python programming language, with the task to find, recognise and analyse elements to perform task how images are similar among each other to be grouped together:

Within AI	The semiosphere modelling with explanations
 Figure 10 - Elements of Platfosphere within Semiosphere. -Text (digital representations - users' input that creates datasets -AI dynamic models - AI algorithms used, e.g. AIRS -Dynamic systems (AI-based digital platforms) - the way AIRS interact with dataset in selected digital environments	Designer agency contribution in AI mediated DM: -type and model of algorithm (dynamic model) -libraries and datasets (digital representations) -user agency contribution in AI mediated DM: -libraries and datasets (digital representations) All these are inevitably present within a AI-based digital platform, where AI performs structuring function on syntactic level and reinforce connections with environment, digital and physical, therefore with semiosphere through the selected elements: text (digital representations), AI dynamic models (structuring functional models of operating algorithm) and dynamic systems (AI-based digital platform).
input: "python verification= fn.verify(img1_path="img1.jpg", img2_path="img2.jpg")	The verification process going between nod to nod, meaning from one element to other element and not through the whole library/dataset simultaneously and value assigned to the elements one by one; which means that some elements can be identified prior to others, receiving higher value, be assigner close to centre of the semiosphere representation within the AI processed environment. **img(number)_path** – the access via chich algorithm is looking for the element **img(number).jpg** – selected element in database analysed **fn.verify** – task performed by algorithm, in the case of the present algorithm it verifies how close/equal values between selected elements.
operation: recognition= fn.find(img_path="imj.jpg", db_path="C:/image_db")	Recognition process is based on the verification task of comparison between values of the elements.

	fn.find – task performed by algorithm to access the elements and perform tasks **img_path** – model to the access via chich algorithm is looking for the element **db** – database Also, this part can include parts related to analysis of specific elements selected and defined by designer via finction (e.g. **analysis**=fn.analyse(img_path= "img.jpg", actions= ["element1", ["element2", ["element3"]) print(analysis) In this case all the elements to be analysed are selected by designer and performed by an algorithm.

output: {
"verified":True/False
"distance":numerical outcome
"max_threshold_to_verify":numerical outcome
"model": selected model
"similarity_metrics": "category"
}
	"verified":True/False – algorithm predefines whether result can be sorted to the centre (True) or excluded from further analysis, moved to periphery (False)
	"distance" and **"max_threshold_to_verify"** are both measured in numerical outcome, which justifies how close or far they can be located to the "True" value, to the centre
	"model" – is selected algorithmic model to perform analysis, usually it is algorithm written by designer or outsourced from other authors/designers and often a collective work of several designers who create functional tool, e.g. algorithm's code
	"**similarity_metrics":** is a preselected "category" that will be printed in output as the category solution of the algorithmic task to the designer based on the above output

Table 1 - Algorithmic recognition and categorisation process on an example of a simple algorithm written in Python programming language

A filtering algorithm in AIRS used on social media, similarly to the one described in the Table 1 above, is trained to find similar elements, group them based on selected by designer similarity metrics and create models and categories. Social media are created to resemble and be based on the natural processes of communication processes within society, such as the Semiosphere. However, social media is an artificial system, which may not possess all the qualities defined through modelling presumed by Lotman (1990). However, to function properly, it had to demonstrate the primary mechanism inherent to such a system as semiosphere. Structural definition of the semiotic space, as centre and periphery, connected through the translation process. According to Lotman, translation within the semiosphere guarantees binarism, asymmetry and heterogeneity (Salupere, 2015). Heterogeneity is defined by the diversity of elements and their different functions, presuming not having a single coding structure but a set

of connected but different systems. However, in the case of AI recommendations, all data, all languages used and available to the human-users semantically, are translated through the algorithmic processing to the system of categories, which makes it more homogeneous, causing the above-mentioned effect of echo chambers and filter bubbles. Therefore, similar elements are more likely to be sorted together. Reviewing the function of AIRS, as proposed in Figure 7, reveals their aim to provide optimal solutions in the fewest possible steps. This is evident in the outputs of AI recommender systems (AIRS) on social media. In both conditional and loop algorithms used in collaborative filtering, the primary goal is to find a "true" value within minimal steps and time, producing an output with the highest weight Nx, where N represents the central value and x the first optimal output with a higher weight. Subsequent outputs are ranked as $Nx+y$, where y represents the index value of the next best result with a lower weight than the previous one. In this way, the algorithm ranks outputs based on the recognition of repetitive patterns, reinforcing certain categories. However, when certain positive outputs are found first—because they were pre-programmed by a designer—the algorithmic decision-making process becomes skewed, making it less fair and more asymmetrical in value. Algorithms operate mainly within a syntactic structure, which means that they define one or several key elements within a data set to provide matching categories to a user, which are supposed to correspond to the user's interests semantically. However, a user agent defines the semiosis process behind AI recommendation outputs.
An important aspect to be considered is the human-user agency in this process. Human-user contributed to libraries and datasets that are used within social media. This contribution can be based on the contextual requirements of social media as an environment. In case users recognise the AIRS recognition process as an agency impacting the communication process online, they might be involved in a dual process related to algorithmic principles:

- recognise the categories valorised higher by AIRS within social media as an environment;
- use algorithmic processing, such as AI-augmented image editing, to make their images assigned higher values.

Following the Table 1, the semiotic perspective on collaborative filtering, which lies in assigning categories to the elements of data (contents), considers human agency at the final step when the output is served through the digital device and platform structure. Algorithmically previously processed images have more similar patterns for an algorithm among each other and, therefore, more accessible to create a category which will be subsequently followed (Figure 11). However, in many cases, the reasoning of the algorithmic processing may not align with the way human users recognise and make meaning out of it. Human perception and processing (interpretation) are more complex than algorithmic and also error-prone as well as subject to illusions and misunderstandings. Moreover, in the social media defined as a part of semiosphere people make their decisions and preferences not only as free individual agents, but also as agents deciding based on "how I look to others", "how politically outstandingly correct I am" or "I do not have time to delve deeper into this issue". Oftentimes these biases work unconsciously. While algorithms in the case of collaborative filtering to digital representations mainly in two steps: recognition of the pattern and creation/assigning to a category, human perception lies within at least 4 steps: perception (through eyes, as a primary perceptual organ, in the case of social media), recognition and categorisation via verbal and non-verbal levels (T. von Uexküll, 1972; Valsiner et al., 2023). Therefore, AIRS latent structures can be present within higher-valued outputs that are not identified by an algorithm but are perceived by users. This way, in Figure 11, the examples of celebrities' photos are present and recommended to me as a Pinterest user. These photos have been processed with

beautifying tools, presumably FaceApp, which makes these images appear rather monogenous to human-user. However, they rather receive a higher value through the process of algorithmic processing in collaborative filtering by having similar or identical elements that can be united into categories.

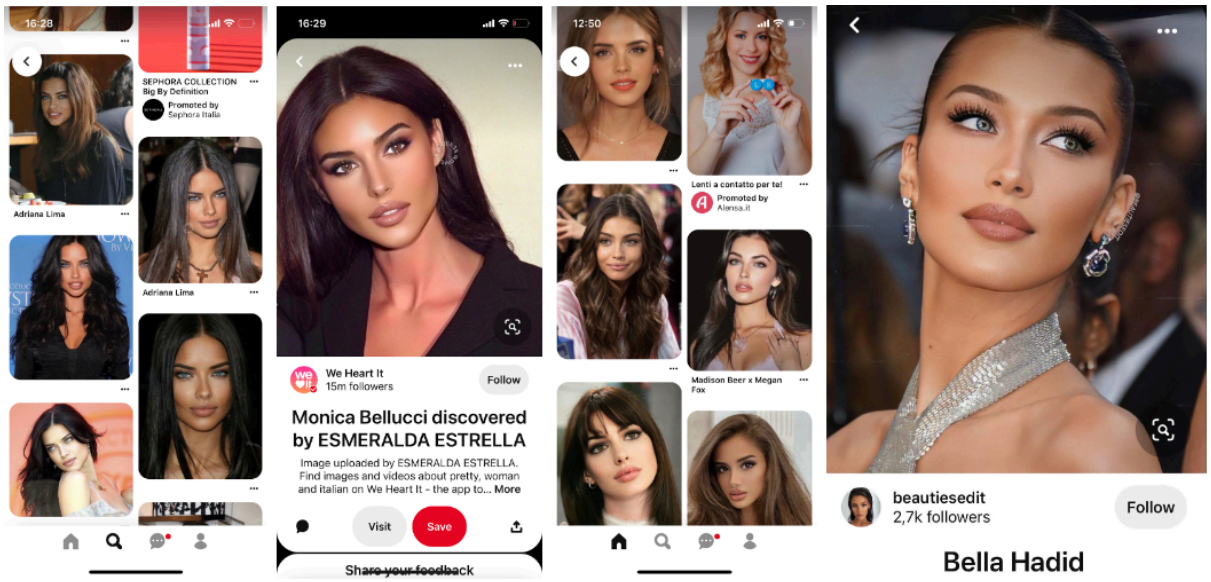


Figure 11 - AI augmented images of celebrities (from left to right: Adriana Lima, Monica Bellucci, Emma Watson, Ann Hathaway and Bella Hadid images altered through AI beautifying tools).

In algorithmic processing, such as AIRS based on collaborative filtering, the first image would be more valuable for an algorithm in the context of Figure 12 due to the following reasons:

- the data structures in Image 1 are closely corresponding to the structures the algorithm is trained on (the other elements of data sets, e.g. Figure 11);
- within the algorithmic approach to data solving lies a core approach to finding the most optimal solution within minimum steps, which makes Image 1 a more valuable output for the algorithmic processing than Image 2 within a given dataset of Figure 12.

Figure 12 - The snapshot on the left is a processed image with AI beautifying tool both images re-shared through the Pinterest application and recommended through the AI recommendation of the platform. The one on the right, is the original image from the TV series “Friends”, source Netflix.

Therefore algorithmically, Image 1 might be more algorithmically valuable than Image 2 in Figure 12. Image 1 is processed through AI beautifying tools Image 2, which is an original screenshot from the popular TV show “Friends”. An observer may notice the pattern between the processed images in the two snapshots of Figure 12: skin and facial features appearing smooth, even skin colour, whiter teeth, eyes, lips and nose are sharper and have more contrast details, some additional head hair density.
In Chapter Three the process of Algorithmic recognition and categorisation (Algorithmic decision-making) will be compared to a user’s organism interpretation process (Human decision-making).

2.4.2. Latent structures in algorithms

One distinctive aspect of AI recommendations lies in their reliance on latent structures, a concept rooted in Machine Learning that denotes underlying models or relationships not readily apparent in the data. Within recommendation systems, these latent structures empower algorithms to recognise user preferences and interests, even when not explicitly expressed. By

uncovering these hidden patterns, AI recommendations can be tailored to each user, offering suggestions that accurately align with their inclinations and tastes. This personalisation is believed to enhance the browsing experience and foster greater user satisfaction. Consequently, these practices contribute incrementally to the convergence of human reasoning and behaviour, leading to a standardised satisfaction among users. Unlike the inherent diversity and uniqueness found in immediate natural environments, digital environments, while initially diverse and individualistic, have the potential to become homogenised and less diverse through AI processing. Social media's influence on daily life and decision-making processes is undeniable (Janssen & Kuk, 2016). The communication process that occurs on social media can engage users to accept algorithmic processing based on syntactic elements like central values, where latent structures play an undeniable role in the mechanism of one's identity. Identity serves as a cornerstone in every communication endeavour. Within the realm of social media, digital representations like images and videos not only facilitate self-identification but also serve as tools for observing others and comparing oneself to prevailing narratives. Among these representations, the human face, being a prominent aspect of the body, stands out as one of the most significant categories shared by users on social media platforms. The algorithmic processing of digital facial representations has become a prevalent practice in the realm of social media (Leone, 2020). Social media platforms provide fertile ground for collecting and analysing data through a blend of quantitative and qualitative methods rooted in ethnographic principles (Ardévol & Gómez-Cruz, 2014; Wang & Liu, 2021). Images previously modified by the algorithm and enhanced through the filtering systems can be perceived as realistic by human users. At first glance, the pattern among processed images may appear rather appealing based on the socially approved culture of fashion magazines from the 1990s to the 2010s (Slater et al., 2012; Donovan, 2012). Instead of taking a critical approach to highly standardised digital representations of the female body on social media, the user can recognise the value created by algorithmic structures, categorising them as the central beauty standard for a particular culture to be pursued at the social level. In this case, the latent structures of AI recommendations may not carry algorithmically processed categories yet be sufficient to be perceived by users. They may not be recognised as elements for solving algorithmic tasks, but they play a fundamental role in shaping the semantic space of the digital environment for its users.

Primary functions (task and problem-solving operations) of AIRS as an algorithm are necessarily specific to the environment where they are applied. In the case of social media, the social aspect of algorithmic value created behind digital representations is highly specific to the narratives attached by the users. Since the inception of the first social media platforms, initially catering to users with personal connections (such as Facebook) or those seeking to express their emotional facets in a secure environment, to the subsequent era where the quantity of digital friends (followers) began to wield social influence in offline realms, notably marking the emergence of influencers. Social media platforms, while digital in nature, have retained elements akin to diaries and interpersonal communication by simulating various forms of correspondence, including epistolary genres (Toktagazin et al., 2016; Bourdon, 2019), fostering candid and deeply personal interactions (Yuan & Lou, 2020). This emulation aims to present digital representations as narratives rooted in the user's lived experiences, blurring the lines between fact and opinion (Piredda, Ciancia & Venditti, 2015). For roughly a decade (circa 2005-2015), before the integration of AI recommendations into the core structure of social media, users could cultivate online engagement through their digital creations, be it texts (images, videos, natural language texts) or platform tools (hashtags, filters, editing structures, etc.). Engagement on digital platforms or social media, was primarily content-driven; in other words, content needed to resonate with users' preferences. However, with the advent of AIRS, the primary criterion for content to garner engagement shifted to its recognition as valuable through algorithmic processing, aligning with established categories and patterns or fortifying

new ones. Therefore the main criteria for content to create engagement is to be recognised through the algorithmic processing as valuable, corresponding to main categories and patterns or reinforcing new ones.
“Let’s play with an algorithm” is one of the phrases that can represent individuals who use it in their communication with fellow followers on social media, expressed directly or through the narrative. One of the central values of the algorithm is to incentivise online engagement between users and content. In this task, users attempt various communication strategies in which the central aspect is rather syntactic, directed to the recommendation algorithm, rather than semantic, directed to the human-users of digital space. In this scenario, the latent structures of AIRS categories that users may not consciously recognise as elements of algorithmic task-solving. Nevertheless, these structures play a significant role in modelling the semantic landscape of the digital environment for users. Consequently, algorithmic value has the potential to evolve into social value. Within this framework, social value encompasses key components of the semiosphere.
The influence of social media digital space on all spheres of life in communities today is undoubtful and how we make our decisions (Janssen & Kuk, 2016). Taking a deeper look at the communication process occurring on social media to reinforce their users to accept algorithmic categorisation processing based on syntactic elements as central values, where latent structures play an undeniable role in the self-identity mechanism. Self-identity is a leading element in any communication process. Digital representations used on social media, in the form of text, such as images and videos, serve as a tool for self-identity as well can a way to monitor others and compare to dominant narratives.
The images shared on social media Instagram, TikTok and Pinterest suggest that users apply three main strategies of content production and post-production to impact the functions of AI recommendations:

- citation and augmentation of one’s digital representation text (e.g. repost, co-creation, any other type of use of someone’s content to entail one’s own content, therefore, creating connections for an algorithm),
- following audio of visual trends (e.g. using popular audio or visual contents as a part of created content or replicating visual contents such as dances, moves and actions in the digital representation production or post-production stage),
- creating textual links via hashtags and AI-recognisable captions that lead to algorithmic categorisation.

To illustrate how the shift between self-identity impacts digital representations, this research offers to take a deeper look at the profile of influencers on Instagram, @holcockerill, @chiaraferragni and on TikTok, @danishacarter. The tendency to individualise an algorithm (in this case, AIRS via AI-processed images) can be highlighted within the practices of influencers, e.g. users whose digital identity transformed into social identity, creating significant social, cultural, political and economic impact.
Some users, such as the blogger @holcockerill, openly confirm the use of images previously modified by AI, while others prefer to leave other users and researchers in doubt.
AI tools for automatic image processing, e.g. embellishment filters, are not the main focus of this research. However, changes made through the algorithmic process of applying filters are recognised by the AI recommendation algorithm and used as a category in image search and exploration. When they are not recognised, they remain as latent structures, which may not be categorised by the algorithm but perceived by the human eye. For example, these photos shared on the @holcockerill profile show that many definitive features in the famous influencer's face

only play with the algorithm (Figure 13). Facial features become smoother and more youthful, teeth whiter, eyes become more prominent and lips fuller with more definition.

Figure 13 - Examples of AI modified photos shared on the @holcockerill profile on Instagram.

Throughout the images presented in Fig 14, the transformation of digital representations of Chiara Ferragni's face may appear younger on one of the images taken and shared in November 2021 than one from 2016: facial features become smooth and baby-skin-like, eyes become more prominent and lips fuller, with higher definition. The quality of the image shared on Instagram cannot be considered as one of the factors for this transformation since all the photos were posted on the profile within November 2021. While another image (Image 3 in Figure 14) look different, revealing time difference between image taken in 2016 and one from November 2021.

Figure 14 - From left to right: Image 1, photo of Chiara Ferragni taken in 2016. Image 2, photo of Chiara Ferragni taken in November 2021. Image 3, a photo of Chiara Ferragni taken in November 2021 Image 4, AI-processed photo of Chiara Ferragni. More similarities exist between 2 and 4 images processed and altered algorithmically.

Figure 15 - Comparison of photos of Chiara Ferragni shared on her Instagram profile compared to her images processed on FaceApp.

Observers can notice uniformity in facial features appearing more smooth, with rounded eyes and lips and sharper and more contrast details in respect to the original image. The same can be noticed for Images 3 and 4 in Figure 15. Analysing the images present in Figure 16 and the processed image of Chiara Ferragni and one may find more similarities between the AI-processed images than the photo of Chiara Ferragni taken in 2016 (Figure 15, Image 1). To verify whether AI image processing tools were used to modify digital representations of Chiara Ferragni's face, the following steps were taken:

- The filters available on the AI beautifying tool FaceApp were applied to one of the images to see how the results would differ from photos posted on Chiara Ferragni Instagram profile. Results in Figure 16 show that minimum retouching through the FaceApp filter "silk" is almost identical to the photo posted. Presumably, since the photo is already processed through this or a similar AI tool, this photo does not require significant manipulations since the value of the photo processing task is reached. The two digital representations in Figure 15, posted on CF Instagram (image 1) and processed with a FaceApp filter (image 2), look similar because the algorithmic value was reached already on image 1. Therefore, the resulting images would be similar or identical through the following algorithmic processing.
- To confront it with other possible images processed through the same AI beautifying tools a female representation from the painting Grand Wood "American Gothic" was processed (Figure 16)

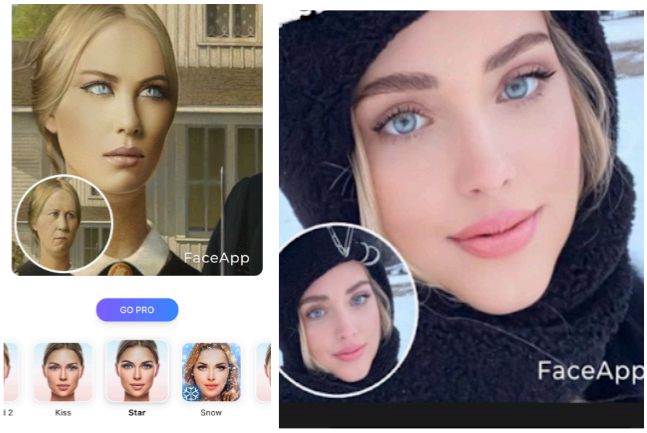


Figure 16 - Digital representation of a female representation from the painting Grand Wood "American Gothic" processed through the AI beautifying tool FaceApp.

The practice of altering the representation of the female face and body is not new or unique to this case. Most traditional media, including fashion magazines, are known for applying various retouching techniques, like manual adjustments in Adobe PhotoShop, to make the bodies look a certain way. The effects of these adjustments on socially acceptable beauty standards are widely discussed (Halliwell & Dittmar, 2004). However, the main focus of this research is not in the fact manipulation of representations of the female body but in how these manipulations are done and with what purpose and what effects they cause on the final addresses in this communication. In the case of influencer Chiara Ferragni (or her team that might help her manage her almost 30 million followers Instagram account, by June 2023), the adjustments are made through beautifying AI image processing, which is a standardised image retouching practice, opposite to manual retouching techniques, like Adobe PhotoShop, which can give each image unique improvements and targeted to avoid inconsistencies in processing, e.g. when the image starts to look less realistic and to lose similar features with original (shape of nose, eyes, eyebrows, lips, as well as hair and eye colour, etc.). Manual processing is time-consuming and, therefore, more expensive, but gives a better quality as a result, together with a unique image. However, in the case of Chiara Ferragni, retouching her images was not a task per se because, in this case, manual retouching would better suit the narratives established through her past and present digital representations profile.
The latent structure present in digital representations on Chiara Ferragni Instagram profile, which might not be recognised and categorised by AI recommendations, is still largely perceived by users. The effect of digital beautifying tools on users' interpretations is largely discussed in Leone (2019a, 2020). Also, in case AI beautifying tools were not applied to the digital representations discussed above and as often claimed in digital influencers' posts on social media. Digital representations of Chiara Ferragni, as many other highly algorithmically valued digital representations, have never explicitly been classified as algorithmically processed through AI image processing to target algorithmic structures purposely. And it is challenging to evaluate since the code behind AIRS on most social media platforms is not publicly accessible. However, based on the analysis performed in this research, it is possible to conclude that users may aim to create patterns that can be easily recognised by the algorithm and can play a part in AIRS' latent structures and be perceived by users as meaningful, impacting their individual and social values.
Since communication on social media, despite being highly criticised for distorted representation of reality, yet believed to be more sincere than traditional media (TV, press and other institutionalised media), many users may perceive a need to uphold the beauty standards discussed above. These standards may lead users to believe in beauty values behind female

face representations that can affect various spheres of life for individuals, such as perception of oneself and others, creation and change of self-identity, as well as for society, driving some values to the centre and others to its periphery.
In this context, it is possible to talk about the extremization of social practices when AIRS are considered as a primary user, primary addressee, contrary to the human addressee, human followers on social media. The case of TikTok influencer Danisha Carter is rather extreme in the attempt to fill the gap between algorithm-user (AI recommendations) and human-user (users of TikTok). Her profile on social media TikTok, which has 1,8 million followers) is created intentionally to resemble robotic behaviour. These traits are expressed through limited motions of the facial muscles and body, indifference in eye-focus (the size of the pupils does not change noticeably), fast and monotonous and emotionless level of speech, etc. However, her YouTube profile (5,79 thousand followers) and videos shared there display a vivid human (Figure 17) whose facial features do not always correspond to the digital representations shared on TikTok (Figure 18) and partly Instagram (with 103 thousand followers). Therefore, one may presume that Danisha heavily relies on AI tools to produce and post-produce her digital representations.

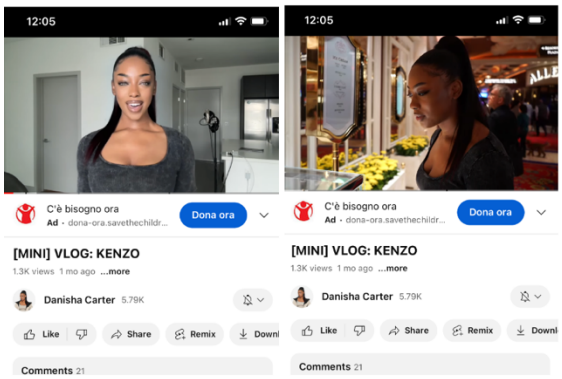


Figure 17 - Screenshots of digital face representations in a video of Danisha Carter on her YouTube channel.

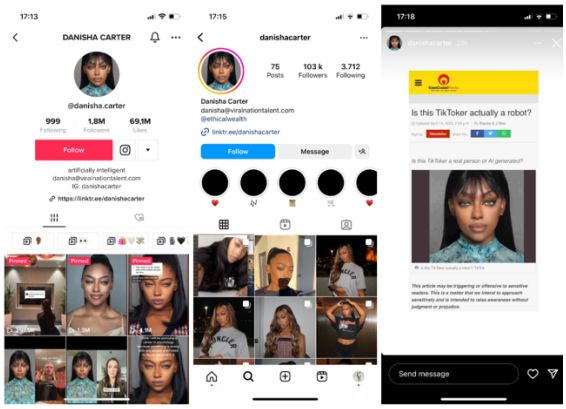


Figure 18 - Profiles of Danisha Carter on TikTok, where she imitates robotic traits of deep fake phenomena, Instagram and a critical article about her work shared on her profile.

TikTok as a social media is mainly based on the relative contents AIRS rather on the network of connections (e.g. friends, followers) priorly created by a user (Yao, 2021). Therefore, application to the patterns that can be easily recognised by algorithm, such as creating a duet (using someone's content to entail one's own content, therefore, creating a connection for an

algorithm), following the music of visual trends (using popular songs as a part of created contents or replicating visual contents as dances, moves, actions in the video production stage) or creating textual link via hashtags and captions, created additional value. In this case, Danisha Carter uses all the mentioned above together with the imitation of deep fake and robotic videos. The number of followers is one of the social media tools used to enrich one's social status today: the significant number of followers on social media may transform a person into a leader of opinions that emit social power. However, the growth of followers on Instagram, as with other social media, highly relies on AIRS recognising and adding value to one's digital representations and later sorting it to other users favourably. Therefore, it is possible to presume that the use of algorithmic processing behind digital representations of Danisha Carter's face was targeted at the AIRS algorithm primarily than human-users of Instagram.

2.5. UX/UI and semiotics-in-the-loop

User Experience (hereafter UX) is a term used to define the field of digital design centred on the users' interactions and experiences online. User Interface is the perceived part of the digital product with which a user can directly interact. The main task of UX and UI is to meet the needs and capacities of a potential user that would allow her to intuitively communicate with the required elements to maximise the usability of a digital tool. AIRS are a tool used to maximise UX and, therefore, one of the core elements of UX/UI research today.
Communication on social media is an environment in which various actors express their agency and enunciate via the tools that this environment and their own capacities for expression allow. The expression tool, in this case, is the text, e.g. digital representation. The process of enunciation. This term is closely discussed in the Chapter Four because it is used as a part of specific for this research methodology based on the act of enunciation[3].
Text is a core element of the communication process on digital platforms like social media, where users contribute with the content. It is one of the tools to communicate with other social actors. It is a visible and easily identified element, access to which should be provided by the platform's structure (role of designer, AI recommendations, other digital tools). It functions as one's representation, impacting one's communication online (on a particular social media platform) and offline. However, a text one can share online is not isolated; it is a mediated element. This mediation is performed based on the UX design of the platform, where the designer and AIRS, other users and datasets involved can significantly impact text's syntactic, semantic and pragmatic dimensions for its addresses.

[3] Enunciation, as designated in the works of Benveniste (1971) – see more in Chapter Four – enunciation which is the act of producing an utterance (énoncé), the "conversion of language into discourse", applied in broader terms than strictly linguistic approach. Enunciation is a crucial part of any decision-making, as it can indicate how actors express their agency following syntactic structures of the environment, underlying semantic and pragmatic dimensions.

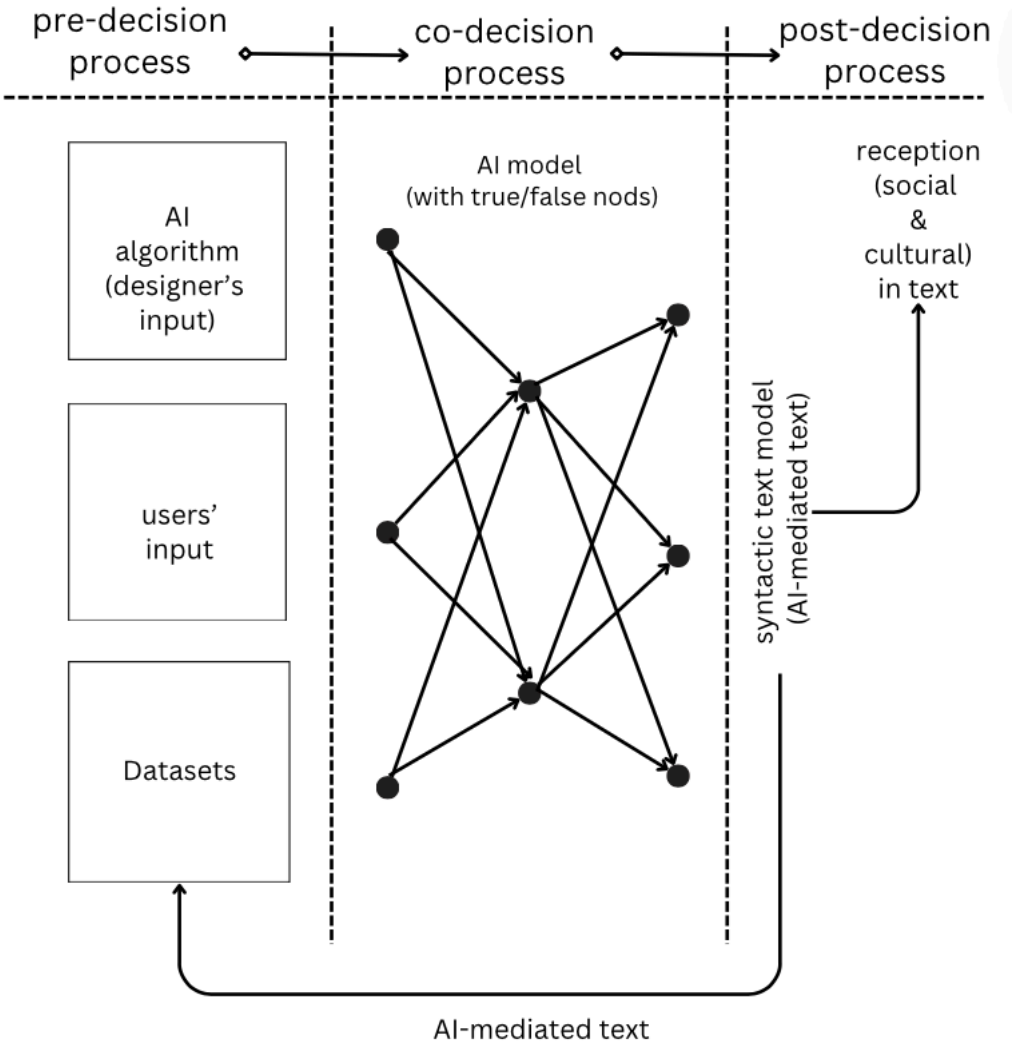


Figure 19 - AI-mediated decision-making process that includes multiple actors and elements for decision environment.

Text as a semiotic element can be analysed from various perspectives. Lotman's works offer various tools to analyse text as an artistic text. According to the definition of an artistic text, elements shared on social media can be considered as artistic texts as they represent one's self-expression level, representing someone's experience and, therefore, one's subjective point of view. However, most of the texts shared online, including social media posts, are not considered artistic texts but digital representations of fact and events of immediate physical environment. This is valid for both AI-mediated texts, in which meaning is altered via contextual connections shaped by AI syntaxis and AI-augmented texts, in which AI alters the structure of the text itself.

Analysing AI-mediated texts, from Lotman's perspective on texts and semiosphere (Lotman, 2005 [1984]), involves understanding how AI-augmented texts, via context or change of the proper structures, can be considered as AI-mediated if recognised as such and fit into the broader cultural and semiotic context. AI-mediated texts can communicate meaning through a system of signs. These signs can include visual, auditory or other sensory elements generated by AI algorithms based on given datasets, e.g. the selected fragments of elements within the semiosphere. Therefore, AI-mediated text exists within a specific context predefined by AI models.

Lotman's concept of semiosphere (2005 [1984]) emphasises that texts are situated within a larger cultural and semiotic space, where they interact with other signs and texts. AI algorithms utilise predefined codes and patterns to mediate texts. Understanding how these codes are used and interpreted by both the AI system and social actors is essential for semiotic analysis. In the case of AI-mediated text, questions arise about the role of human creators (programmers, designers) in shaping the AI's output. Analysing AI-augmented texts should thus involve several levels, deciphering structural, textual and contextual elements to understand the intended or perceived meanings elicited by the artistic text. It is challenging to draw the threshold between these three levels, which involve analysing intra- and extra-textual elements working together through re-coding, meaning translation, (Lotman, 1977) of existing texts introduced through AI algorithms and how they interact with other texts (Kristeva, 1980) and cultural elements. The notion of re-coding is proposed to the process of artistic texts obtaining necessary descriptive capacities for AI-mediation.
Applying Juri Lotman's semiotic framework to AI-mediated and generated texts involves examining these types of texts within a cultural context, understanding its creation process, decoding its signs and codes and considering their role in shaping and reflecting cultural meaning within the semiosphere. It highlights the dynamic interplay between human and machine creativity in contemporary culture, expressed in AI-mediated texts as dynamic models. As such, they introduce a re-coding process within the semiosphere through their structural, textual and contextual elements at pre-creation, co-creation and post-creation between AI and social actors.
Therefore, AI-mediated texts are rather models, dynamic systems situated within the semiosphere with the centre on the AI and designer-user co-creation process (Arkhipova & Viidalep, 2023). This includes (see Figure 19):

- pre-decision process, AI models and shells created by groups of IT professionals and data sets sourced from users, available for the algorithmic processing, preselected by a designer-user based on their individual preferences;
- co-decision process, the decision-making between a user’s input and AI output through an input, e.g. contribution to datasets and libraries, algorithmically categorised, used to receive the most optimal output based on the AI algorithmic processing set by designers;
- post-decision process, where the AI-mediated text is used to generate new texts as a model or deconstructed to understand the underlying algorithmic process and technical, social and cultural potential of these texts.

AI-mediated texts that unite into environments are dynamic cultural elements that can be used as modelling systems to bridge various elements within the semiosphere, allowing interpretation and new meanings through their reception.
This way, the enunciation of decision-making process is a measurable part of the interpretation process and an agent-based part of semiosis, within digital environments, represents the cycle where an individual’s involvement can be divided into pre-decision, co-decision and post-decision (Figure 19). Therefore, the decision process that can be verified through the way actors enunciate texts should be considered as a continuous process. This process can be modelled through different stages within a semiosphere: pre-decision, co-decision and post-decision. Moreover, at all the stages, it includes various actors, who are presented at all the stages with different degrees of impact.
AI tools available today is not the main focus of this research but they had to be discussed in this chapter in order to show how use of AI tools on digital environments can impact

functionality of AI recommendations. The findings highlighted within this chapter underline that AIRS recognition and categorisation process, as any algorithmic processing, function faster and more efficient with elements that has been created with other AI tools applied, e.g. images and texts altered by AI.

Another significant point from this chapter underscores how statistical methodologies influencing the effectiveness of AIRS in digital environments, particularly social media platforms, can result in categorisations with elevated significance. These AI-altered digital representations have the potential to mould human-user perceptions of the environment. It can create shift in central values within digital environments as well as immediate physical environments for the users intensively using social media. One significant gap in the research addressed in this chapter is the unclear distinction between user-centred AI tools designed to assist human decision-making and AI tools that are deemed effective in aiding decision-making based on productivity indicators that align with other AI tools, but distant from user-centred approach. The next chapter aims to focus on the possible communication models used within an AI-mediated digital environment from the point of view of the human user.

Chapter three -
Modelling user-centric decision-making process in AI-mediated digital environments: A semiotics perspective

This chapter elaborates on the discussion concluded in Chapters Two focusing on decision-making in AI-mediated environments. It focuses on the role of human agency in decision-making and in the process of HCI communication. The aim is to discuss the capacities of semiotics to provide descriptive modelling of humans in AI-mediated communication. This chapter examines established understandings of communication processes and models for interpretation and decision-making, exploring their applicability to interactions with AI agents like AIRS. Finally, it proposes a list of hypotheses on how AIRS, as integral parts of digital environments like social media, can influence users and what are the potential implications of this interactions.

3.1. Modelling communication process of AI-mediated social media

The process of interpretation plays a crucial role in semiotic modelling and descriptive approaches. This chapter seeks to centre on users' perspectives within Human-Computer Interaction, examining how AI-mediated digital environments can be characterised using various analytical frameworks. From a semiotic standpoint, signs serve as the fundamental units of the communication process, forming the bedrock of interactions between users and algorithms.
Peirce's model of the sign, deriving from logic and mathematics, is important for this research as a primary element of semiosis, communication and interpretation. Peirce's model can aid to create a descriptive model for mechanism behind a user, digital environments and their designers and digital representations of objects and processes of immediate physical environment. Peirce's model has different representations, as a triangle or as a tripod, at the core. It also differentiated from simplified versions to more complex. It simplified triadic model version explains how unites representamen, interpretant and object relate to each other forming a sign in semiosis:

> "Expression is a kind of representation or signification. A sign is a third mediating between the mind addressed and the object represented. If the thirdness is undegenerate, the relation of the sign to the thing signified is one which only subsists by virtue of the relation of the sign to the mind addressed; that is to say, the sign is related to its object by virtue of a mental association. Conventional modes of expression and other modes dependent on the force of association, enter largely into every art. They make up the bulk of language. If the thirdness is degenerate in the first degree, the sign mediates between the object and the mind by virtue of dynamical connections with the object on the one hand and with the mind on the other. This is the only kind of sign which can demonstrate the reality of things, or distinguish between things exactly alike". (Peirce, 1992, p. 281)

Peircean approach to a sign as a minimum element of semiosis process can be applied to create communication models that can explain relationships between objects, their representations and interpretant as an actor. It can be used for complex environments, like digital environments, use of Peircean model of sign applied as a descriptive tool to the relation between iconic, indexical and symbolic representations of material objects of immediate physical environment (Morandi, 2023).

Mingers and Willcocks (2014, p. 62) explore the dynamics of "personal and social worlds interacting through semiosis" (Figure 20), highlighting the role of technology in mediating these interactions. Using the example of online profiles and avatars, they illustrate how key affordances serve as embodiments, symbolically transforming perceptions of digital communication into holistic experiences, with a focus on embodiment. Drawing from Peircean triadic modelling, as proposed by Mingers and Willcocks (2014, p. 61), they demonstrate how digital representations, such as avatars, encapsulate Schultze's (2010) six types of illusory presence, e.g. telepresence, social presence, co-presence, self-presence, hyperpresence and eternal presence, within a digital environment. This transformation occurs through personal and social interactions, mediated by embodiment and semiosis.

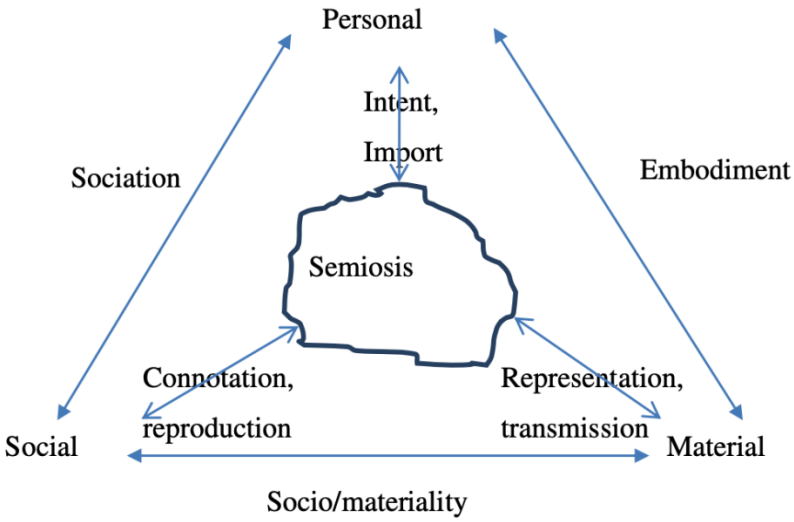


Figure 20 - Model of transformation of digital into material dimension for users by Mingers, J. and Willcocks, L. (2014).

Describing the interpretation of signs in AI-mediated communication involving both human and non-human agents can pose challenges. Human agents, each with their unique Umwelt and agency, navigate decision-making processes within the digital environment. This includes users, whose actions contribute to the accumulation of Big Data, as well as designers, whose algorithmic approaches shape the system. Moreover, other users' contributions, represented through text and the AI-based algorithms, functioning as organising devices, add layers of complexity. These algorithms are trained on vast libraries of Big Data under the supervision of designers. The intricate interplay of these elements impacts the communication process within and outside the digital environment, influencing the user's decision-making journey.
A user's interaction process, starting from the emergence of signs, can be conceptualised as a dynamic exchange, in alignment with Lotman's model of communication and interpretation (Figure 21).

> "In a situation where there is no intersection, communication appears to be impossible, whilst a full intersection (where A and B are deemed identical) renders communication insipid. Thus, whilst a specific intersection between these spaces is admitted, at the same time an intersection between two contradictory tendencies appears: the struggle to facilitate understanding, which will always attempt to extend the area of the intersection and the struggle to amplify the value of the communication, which is linked to the tendency of maximally amplifying the difference between A

and B. <...> It appears that the value of dialogue is linked not to the intersecting part, but to the transfer of information between non-intersecting parts. This places us face-to-face with an insoluble contradiction: we are interested in communication in the very sphere which complicates communication and, in actual fact, renders it impossible. Moreover, the more difficult and inadequate the translation of one non-intersecting part of the space into the language of the other, the more valuable, in informative and social terms, the fact of this paradoxical communication becomes. You could say that the translation of the untranslatable may in turn become the carrier of information of the highest value". (Lotman, 2009)

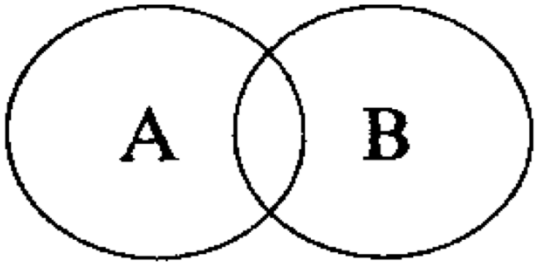


Figure 21 - Lotman's model of communication act.

Lotman describes the communication process through the concept of text, applying it inclusively to all types of messages. In most of his works, he analyses artistic text, which is presumed to be an element of the communication act and semiosis process within the semiosphere. According to Lotman, in the communication process, new text is created "...the author's code and the reader's code must form intersecting sets of structural elements. For example, the natural language in which the text is written must be comprehensible to the reader" (Lotman, 1977, p. 25). The communication process to Lotman is a process of translation, "The very possibility of such a translation is determined by the fact that the codes of both participants in the communication, although not identical, form intersecting sets" (Lotman 1979, p. 91). Introduction of Lotman's model of communication, where the unit of communication is a text, with reference to the lower levels of sign communication as algorithmic level, allows to hypothesise a descriptive model to a communication process within AI-mediated digital environment that is mimicking the communication process within semiosphere.

Semiosphere is characterised through main elements as centre and periphery and border through which the process of translation occurs. Referring to the model introduces in relation to algorithmic processing occurs within AIRS (Figure 22), where the higher value would correspond to AI-mediated optimal output AIRS present to a user (*Nx*). Here user's interpretation would be always centred to the AIRS with value *Nx* and periphery would include other less algorithmically valuable outputs indicated as *Nx+xy*.

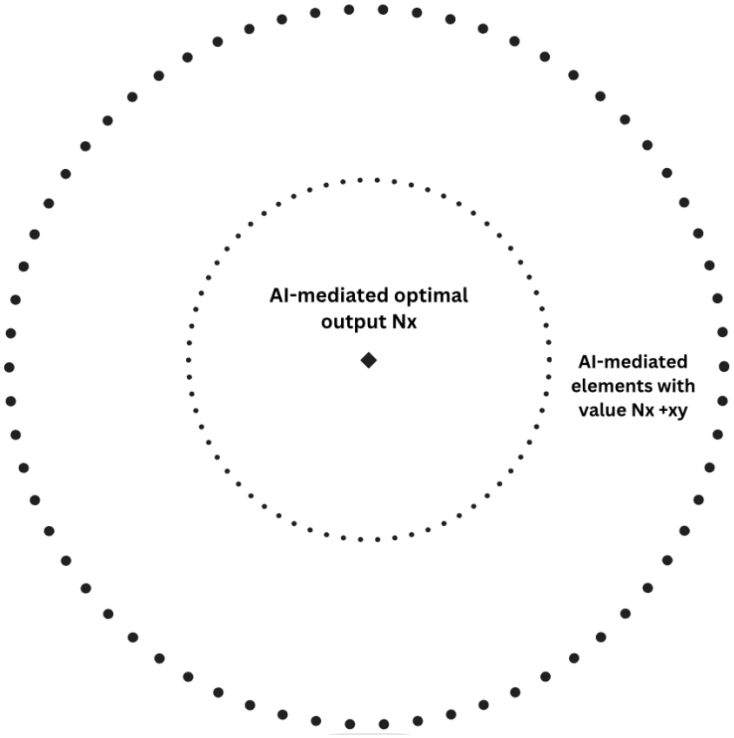


Figure 22 - Model of semiosphere applied to explain algorithmic processing (application of Figure 7).

However, the aim to model AIRS-mediated communication process for a user would include different agents 1) digital representations, which can stand in iconic or indexical relations to other users' texts, 2) AI-contextual message which can stand for datasets on which AIRS are trained and 3) designer that exercise her agency through impacting AIRS and datasets. It can shed light on the complexity of this communication process by uniting modelling tools of Peirce's sign representation in communication and Lotman's approach to communication and semiosphere. Therefore, the described above models can be used to describe complex communication process to which users are involved on AI-mediated digital platforms.

Schematic description of elements in semiosis process of AI-mediated digital environments	Description

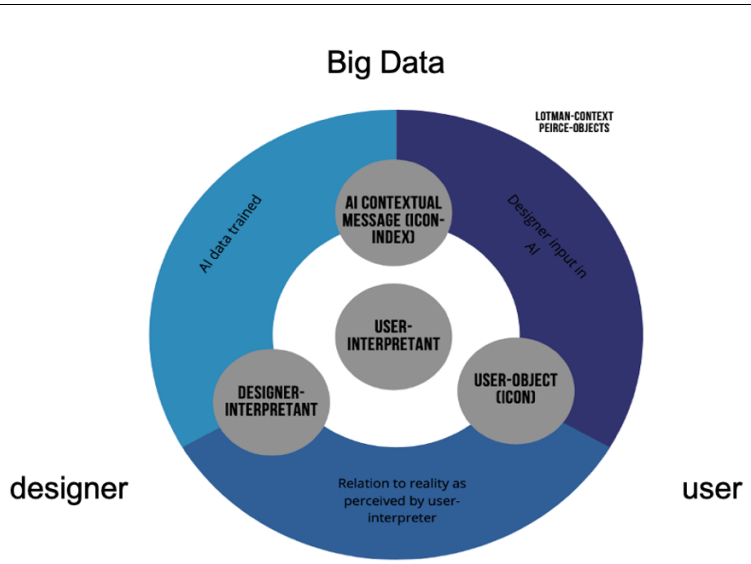
 Figure 23 - Model of communication process on AI-mediated social media based on Peirce's and Lotman's models	-Big Data -Relation to reality as perceived by user-interpretant -AI contextual message -Designer -Designer's input to AI -Designer-interpretant -User -User-text-object -AI data trained -A User-interpretant at centre

Table 2 - Model of communication process on AI-mediated social media.

In the communication model of AI-mediated social media, inspired by Peirce's and Lotman's frameworks and depicted in Figure 23, the User-interpretant occupies a central position, reflecting the personalised nature of interactions with AIRS. This personalised communication process involves three primary actors: Big Data, which encapsulates the user's perceived reality and generates contextually relevant AI messages; a Designer, who acts as an interpretant by shaping the AI's responses based on user input; and another User, who serves as a User-text-object, contributing to the AI's training data. From the perspective of the user at the heart of social media, the communication dynamic unfolds among Big Data, the Designer and other users who, in the context of AI-mediated communication, are represented not as social agents but as texts. Thus, users engage not directly with fellow social agents but with texts and inputs mediated through AIRS.

Lotman (1977) describes the notion of text as any meaningful message or communication that conveys information through a system of signs. He emphasises that texts are not limited to written or verbal forms but encompass a wide range of semiotic expressions, including visual, auditory and gestural elements. Texts are thus not isolated entities but exist within a cultural and semiotic context, interacting with other texts and contributing to creating meanings. In this sense, Lotman's definition of a text is expansive and inclusive, recognising the multifaceted nature of communication in human culture (Lotman & Uspensky, 1978).

The texts shared on social media are digital representations, which factually machine-translated elements that uploaded by users and perceived by users as a part of communication process online on digital environments. However, syntactic, semantic and pragmatic function of these elements can be defined as digital representations, may be interpreted as texts, as an element of communication process created by user and mediated by AI and as artifact that can provide similar stimulation to users as tangible objects of material physical world.

Digital representations constitute a modern extension of the semiotic landscape. In the digital era, representations are no longer confined to physical or analogical forms but proliferate in digital formats. Manovich (2001) in "The Language of New Media" discusses how digital

representations, which include images, texts and sounds in digital form, are characterised by their modularity, variability and algorithmic nature (Manovich, 2001). These digital entities can be seen as texts in Lotman's sense, as they convey meaning through signs and symbols, albeit in a virtual format. The transformation of physical artefacts into digital representations exemplifies the fluidity and dynamic nature of semiotic systems in a digitalised world.

3.2. Modelling communication on digital environments: An ecosemiotic approach

Nöth (1988) defines ecosemiotics as delving into the semiotic connections between organisms and their surroundings:

> "ecosemiotics is the study of the semiotic interrelations between organisms and their environment. This definition presupposes that the center of interest of an ecological semiotics is not a homo semioticus, but more generally, an organismus semioticus. Still more fundamental is the question concerning the relationship between the organism and its environment". (Nöth, 1998)

Maran and Kull (2014) underscore the core principles of the ecosemiotic approach, highlighting its focus on studying the role of environmental perception and conceptual categorisation in the design, construction and transformation of environmental structures (Maran & Kull, 2014). While their work primarily examines the physical environment, it is imperative for this research to broaden this definition to encompass the perceived environment, which may encompass both the immediate physical surroundings and the digital realm.
The concept of "affordance" is extensively explored within the context of objects present in an environment, as they offer specific usability possibilities to users based on their needs and abilities (Gibson, 1977). In the domain of cultural objects, these characteristics are often envisioned by designers themselves. According to Gibson (1977, 2014 [1979]), affordance is neither a static property of the environment nor solely determined by users; instead, it emerges through the process of interaction and communication between them. Recent studies investigate affordances from two primary perspectives: the interaction between users and the environment (Nye & Silverman, 2012; Nagy & Neff, 2015) and the relationships between the designer, artifact and user (Osch & Mendelson, 2011; Shaw, 2017).
Valsiner (2005, p. 205) defines "scaffolding" as a form of guidance pervasive in human social and internalised personal lives. It operates as a generic process, manifesting in unique forms across various contexts. Thus, it can be hypothesised that social media platforms may influence users by facilitating both cognitive learning and various bodily reactions. Semiotics offers tools to comprehend how digital representations within these platforms shape self-perception, perception of others and the surrounding environment. Paolucci (2021) also elucidates how language can serve as a scaffolding structure for human cognition, shaping perspectives and enhancing cognitive abilities and understanding of the world. Similarly, all digital elements within social media platforms serve analogous functions.

3.2.1. Affordances of AI recommendations within social media

Digital platforms as environments provide their users' affordances and can impact the scaffolding process. Interaction practices and communication processes in HCI develop and change over time. Reeves and Nass (1996) introduced the concept of media equation, indicating that users are keen to assign to digital devices human-like qualities and treat them as they would be other humans. Users were noted speaking politely to the systems or being angry or annoyed with them. The voice used in systems (male or female) impacted how users reacted to the

information. During Reeves and Nass's observations, the primary users of digital devices were 20 years old or older and presumably were born in 1975 or before. In 2022 most users at age 40 or younger do not treat their digital devices like they are other living organisms. However, these interactions' structures and effects still need to be thoroughly studied. Moreover, there is a significant gap in understanding whether the affordances and interpretations users pursue on digital platforms, such as social media, depending on their capacities to receive environmental cues, may directly affect users' Umwelten or platforms primarily imply them and their designers using AI recommendations.

Affordance serves as a fundamental concept across various disciplines, including design, social studies and communications. Descriptive methodologies approach affordances from two primary perspectives: the relationship between the user and the environment (Nye & Silverman, 2012; Nagy & Neff, 2015) and the triadic relationships involving designer - artifact - user (Osch & Mendelson, 2011; Shaw, 2017). Drawing from Ingold's perspective on affordances (Ingold, 2009), users incorporate the functional qualities of encountered objects into their world according to their individual needs. Campbell et al. (2019) offer an extensive examination of affordances in the learning process, linking them to the concept of Umwelt. They underscore that organisms identify the properties of their environment rather than these properties being predetermined by the environment itself. The biosemiotics perspective by Campbell et al. (2019) provides an in-depth analysis of affordances in the learning process, linking them to the concept of Umwelt, where the properties of the environment are identified by organisms themselves rather than being predetermined by the environment. The concept of Umwelt, developed by Jakob von Uexküll (1982 [1940]) and Thomas A. Sebeok (1989), pertains to the specific sensory world of an organism. As demonstrated by Ingold (2009), every living organism creates affordances 1) within a given environment and 2) based on the perceptive capabilities of the organism itself, identified as the Umwelt. Biosemiotics primarily focuses on the physical dimension of communication between an organism and the environment. The case of AI-mediated social media is more complex: to access them, the user must possess a portable device, such as a smartphone or computer, Internet access and the ability to interact using fingers and so forth. The affordances of social media can be identified in how they organise their environment, comprised of positional and relational values, populated by texts, images, videos and audio.

One hypothesis regarding affordances in social media suggests that user interactions in the digital environment of these platforms, including the sharing of digital representations such as images, videos, texts and audio, may be influenced both by the intentions and inputs of designers in system features (AIRS) and by the affordances provided by the system itself. These interactions, consequently, adapt to the needs and capabilities of the users. In this context, AIRS can play a prominent role in structuring social interactions within the digital environment, manipulating the Umwelten of their users. Following the concept of Umwelt, perceptual organs play a crucial role: social media platforms, like TikTok, primarily rely on users' visual perceptual ability. The eye is the primary organ enabling users to interact with digital representations. Considering that social media is perceived similarly to the natural environment, users may experience holistic perception of selection of digital representations as part of a general message created by AIRS (Whitney & Leib, 2018). The categorisation process, subsequent to the perception process (Klinkenberg, 2015), is strongly imposed by the digital platform and AIRS, akin to holistic human perception in the natural environment (Mitchell et al., 1995), based on context (Russell & Giner-Sorolla, 2013).

Therefore, AIRS as affordances occur in the digital and physical relationship between a user and the environment. Although AIRS are present within the digital environment, they are recognised as affordances by a user playing a crucial role for human Umwelt. They provide users with the selections of audio and visual stimuli, which can be recognised and interpreted

as real objects and cause similar body responses as tangible objects (Hodzic et al., 2009; Zink et al., 2008). In this respect, the concept of environment is central to the definition of semiotics resources social media provide to their users. The environment would include embodied cultural and non-cultural stimuli of a physical world. These stimuli would persist in their digital extensions, which afford a user continuity of semiosis.
AI recommendations play a significant role in meaning-making for users in highly structured social media environments. The affordances of AIRS cannot be separated from the affordances provided by their environment. In the case of social media, users may recognise affordances based on their own needs. AIRS fulfil the function of collecting, evaluating and categorising data within an environment, collecting and categorising data about users and providing them with a weighted output. Based on these theoretical premises, AIRS can give the users the ability to

- receive categories of information based on their prior choices and behaviours,
- receive categories of information based on the choices of other users with whom they share some patterns in their choices and behaviours,
- create a shift in the central values within own Umwelt,
- create, unite and enclose social groups based on their social practices.

One of the main tasks of AIRS within the digital environment is to fill the function of dialogical relationships with users based on the information collected about a user's Umwelt. Based on this data, AIRS offer a selection of groups with similar properties to the categories known to be part of a user's Umwelt. This way, AIRS used on social media can evoke interpretative and emotive context by providing more information about the world through audio-visual stimuli. Also, the interpretation may vary among users and AIRS may influence users' self-actualisation and identification through self-monitoring and self-presentation to adapt to social conformity (Erz et al., 2018). In other words, users may find AIRS affordances to self-actualisation through self-presentation, self-identification and self-enhancing practices (Jakesch et al., 2019). Table 3 represents various types of AI recommendations' affordances for their users.

Self-actualisation	• self-monitoring • self-identification • self-presentation
Self-enhancing	Through digital representations via: • text • image and video, audio • social network
Scaffolding (on iconic and indexical relations)	Through textual elements and syntactic structures

Table 3 - AIRS affordances for their users on AI-mediated social media.

The affordances (Table 3) of social media can be considered two-directional. On the one hand, they are directed at the user's self and on the other hand, through the representation of the user's Umwelt, which expresses in decisions to actions, to the outer world. However, the capacities of AIRS are not exhausted at this step which can be considered final in the meaning-making process ending with a user. The textual representation expressed in language (natural or secondary) is the primary tool for accessing human Umwelt on social media.

3.2.2. Scaffolding process

Affordances provided by AIRs on social media influence the scaffolding process of users through three key dimensions: (1) syntactic constructions, (2) users' perception of digital representations as tangible objects and environments (semantics) and (3) users' responses to these representations through holistic perception, recognition and interpretation (pragmatics).
Scaffolding is a gradual process characterised by the establishment of "sign relations interlocking with and reinforcing one another and by so doing, providing directionality towards and away from other sign relations in the network, through the dynamic emergence and canalisation of semiotic pathway biases and constraints" (Favareau, 2015, p. 237). This scaffolding mechanism facilitates the creation of new pathways and enhances semiotic capacity. It can guide users toward adopting certain practices and habits, such as recognising digital representations as integral components of the platform's core values. From Deacon's perspective, scaffolding relies on iconic and indexical relations (Deacon, 1997, p. 86), as well as intertextual relations within AI recommendation-mediated digital environments.
AI recommendations, grounded in logic and statistics, offer affordances that empower users to craft syntactically accurate textual representations of reality. AIRs possess the ability to establish both weaker and stronger intertextual connections (Lemke, 1995) through syntactic links and repetitions, albeit not through semantics. While syntactic connections may encompass semantic specifications, these tend to be unsystematic, sparse and disorganised, thus lacking semantic coherence in a strict sense. Semantic components primarily reside within the domain of users. Filters play a crucial role in shaping digital representations with similar elements, facilitating their recognition by AIRs and ease categorisation (refer to Figure 24). Users frequently employ filters to produce cohesive videos with uniform syntax. Many users incorporate natural language comments to inject a comedic effect, thereby introducing a semantic layer. However, syntactically coherent constructions based solely on logical regressions may lack inherent semantic components. In such instances, the presence of semantic elements hinges entirely upon users and their preferences and intentions.

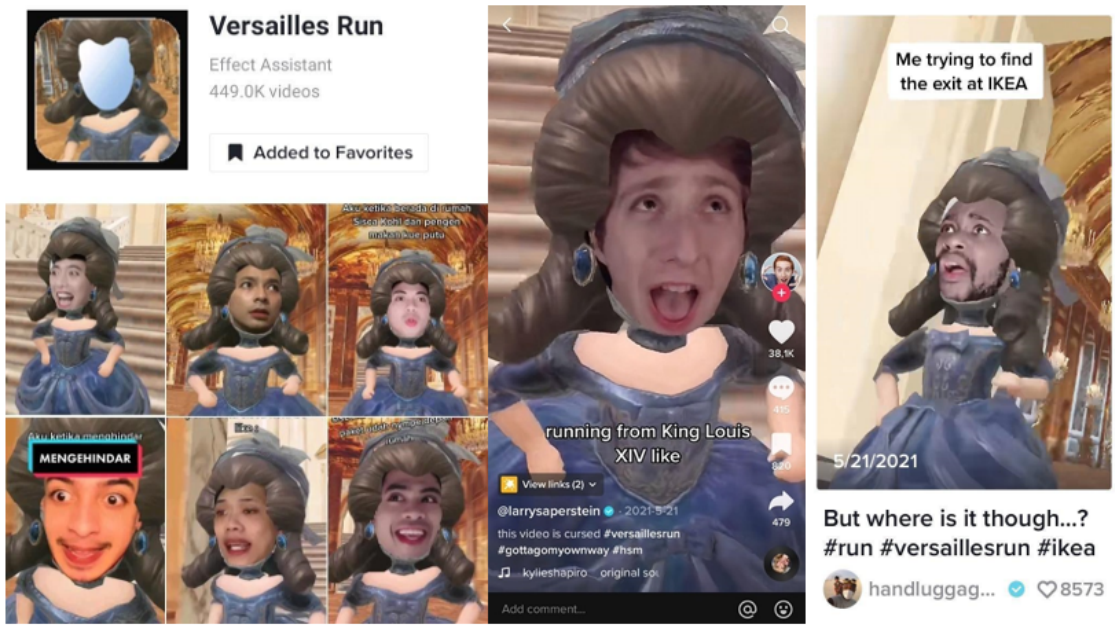


Figure 24 - Versailles Run is a popular filter used primarily on TikTok, but later also shared on Instagram and other social media.

The experiments confirm these theoretical premises: primed participants had less trust in the semantic component of the textual representations when told that digital representations were enhanced with AIRS tools. (Jakesch et al., 2019). In other words, AI recommendations' syntactic impact on the text and context makes users deliberately limit the meaning-making process. However, it is not happening when the AIRS component is not recognised within the text.

The question of recognition is closely connected to scaffolding and habit for users. To be meaningfully processed, texts and their elements should be recognised first as a specific category. Moreover, the more these categories stand outside the meaningful centre, the easier they can be recognised and identified as alien. However, the closer they are to the centre, the more they have to do with the scaffolding process. AIRS may create syntactic structures which cannot be semantically meaningful to the users. However, these structures can be adopted into habits after the scaffolding process. They may become semantically transparent and promote other affordances of AIRS for users. For example, textual constructions, including #hashtags in it, did not provide semantic value to the users when they were used for the first time and they performed a utilitarian function to AIRS rather than for users. However, today #hashtag-marked words are largely used in text messages even when they have no utilitarian need for AIRS and are directed only to another use in a private message, providing emphasis and accent on the superficiality of the object/action. These can be recognised in other texts exchanged on social media publicly or privately through natural or secondary languages.

3.3. Question of agency: Humans and AI

This paragraph analyses how user agency can be considered within AI-mediated environments like social media. To understand the concept of user's agency is essential to focus on specific aspects of user's Umwelt. The term Umwelt, introduced in works of Jakob von Uexküll (1957), denote an individual's subjective world and is inherent to understand how users exercise agency in digital spaces shaped by AI. It refers to the self-centred world unique to each organism. Uexküll introduced this term to describe the subjective universe that an organism inhabits, which is shaped by its sensory perceptions and biological capacities. In Uexküll's perspective,

each organism experiences the world differently, based on its sensory and operational capabilities. This means that the reality of an organism or its Umwelt, is not an objective, universal world but a subjective construction based on how it perceives and interacts with its environment. For instance, the Umwelt of a bat, which navigates through echolocation, is distinct from that of a human, who relies more on visual and auditory cues. In the context of AI-mediated digital environments, like social media, the environment is developed to provide users' organisms with sensory stimulation mainly oriented to visual perceptive organs (eyes – digital representations, primarily).

Uexküll's concept of Umwelt underscores the idea that different species live in different perceptual worlds, even though they may physically occupy the same space. In the context of AI and social media, the Umwelt concept is employed to analyse how users with different backgrounds, experiences and cognitive frameworks perceive and interact with AI-mediated environments. It emphasises that each user's interaction with AI is unique and subjective, shaped by their personal Umwelt or perceptual world.

The use of AI in digital platforms, especially social media, has transformed the way users interact, communicate and perceive their digital environment. To understand user agency in such environments, one must consider the specific aspects of the user's Umwelt, a concept that encompasses the user's experiential world, including their perceptions, interactions and interpretations. The concepts of Umwelt and agency inherently intersect in the process of decision-making. Semiotic agency refers to the capacity of living organisms, including humans, to interact with and interpret signs in their environment. This concept is grounded in the field of biosemiotics, which studies the production, interpretation and communication of signs in the biological realm. Sharov and Tønnessen (2021) explore how organisms not only respond to physical stimuli but also engage in meaningful interactions with signs, which are central to understanding their behaviour and evolution.

In the context of semiotics, an "agent" is typically an entity that has the ability to interpret and assign meaning to signs and then act upon that interpretation. This ability is seen as a fundamental aspect of life, distinguishing living organisms from non-living entities. Semiotic agency, therefore, involves a deeper level of interaction with the environment than mere physical or chemical responses. It encompasses the capacity for understanding, interpretation and decision-making based on semiotic processes (Hoffmeyer, 2008). The concept of agency extends beyond human communication and includes a wide range of biological phenomena, from the simplest organisms interpreting chemical signals in their environment to complex human interactions with sophisticated sign systems.

Concepts of Umwelt and agency in the context of digital environment, as a part of semiosphere, partly touch the question of sign systems which can elaborate from human-AI interactions which may uncover "the potential of complex systems to self-organize" (Sharov & Tønnessen, 2021). Users' own perception and exercising of their agency in AI-mediated social media environments can be seen of multiple levels, as presented in Figure 25.

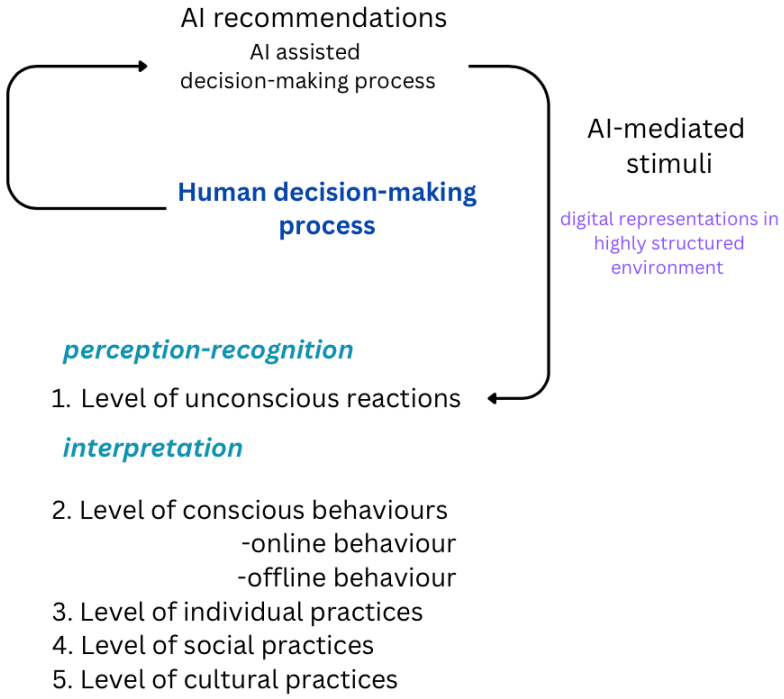


Figure 25 - Modelling levels of interpretation process in AI-mediated environments.

In summary, the experience lived through the digital environment can be perceived and interpreted similarly to the experience lived physically in the natural environment. Objects represented by digital environments and mediated by AI can be interpreted as physical objects, eliciting bodily reactions in users through the following levels that are not mutually distinct and independent, but for the descriptive purposes of this research are divided as following:

- perception and recognition
- categorisation via verbal concepts, affordances of languages
- categorisation non-verbal tools like practices, cultural affordances
- uncategorisable level

Importantly, the division into five presumed stages of interpretation presented above and in Figure 26, spanning from perception to interpretations at uncategorizable levels, as well as levels of individual, social and cultural practices, is proposed for descriptive purposes of this research. Perception and recognition are integral parts of the interpretation process and are not mutually distinct or independent. Perception naturally leads to recognition, which itself is a form of categorisation. The process of perception signifies the ability of perceptual organs to register the environment, yet it only gains significance to an organism once it is recognised. Recognition, on the other hand, denotes a form of categorisation wherein elements of the environment acquire meaning within the organism's Umwelt.
In the context of Human-Computer Interaction (HCI) and the role of human agency, it's essential to delineate the differences in the communication process between human-users and AI agents based on their respective Umwelten. Table 4 provides a comparison between the analytical and interpretive steps involved in processing input or perceived information by AI and human users.

AI recommendations:	Human communication:
-recognition -articulation via categorisation	-experiencing -recognition -interpretation -articulation via language -reflection in non-verbalizable generalisation

Table 4 - Comparison between steps in analysis and interpretation of input/ perceived information between AI and human user.

3.4. Unfolding human-user communication in AI-mediated environments

The multi-level process of interpretation, grounded in users' Umwelt, bridges the biological level of perception with cognitive levels of recognition and categorisation. This ultimately culminates in interpretation, a process in which users exert their agency. Social media as digital environments are in constant change and manipulated by AI. Therefore, users constantly adapt according to information from both online and offline environments, perceived holistically as a fusion of immediate physical environment and its digital representations. An examination of the underlying cognitive processes is needed to comprehensively grasp the influence of digital representations shared on social media platforms on an individual's Umwelt and their subsequent interpretation as components of the natural environment, tangible objects. This analysis necessitates an exploration of the intersection between virtual stimuli and human perception, as outlined by Gibson's theory of affordances, which posits that perception is fundamentally shaped by the actionable properties that an environment offers an organism (Gibson, 2014 [1979]), as discussed above in this chapter. Moreover, the concept of Media equation, proposed by Reeves and Nass (1996), which suggests individuals interact with media and computers as they would with real human beings, offers a lens through which to assess the psychological impacts of digital elements on the human mind. Additionally, the research by Turkle (2011) on the fluidity of identity in online spaces underscores the complexity of how virtual representations can become entwined with an individual's sense of self and reality. Collectively, these theories provide a comprehensive understanding of the cognitive mechanisms at play in the assimilation of digital representations into the human Umwelt within the context of social media, but do not provide descriptive explanations.

3.4.1. Perception level and recognition level

There is an inquiry regarding whether perception precedes recognition. Two scenarios can be proposed: first, stimuli are perceived through sensory organs but not recognised, remaining as noise in the environment or system; second, stimuli are recognised at some level, integrating into the semiotic processes of an organism. When sensory organs enable the perception of certain stimuli from the environment, they can be recognised at conscious levels and later interpreted through tools facilitating the meaning-making process. When discussing the perception and recognition processes of human users within digital environments, it's pertinent to highlight the targeted sensory organs aimed at providing stimuli. Specifically, digital platforms, particularly social media, emphasise a diverse array of colourful digital

representations that stimulate the visual perceptual system of human users. This assertion finds support in the evolving approach to digital representations over the past decade.
Individual digital representations, such as images and videos, undergo enhancements in resolution, sharpness, colour grading and other tools. These enhancements not only enhance their realistic portrayal of tangible objects, as perceived in the material world, but also enrich their syntactic qualities in relation to the context of other digital representations. Collectively, these representations construct a perceptual environment.
Aligned with their own Umwelt, users exercise agency online by crafting digital representations that are realistic and may or may not depict tangible objects from the physical world. While digital representations primarily consist of syntactic and semantic texts within digital environments, they often evoke the perception of tangible physical objects. This phenomenon can be attributed in part to the holistic perception human users possess toward their surrounding environments, whether physical or digital. Cognitive semiotics offers tools to elaborate on existing knowledge to describe how perception of digital representation is transformed into their categorisation as tangible objects of reality.
Paolucci (2021) explains this process as our brain tries to guess information not available about the environment that ultimately corresponds to evolving sensory data, influencing the way we perceive the world and eventually re-creating a mental representation of real objects of immediate physical environment. Applied in the case of perception on social media, it forms a bricolage between the physical world and AI-mediated digital stimuli. In this context, self-perception and the perception of others on social media can be associated with a form of 'controlled hallucination.

> "[...] by 'controlled hallucination', I mean the product of the imagination controlled by the world. The way in which we match the 'hallucination' of imagination with the "control" of the world is through diagrams and narratives. The main idea is that 'hallucination' is the model of perception and not a deviant form of it. With 'hallucination', [...] I mean the morphological activity of the production of forms by the imagination, which remains crucial both when it is not controlled by the world— as in the case of hallucination, imagination or dream — and when it is controlled by the world, as in the case of online perception." (Paolucci 2021: 127)

Applying the concept of controlled hallucination, relevant considerations emerge regarding the role of control in describing the hallucination based on perception, governed by the digital environment represented by social media. Despite the nature of such platforms being considered far from the natural environment, they are perceived holistically, aligning with Paolucci's perspective (2021) on the connectivity between organisms and their environment, between mind and matter. This perspective convinces users of the materiality of the digital representations they interact with. In other words, users of AI-based social media tend to perceive them as an extension of the natural environment, integrating digital representations into a holistic view of the world. This perception involves intensive cognitive processes, as users must continually adapt to the digital environment and its affordances while maintaining an ongoing connection with the physical world. This ongoing negotiation between the real and the digital can result in a significant cognitive load and, in the long term, may lead to stress and digital burnout (Arkhipova 2023, Arkhipova 2024). Studies cited by Liu and Ma (2020), Shao et al. (2021) and Sharma et al. (2020) provide evidence of the relevance of such negative effects.
In summary, users' perception of AI-based social media is profoundly influenced by the relationship between the organism and the digital environment, resulting in a holistic experience and materiality attributed to digital representations. The hashtag #horseface has

gained significant traction, serving as a prominent tool for users to explore and uncover related content (Karamalak et al., 2021). Beyond its role as a mere hashtag, it also functions as an augmented reality (AR) filter, seamlessly morphing human faces into equine visages within the confines of a short TikTok video. This paragraph delves into the affordances provided by this filter, shedding light on the pivotal role of AI recommendations in amplifying its reach to a broad audience. Moreover, it examines how this exposure shapes users' learning experiences through the scaffolding process.

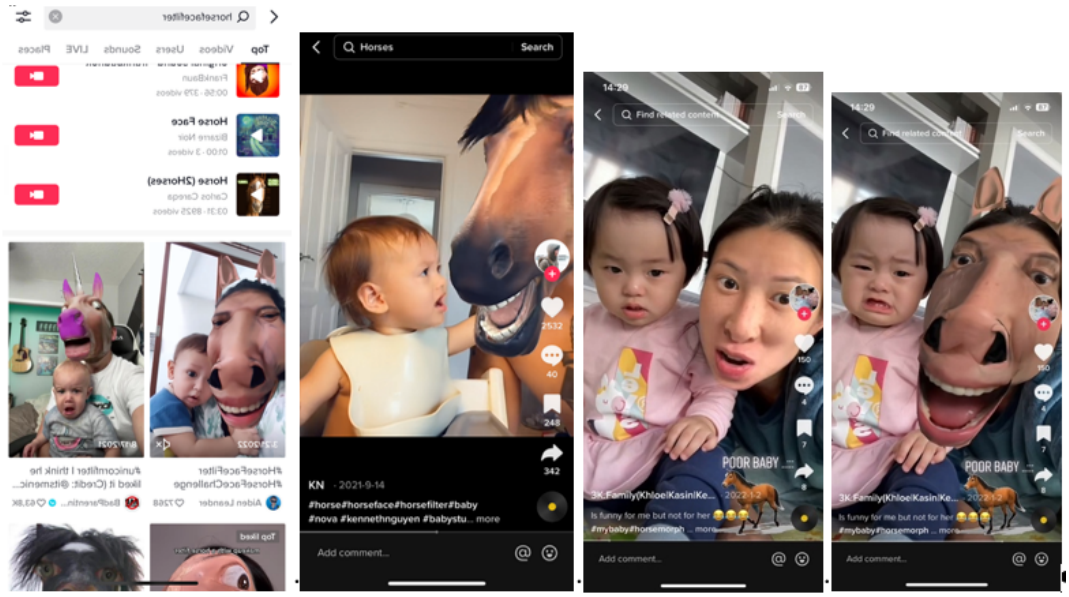


Figure 26 - Examples of “horse face filter” on TikTok.

The Horsehead filter was initially launched on Snapchat and subsequently adopted by TikTok under the name “horseface” (Figure 26), gaining considerable popularity through AI recommendations. Users can employ it to experiment with digital masking and share videos of these transformations. On TikTok, this filter gave rise to the challenge known as #horsefacefilterchallenge, where adults try the filter while their children observe the transformation on the smartphone screen. According to data provided by Google, approximately 31 million videos have been published using this filter. The videos shared online demonstrate that children, after observing the transformation of the adults' heads into that of a horse, appear frightened and begin to cry, gazing at both the screen and the physical presence of the adult. In some videos where children react differently from crying, there is an element of surprise among the adults regarding their children's reactions, as the expectation, also created by other similar suggested videos, was that they would interpret these digital representations with fear or tears.

The affordances that users find in using the “horseface” filter on TikTok are based on their Umwelt, their needs and their capabilities. These affordances are closely linked to the function of AI recommendations. The majority of users participate in this experience, which involves creating a video with a child, for three main reasons: 1) exposure to the filter was suggested by AIRS; 2) they seek to experiment with alterations in their cognitive and physical state inspired by the reactions observed in other users' videos; 3) they hope that AIRS can identify their video, recommend it to other users and receive reactions and feedback from the rest of the online community. However, the results indicate that most users expose children to a potentially stressful experience, where “controlled hallucination” can occur in the digital environment (Paolucci, 2021) and this can influence how children learn to understand the world.

Furthermore, TikTok imposes tools of interpretation, as highlighted by Valsiner et al. (2023) classification, especially in contexts of complex experiences by offering categories through AIRS in repetitive texts and textual elements used by algorithms to manipulate elements within the platform's space.

3.4.2. Interpretation level and categorisation level

The interpretation process can be modelled through the various steps of categorisation at different levels, as proposed by Valsiner et al. 2023:

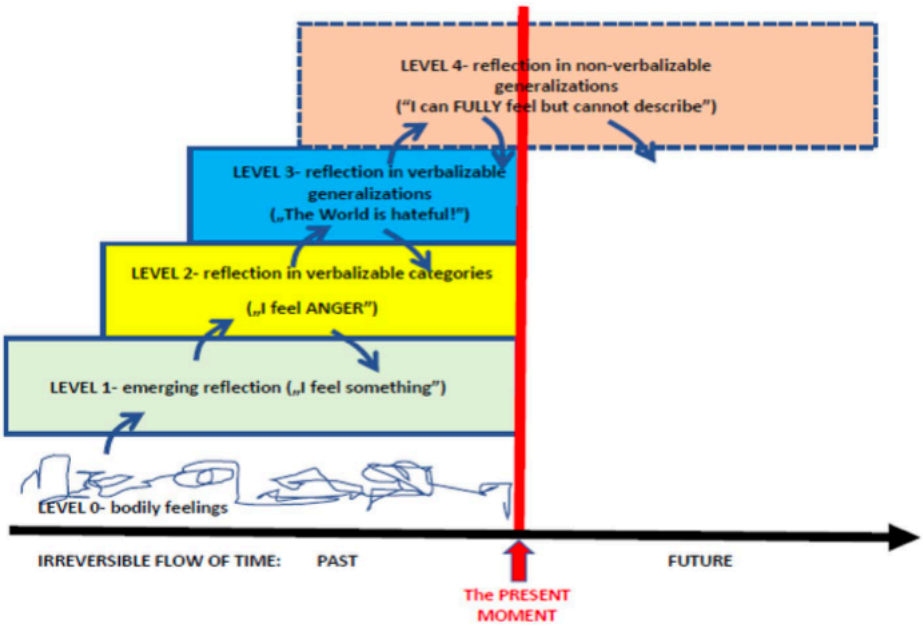


Figure 27 - "Levels of categorisation via language and interpretation in the hierarchy of signs" by Valsiner et al. (2023, p. 583)

The categorisation for users is part of a structured interpretive process at different levels. Valsiner et al. (2023, p. 584) propose a model that identifies five levels of interpretation. Level 0 concerns bodily sensations based on perceptual organs (e.g. in the case of digital representations, colour, contrast, shapes, etc.), while level 1 involves emerging reflection (e.g. users realise they are interacting with something that will be categorised and interpreted at subsequent levels). At level 2, there is reflection in verbalizable categories, which, in the case of social media, includes categories offered through AI (e.g. repetitive texts used by algorithms). Level 3 involves reflection in verbalisable generalisations, such as recognising an influencer based on the number of followers or viral click-based videos. Finally, level 4 pertains to reflection in non-verbalisable generalisations, representing holistic perception and potentially influencing level 0. In the context of users' interpretative processes on social media, it is hypothesised that affordances are present at all levels.
An example of Valsiner et al. (2023) classification can be found in the study by Kramer et al. (2014), which demonstrates how AIRS influence users' perception through audio-visual content such as texts, images and videos. During the experiment, some users received a selection of positive news, others received negative news, some chronologically and others randomly for various weeks. Users with negative news tended to post negative messages, highlighting the effect of AI in content categorisation and user learning based on

recommendations. On one hand, this confirms that the perception of oneself and others in digital environments and in natural environments is similar, confirming a general trend already demonstrated by Baumeister et al. (2001). On the other hand, it underscores the role of AI in the categorisation process adopted by users and how AIRS influence their scaffolding process, based on the opportunities provided by social media.
Valsiner et al. (2023) discuss the categorisation process through the affordances found in natural language, as presented at Level 2 (verbalizability and concepts). However, in the context of digital environments digital representations can serve as affordances for categorisation process. In this process users may find digital representations as useful categories to describe their experiences (like using emoji (Danesi, 2019) to describe their emotional condition stimulated through visual and audial stimuli) or more complex digital representations to categorise enunciate the experience transforming it into meaningful component of own holistic generalisations about the world, as presented at Level 3. An example of a holistic generalisations about the world enunciated in digital representation can be a syntactically repetitive images on social media among users which meant to signify for them and for others socially approved values, which are often simulacrums: success, happiness, richness, freedom, etc. The image below (Figure 28), a collection of nine very similar photos from different users, did become very popular way to communicate to others and raise awareness (of other users and AIRS) about own decisions as a caring person and member of society, protecting others from potential danger to infect them with the COVID virus.

Figure 28 - Instagram account @influencerselvaggia collecting pictures of users sharing their experience of taking COVID test.

3.4.3. Generalisation level

At the culmination of interpretation lies the generalisation level, characterised by repetitive actions indicative of individual, social and cultural practices. This research posits that AI-mediated digital environments, such as social media, can stimulate users, potentially eliciting

stress reactions. Here, stress reaction can refer to the organism's adaptation to environmental changes, a process deeply intertwined with the organism's reaction rather than the stimulation itself (Favareau, 2015). Consequently, stress can manifest as a process that influences the user organism's Umwelt and lead to changes across all levels of interpretation and response, discernible through online and offline behaviours and practices.
Users' interpretations have been shown to influence psychological conditions and bodily shifts, as demonstrated by studies examining the impact of verbal constructions on individuals (Adler et al., 1976). These experiments revealed that verbal constructions related to negative aspects of social status and self-identity could lead to changes in speech speed and blood pressure. Consequently, it is reasonable to suggest that various cultural texts may elicit similar effects on the human body. Therefore, it can be hypothesised that users may experience physical, cognitive and axiological effects, influencing their decision-making processes and behaviours on individual levels. These effects may include: 1) adapting and navigating an environment with incomplete knowledge; 2) engaging in multitasking across multiple environments simultaneously; 3) encountering categorisation as a syntactic element within the environment, limiting expressive communication process on users based on its syntactic elements of digital environment; 4) perceiving self and others; 5) experiencing feelings of control and stress anticipation within AI-mediated digital environments, such as social media. Furthermore, these individual effects may precipitate changes on social and cultural levels.

3.5. How AIRS can coerce users to conform and navigate environments despite limited knowledge

The scaffolding process involves an organism adapting to its environment or modifying the environment to suit its needs. In human interactions with digital environments, this process often entails adjusting the chosen environment to alter habits, essentially influencing one's own scaffolding process. This phenomenon, often termed escapism in communication studies, refers to the ability of new media to facilitate a transition from one context to another. From a semiotic perspective, escapism involves replacing one context with another to reshape the system and affect its Umwelt meaningfully. While digital environments offer opportunities for this process, they are typically limited in semantic and pragmatic aspects. When users engage with social media, they initially embark on a journey of exploring a new environment. They create a digital profile, essentially a representation of themselves in the form of cultural texts and begin to receive stimuli from this new digital realm. As users navigate this environment, they realise they can manipulate their digital representations, thereby exerting control over their digital surroundings. AI recommendations play a pivotal role in this process, assisting users in customising the digital environment to align with their preferences and needs.
Initially, users' immersion in the digital environment demands significant attention, often diverting focus away from their physical surroundings and potentially leading to safety hazards, such as using a phone while driving. Over time, prolonged exposure to the digital realm can impact users' perception and Umwelt. Moreover, the tailored digital environment created through AI recommendations allows users to shape their own Umwelt according to their desires. Terms like “information filter bubbles” and “echo chambers” describe situations where AIRS contribute to users perceiving the world as less diverse and more aligned with their central values. However, prolonged exposure to the digital environment, coupled with multitasking and overstimulation, can lead to attention deficits and incomplete information processing. This may result in users misinterpreting their physical environment as an AI-mediated digital space where central values mediated through AIRS.
Therefore, AI-driven digital environment influence users’ perceptions of central and peripheral values, while users simultaneously shape their own environment and scaffolding process. This

dynamic interplay necessitates constant adaptation to multiple environments, immediate physical and digital, perceived holistically. As digital environments lack explicit information and constantly evolve based on AIRS, adapting to these environments becomes a cognitively demanding task that may contribute to maladaptive behaviours, frustration and stress.

3.6. How AIRS can compel users to multitask across multiple environments simultaneously

Multitasking inevitably divides attention among various stimuli, resulting in users receiving information only partially (Beuckels et al., 2021). This limitation can manifest across different levels, particularly affecting interactions within highly structured environments like social media. Aru and Bachmann (2017) demonstrated that perception is heavily influenced by attention and expectation. Participants in their study reported "seeing" non-existent objects in highly structured and repetitive environments after an exercise period. Despite the absence of these objects, respondents affirmed their presence, indicating how structured environments can shape perception. In the context of social media, characterised by textual repetition to facilitate algorithmic recognition, users may subconsciously recognise and "remember" objects absent in digital representations, experiencing arousal without conscious processing via iconic memory. The timing between AI recommendations and users' recognition processes differs significantly. Users require additional time for perception, recognition and interpretation, delaying subsequent cognitive processes. Consequently, AI-driven decision-making on social media cannot be equated with human decision-making, increasing the likelihood of users encountering irrelevant or "noisy" content selected top-down by designers rather than bottom-up by users.
This phenomenon contributes to users' overstimulation by AIRS, imposing a rushed decision-making process that depletes ego resources (Baumeister, 2014). It correlates with overexposure to social comparison and limitations in exercising self-control. On social media, self-control often involves suppressing natural reactions due to the lack of adequate tools for articulation in primary and secondary languages provided by the platform.

3.7. How AIRS can induce categorisation processes in users through syntactic elements in digital environments

The model proposed by Valsiner et al. (2023), Figure 27, delineates four levels of interpretation, with only one level explicitly addressing the potential for categorising experiences. This model can provide insight into how the holistic perception of human-users operates within a digital environment. In most digital encounters, the amalgamated experience of the immediate physical environment and its digital representations presupposes what users perceive through their sensory organs. At the third level of generalisation, reflection ion verbalisable generalisations, AIRS can assume a crucial role by utilising verbal language and linguistic categories to suggest categories that users can employ for articulation and enunciation. However, objects or aspects that cannot be translated into digital representations cannot be assigned a value for AI recommendations. With prolonged interactions on social media and ongoing fitting processes, users may internalise this intranslatability through scaffolding, thereby avoiding recognition of the fourth level of hyper-generalisation, such as reflections in non-verbalisable generalisations. This avoidance can profoundly influence their subsequent experiences, behaviours and practices.

3.8. How AIRS can influence perceptions of self and others

Human communication relies on a multitude of elements, encompassing both verbal and non-verbal signs. In interpersonal interactions, individuals often rely on cues such as facial expressions and body language to decipher the intended message of others. Various regions of the brain are engaged in processing these signals, with particular emphasis placed on facial expressions due to their high expressiveness, aiding in the understanding of others' intentions. The Theory of Mind framework, primarily explored in the context of child development but also relevant to adolescents and adults, elucidates how individuals perceive and comprehend the mental states, attitudes and beliefs of others (Astington, 1995; Firth & Firth, 2005; Carlson et al., 2013; Happé, 1994; Schneider, 2017). It is based on the possibility of perceiving and interpreting various signs used in communication, often culture-specific

In mediated communication, such as interactions on social media platforms, users are deprived of the full spectrum of communication tools, including facial expressions, which can significantly impact message interpretation. Nonetheless, users may perceive digital cues, yet incomplete, as substitutes for traditional non-verbal signals, incorporating them into their interpretation process. However, digital representations are subject to manipulation by digital tools, including AI recommendations, further complicating the interpretation of online interactions and potentially leading to cognitive biases.

The concept of an extended social network refers to the expansive web of connections individuals maintain on social media (Babu & Kanaga, 2022), where they interact with numerous individuals on a daily basis, either actively or passively. Research on network size and synaptic connectivity has revealed correlations with phenomena such as social comparison, which can elicit physiological responses akin to those observed in physical pain (Singer et al. 2005; Takahashi et al. 2009), potentially triggering stress reactions and affecting the endocrine system. Despite these physiological responses, users may outwardly appear calm while passively engaging with social media content from the comfort of their chair.

3.9. How AIRS can elicit feelings of control and anticipation of stress concurrently

According to various experiments, individuals may react differently to stimuli depending on whether they believe they have any influence over the situation or not, as well as when they are forewarned about unpleasant stimulation. One notable experiment highlighted in Schonecke and Herrmann (in Adler et al., 1976) suggests a potential link between anticipating a stressor and the sense of control, leading to physical changes within an organism. Results indicate that the anticipation of stressors can have a greater impact on the body than the actual physical stimulation itself. Moreover, the belief in having control or the ability to influence how stressors are introduced can result in more profound and prolonged arousal compared to control groups where subjects experience the direct physical impact of a stressor. These experiments discussing the impact of anticipating a stressor and the sense of control were conducted in both animal studies and studies involving human participants (Juster et al., 2012; Popovic et al., 2022).

Digital texts sorted by AIRS can evoke anticipation of potential stressors by heightening arousal in individuals. Simultaneously, users are led to believe by the digital environment that there are tools available to influence these stressors. Thus, various digital representations can be viewed as stressors, ranging from natural disasters like famine, war and floods to more complex stressors such as social comparison.

Users may develop an illusory sense of control and perceive they can influence their environment based on the information presented by social media. Building on the previous argument, the syntactic alignment refers to the accuracy of digital representations compared to

the physical world, while the semantic and pragmatic components do not fully support this alignment. Additionally, users are exposed to potentially negative digital representations of stressors, thereby triggering anticipation of stress. The syntactic connections created by digital representations are recognised and interpreted as opportunities to control the stimuli received from both the physical environment and its digital representations. Consequently, social media users are consistently exposed to and overstimulated by AI recommendations, resulting in anticipation of stress. Regular use of social media and other digital platforms featuring AI recommendations may lead some individuals to develop anxiety as a bodily response initially and as a cognitive mechanism subsequently.

Chapter four -
Theoretical framework: a semiotic approach to translate experience on AI-mediated environments

4.1. A semiotics approach to AI-mediated communication: From the theoretical level to data collection and analysis

Chapter One considered communication within AI-mediated contexts, where human decision-making processes are significantly entwined with both direct and indirect interactions with AI-mediated components, a ubiquitous phenomenon in contemporary society. Chapter Two delved into exploring predominant strategies for managing AI-mediated communication. It proposed a semiotic perspective as an alternative to the current algorithmic paradigm grounded in logic, mathematics and statistics. Chapter Three narrowed its focus to specific facets of the decision-making and interpretation processes, drawing from various dimensions encompassing the human body, cognition and social and cultural dynamics within the ever-growing digital expansion. This chapter establishes a semiotics-driven methodology to address the issues previously expounded upon in the preceding chapters.

Semiotics still lacks a unified theory for approaching the interpretations of AI-mediated digital environments and their elements and mechanisms and impact at individual, societal and cultural levels. Leone (2021) and Marino and Surace (2023) suggest that semiotic analysis has vast variety of tools and methods that can be used for collecting primary data and its analysis. In response, this chapter constructs and develops the methodological framework for the empirical study of the multiple interpretations of AI-mediated digital environment and what influence AI can have on their users. It aspires to synthesise the findings gleaned from the theoretical analyses presented in the antecedent chapters. By employing semiotics analysis as a tool, it aims to offer a methodological framework capable of substantiating the hypothesis concerning the influence of AI-mediated environments, particularly AI recommendations, on the decision-making and interpretation patterns exhibited by their users.

However, it is essential to note that some forms of arousal and changes in behaviours and practices can seize the effects of these tools. Thure von Uexküll describes the human Umwelt as a symbol system with an ego expressed through language (T. von Uexküll, 1972). He states (T. von Uexküll, 1972, p. 419), “clinical experience shows that men also live in subjective worlds which influence their behaviour and their bodily response” cannot be accessed by an observer but can still be partly seized by analysing the actions of individuals express themselves with. Therefore, analysis of cultural texts social media users creates and how they interact with them can help explain how the changes caused by daily interactions on social media can be used to understand HCI. Semiotics modelling of interpretation on AI-mediated digital environments where AI plays the role of mediating agent of digital representations (texts):

- Experience-to-text – perception to categorisation process via affordances found in digital environments.
- Speech-to-text refers to a process of enunciation on the meta-level from the first levels of experience and categorisation via affordances found in digital environments, like social media, to categorisation on the higher level of reflection through linguistic tools and cultural narratives, where repetitive elements like isotopies can be identified.
- Text-to-culture is a semiotics-based method of analysis of experiences enunciated through texts that contribute to cultural dynamics.

4.2. Experience-to-text: individual (pre)cognition in cognitive semiotics and biosemiotics

After examining the modelling of communication processes within AI-mediated digital environments. With an emphasis on affordances and scaffolding, this paragraph delves into elucidating how these phenomena are expounded through a comprehensive, multi-level interpretation and decision-making process concerning digital, physical and integrated experiences. It explores how such experiences can be accessed and amassed among individual users of social media platforms. In this respect, semiotics can offer tools for accessing and interpretating of the experience of digital environment, the experience of physical or immediate environment and the whole integrated experience (holistic perception).
This research approached the discussion on perception process and interpretation of environment in the previous chapter, specifying importance of concept of Umwelt for users of digital environments as equally significant as for immediate physical environment dwellers. Continuing this discussion regarding human-user experience online as an organism interacting between several various environments which can have significant difference in the way they provide stimuli, it is crucial to underline how the perception and experience transforms into interpretation and description, for example in a form of speech or text. Various studies suggest that perception and experience is primarily holistic and only then it can be analytical under the impact of culture (Nisbett & Miyamoto, 2005). This means that organism perceives all stimuli from the environment as whole and only later identify what stimulus caused arousal. In the chapter "Scientific theory: a bio-psycho-social model" that Thure von Uexküll and Wolfgang Wesiack (1976) concentrate on how biosemitics approach, specifically introduction of works of J. von Uexküll, can contribute to modelling in psychosomatic medicine. Their contribution underlines how somatic system and psychic system works together in interpretation process and behaviour. They suggest that "certain chemical substances in the body fluids, in appropriate concentration, be transformed into a psychological stimulus", which can contribute to the interpretations and behaviours (T. von Uexküll & Wesiack, 1976). Following the discussion in Chapter Three, where we hypothesised that digital environments can cause users stress reaction through digital representations overstimulation (including rise of various hormones like cortisol), which can continue when they interact with physical or immediate environment. Moreover, the aspect of the perceiving both environments holistically would cause integrated experience. This impact interpretation of these experiences and therefore decision-making process.
In the discussion on a possibility to access users' experiences, it is important to acknowledge the limitations and opportunities of self-description process of individuals:

> "A description of the human organism as a hierarchy of systems in which sign processes are being translated from systems of the lower into those of the next higher level and vice-versa deserves a model that we can today only conceive as a very general and to a large extent abstract framework. As soon as we envisage such a model we become aware of the gigantic task before us: It is identical with the elaboration of general semiotics, in which human sign systems of both an a verbal and a verbal nature, sign systems of animal and plant communities, as well as intra-organismic and even intracellular sign systems are being developed as disciplines both distinct and connected with each other. This is the task that Sebeok (1976) has clearly formulated with his terminology of anthropo-, zoo- and endo- semiotics". (T. von Uexküll, 1982, p. 213)

In the context of research on social media, users' behaviours and decision-making that are part of communication process can be accessed through speech and texts, as a self-description process of how they perceive their environment and interpret it.

> "Shands (1977) has shown that at this — specifically human — boundary, translations between analogous and digital sign processes must be performed and that these translations can only be accomplished in situations with special social and individual conditions: socially, a very close relationship between at least two individuals is required; individually, these translations — and with them the Origin of speech' — occur only in 'states of feeling of surpassing intensity' — for instance, when a child experiences a feeling of unity with other human beings (usually the mother) in preverbal periods. They involve a symbolic mediation, where an external code formulated in a linguistic symbol system must be learned in a process of internalization (Shands 1977: 108). With the acquisition of speech, language begins to shape our experience of reality and can thus become a source of pathological developments as well". (T. von Uexküll, 1982, p. 214)

These elements inevitably play a role in the user's (organism's) decision-making process and behaviours. However, not all of them can be grasped to model to be included as a part of AI-assisted decision-making. Therefore, the texts users create online in a form of digital representations represent their own Umwelt in relation to digital and material environments in which they are emerged. However, it is important to consider that these digital representations are part of the communication process and, therefore, presume a receiver. The receiver is meant to be a human addressee, as well as a non-human algorithm, as discussed in previously in Chapter Two.

Interpretative theories in the literary domain offer a wide variety of modelling of communication process. The "Model Reader" concept, introduced by Umberto Eco (1979: 7-11), implies how the text can shape the interpretation process, imposing some interpretations over others:

> "To say that interpretation (as the basic feature of semiosis) is potentially unlimited does not mean that interpretation has no object and that it 'river runs' merely for its own sake. To say that a text has potentially no end does not mean that every act of interpretation can have a happy end". (Eco 1990: 143)

Marrone, one of the scholars of Umberto Eco, re-proposes the concept as a "Model User" (Marrone, 2009, Marrone, 2013), describing the interpretation process of the designer's intentions within environments. The interpretation of Marrone similarly can be applied to a social media user as the "Model User" as an intended user of digital environments that interacts with its (environment's) elements as with texts. And following the argumentation established in the Chapters Two and Three, the elements of digital environments can be considered as texts in broader terms, as proposed by Lotman.

Communication process through the text on digital environments can be considered through its duality, as presented on Figure 29. On one hand, AIRS impose texts and context for their interpretation on users through mediation process. On the other hand, a user perceives and interpret own experiences through AI-mediated text and then enunciate own decision-making through text based on affordances found in AI-mediated environments. Therefore, text as an element on social media can offer linguistic categories that can be used for the categorisation process of user's integrated experience of both digital and physical or immediate environment. At the same time, a text can be considered as one's personal experience enunciated as a decision-making process in their texts. It is thus possible to hypothesise that text can function as a tool for categorisation of a segment of experienced semiosphere as a part of one's Umwelt.

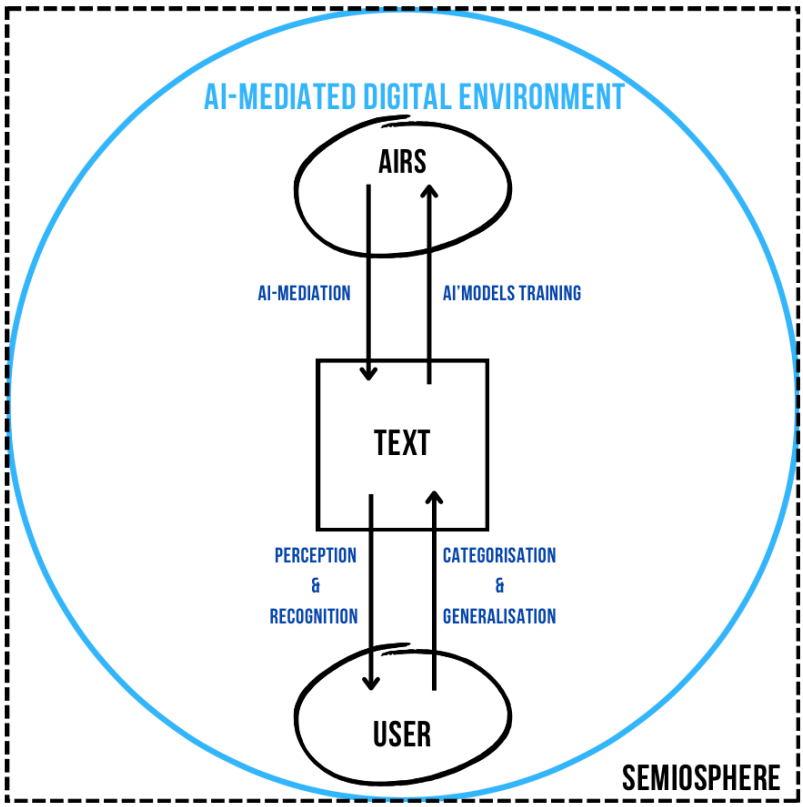


Figure 29 - Duality of the process of interpretation and enunciation via text.

The interactions through the text can be grasped through the enunciation through the text. This can include forms of enunciation online via digital representations (photo, video, text in natural language, comments, platforms' structure syntactic types of engagement like likes, share/repost, etc.), as well as reflection and description of own experience in form of natural language during communication.

This process described during enunciation of one's experiences represents a cultural translation based on individuals' perceptions and interpretations (T. von Uexküll, 1972). This interpretation process also presumes categorisation at the verbalisable and non-verbalisable levels (Valsiner et al., 2023). Therefore, based on the previous research, possible to presume that the process of enunciation through verbalisation, as a translation of one's experience into categories present within the cultural apparatus of natural language, can also be shaped by AIRS output and categories defined by the design of social media.

Based on the cognitive sciences approach and aims to identify social and cultural values, highlighted as isotopies in participants' responses. It also refers to a biosemiotics aspect of the *speech-to-text* translation when identification and naming of own experiences define subsequent actions, as also pointed out by T. von Uexküll (1972) in a psychosomatic aspect of human communication when users' experience is translated through the capacities of natural language.

Digital representations, as a form of enunciation, are shared online and exchanged by social media in the form of text in natural language or the form of audio-visual representations. These texts ordered by AIRS for each user, create a digital environment where users interact directly (in private direct messages) or indirectly (via posts, comments, likes, shares and others).

Hence, the categorisation within natural language, which users may employ to articulate their modes of communication, interpretation and decision-making processes on social media, facilitated through AI-mediated textual interactions, serves as an index of the implied "Model

User" interpretation. This interpretation is shaped by pertinent intermediaries. In this instance, the relevant intermediaries are not solely the authors, as conceptualised by Eco or the designers, as suggested by Marrone. Instead, they constitute a mediated agency. This is not an independent agency but rather a fusion of developers and designers (algorithms), user-contributors and creators (text) and the environment (context), all mediated by AIRS and acknowledged by the user.
Therefore, it is relevant to focus on analysing the user-expressed texts in speech (the interviews) on the repeating similar elements rather than search for differences, which can be individual, culture-specific, etc.
Figure 29 presents a two-directional communication process which includes 4 possible Model Users, where text performs the function of a communicative tool, providing instructions that can be recognised and interpreted as a message. This model focuses on AIRS as agents on social media but can be applied to most current-generation AIs. An important aspect of this communication process is that it represents the stage of co-decision between AI and human agency in relation to text.
In AI-mediated environments, the decision-making process is intricately linked to textual elements. These texts serve as gateways for researchers to delve into a user's cognitive, axiological and pragmatic dimensions through the act of enunciation:

- Digital representation is an AI mediated text categorisation.
- Description of one's experience is speech-to-text categorisation (semi-structured interviews, as a proposed case study for this research, see Chapter Five).

4.3. Speech-to-text: Interpersonal communication, isotopies and text analysis

Act of enunciation, as proposed in the work of Émile Benveniste, involves delivering a spoken or written statement, emphasising the contextual dependency of core language elements like the pronouns "I" and "you". Benveniste contends that formalist and structuralist language analyses neglect the crucial influence of unique circumstances on these elements. Enunciation, therefore, delineates the process through which a speaker or writer assumes the position of a linguistic subject. Benveniste asserts that all language acts are fundamentally dialogical, despite temporal and spatial separations in speaking, listening, writing and reading (Smith, 2021).
Enunciation is largely used in works of structuralism to poststructuralism in approach to literary theory and in schools that follow this approach. Enunciation as a term provides descriptive tools to highlight the shift involved moving from viewing language as a signifying system to examining discourse as a spectrum of processes governed by formal and informal rules. Attention to the enunciative situation, including who is speaking, to whom and why, is essential. The linguistics of enunciation raises profound inquiries about language's role in shaping subjectivity and exerting discursive power and is primarily discussed in application to various fields, including the digital dimension (Marino, 2022; Lima Neto & Araújo, 2015). Lima Neto and Araújo (2015) discuss the term hypertext, which includes text, image and sound is enunciation digital mode. In other words, adopting their discussion on the convergency of expression online and offline, which users may use and which can be converted into data, would show an act of enunciation and should be strictly interconnected through individual subjectivity of the linguistic tools available.
This way, the act of enunciation has common grounds with the statement of T. von Uexküll on translation problem from experience to categorisation and expressing it in the available language, whether natural language (English, Italian, Estonian, Dutch) or the language of audio/(and)visual texts, largely used online or even through the syntaxis of the platform. Often

it can be used all together. And questioning users about their experiences and behaviours online in the form of an interview can provide (a type of secondary reflection) a second level of enunciation where all the previous, e.g. hypertext enunciation, is translated into natural language and later text, where it is possible to highlight and analyse isotopies.

Isotopies, rooted in the structuralist approach of semiotics, serve as a vital tool in text analysis, enabling the identification of key thematic elements. Employing various typologies, isotopies facilitate the recognition of recurring themes within texts. This recurrence can manifest both syntactically and semantically, illustrating the correspondence between figurative and thematic aspects or between discursive and narrative levels (Greimas & Courtès, 1982; Eco, 1976).

Central to the concept of isotopy is the idea of repetition, which allows for the expansion of textual meaning into broader contexts. When applied to the analysis of interview texts, highlighted isotopies reveal the principal narratives shared among different users and elucidate how these narratives are interpreted across various social groups within the realm of AI recommendations.

Extending to the level of generalisations within social and cultural contexts, highlighted isotopies assume a central role in the interpretation and decision-making processes within the semiosphere. Moreover, isotopy presupposes a phenomenological experience, as articulated by Sonesson (2017), further emphasising its significance in understanding the nuanced layers of meaning embedded within textual discourse. Initially formulated by Greimas in “Sémantique structural” (Greimas, 1966, p. 96) and further expanded upon by Umberto Eco (1979; 1984), the concept of isotopy serves as a framework for interpreting strategies. Analogous to a categorisation process, an analysis of isotopy yields a list of terms (“lexemes”) sharing common contextual features (“classemes”) (Sonesson, 2017, p. 7). In this research, textual analysis elucidates the prevalent isotopes within the examined texts, symbolising the affordances perceived by users in their digital platform interactions and subsequent offline practices. Isotopy, in this research context, serves to delineate recurring elements based on shared meaningful components within a given context. When enunciated, speech undergoes transcription into text, functioning as an act of translation (Jakobson, 1959; Torop, 1999). Thus, the choice of language to depict an experiential phenomenon, such as communication on social media platforms like social media, constitutes a syntactic facet of translation. Consequently, culture or the environment, can shape users' enunciation linguistically. Enunciation serves as the translation of users' experiences into natural language, functioning as a semiotic text encapsulating all the features of the original discourse, amenable to analysis as such.

As an integral component of the narrative construction process, isotopies serve to establish connections between seemingly disparate elements and themes, enriching the depth and complexity of the storytelling. The identification of isotopies enables the highlighting of recurring patterns and motifs within the text, knitting together various ideas and occurrences into a coherent and meaningful narrative tapestry. In the context of this analysis, isotopies manifest as recurrent patterns or motifs evident throughout the text, encompassing specific emotions, sentiments, actions and choices made by users during or after engaging in AI-mediated communication on social media.

Isotopies, functioning both as a textual element and a tool for semiotics analysis, can be likened to the categorisation process inherent in algorithmic processing. They emerge from narrative similarities, similar to algorithmic categories determined by the values attributed to the elements. The placement of isotopies within the text and culture is predicated on significant repetitive elements, resembling the categorisation and filtration processes facilitated by AIRS. Within a digital platform, AIRS shape users' experiences by assigning higher value to frequently recurring elements. However, while both isotopies and AIRS contribute to narrative reinforcement within digital environments and culture, the distinction lies in their basis: isotopies are semantically grounded, while AIRS operate primarily on syntactic elements.

These parallels suggest that AIRS possess the capacity to influence shared isotopies within cultures, primarily by manipulating texts that operate within the cultural environment. Consequently, this dynamic represents a dual process wherein algorithms reinforce narratives within digital environments and culture, thereby influencing social media practices and interpersonal, social and cultural communication on multiple levels. It is imperative to recognise that while users adeptly adapt to AIRS on social media to manipulate and regulate their perception of the world and self to achieve desired outputs, this remains a reciprocal process wherein their values are shaped by the information gleaned from digital representations, including AIRS-mediated content on social media. From a semiotic standpoint, AIRS assume a sorting function within digital ecosystems like social media, seeking to mimic the semiosphere (Lotman, 2005). However, given that all AI tools operate on Big Data, AIRS may inadvertently introduce biases and perpetuate discrimination (Janssen & Kuk, 2016), with potential adoption by user in their daily practices.

4.4. Text-to-culture: The social and cultural level and hypotheses for generalisations

This thesis adopts Lotman's concept of the semiosphere (Lotman, 2005) to extend its findings to broader social and cultural contexts. By leveraging the theory of the semiosphere (Lotman, 2005), the research seeks to uncover generalisations related to both individual and collective behaviours. Bankov's (2020) application of the semiosphere theory to digital platforms serves as a valuable descriptive framework, emphasising the systemic relationships among users, designers and algorithms within communication systems. Through this lens, the translation process within digital environments unfolds from the core to the periphery and back again, primarily facilitated by AI recommendations based on user inputs. This approach allows for the identification of highly valued outputs within the platform, such as viral posts and users' responses, as expressed through semi-structured interviews.

Definition of central and peripheral values embedded within the isotopies articulated by users, can help to elucidate the connection between the impact of AI recommendations on users and the subsequent evolution of individual practices into cultural transformations. Building upon the scaffolding process, these practices gradually transform into values that may be regarded as either central or peripheral within the cultural framework. Consequently, this can shed light on how users assess and assimilate algorithmic influence, how they contextualise it within their cultural context and to offer a comparative analysis of the textual context, gauging whether it is perceived positively or negatively in their daily practices, spanning from online interactions to offline behaviours.

Identifying isotopies as repetitive elements within text lays the groundwork for constructing a compelling argument supporting the framework regarding the influence AI recommendations wield over their users. Given the foundational architecture of social media as AI-mediated digital environments, it stands to reason that social media designers have envisioned the following affordances to accommodate users' needs for both direct and indirect online communication, contextual behaviours and practices online and offline and the establishment and nurturing of communities for individuals.

Modelling the communication process for an individual can encompass several forms of communication in the translation process: auto-communication within the text (me-me); interpersonal communication enacted through the text, where Lotman's communication model, as outlined in his work on the text as a "meaning-generating mechanism" (1990, p. 11), comes into play (me-you); and communication directed towards the impersonal addressee, operating at the level of text to culture (me-them) (Lotman, 1977; 2009 [1990]; 2005 [1984]). Drawing from this categorisation applied to communication within the text, it's conceivable that a

similar modelling approach can be discerned within social media to underscore the following affordances based on communication needs:

- self-monitoring (auto-communication based on the texts);
- self-perception and self-identification (inter-personal communication based on the relation to the texts);
- self-representation and self-enhancement (communication based on relations to the culture as a collective representation).

To address interpretation process on these tree levels of communication mediated through AI-mediated digital environments and offer valuable conclusions on individual, social and cultural level, this research proposes data collection process, which is related to enunciation via text and practices, online and offline as shown in Table 5:

Levels of communication	**Level of enunciation via text**	**Meta-level of enunciation via speech**	**Higher levels of cultural dynamics**
self-monitoring (auto-communication based on the texts	Digital representations shared online (e.g. syntactic elements like posts) Text → User	Description and reflection and verbal categorisation on oneself through digital representations as texts in AI-mediated environment	Repetitive syntactic elements enunciated via texts (digital representations) reinforced through AIRS and adapted
self-perception and self-identification (inter-personal communication based on the relation to the texts);	Communication through digital representations shared online (e.g. syntactic elements like posts) User → Text	Description and reflection and verbal categorisation on digital representations as texts	Repetitive syntactic and semantic elements enunciated via texts (digital representations) adapted in users-texts
self-representation and self-enhancement (communication based on relations to the culture as a collective representation).	Dual process of textual mediation between a user and AI-mediated digital environment as a part of semiosphere (User ←→Text) AI-mediated environment	Description and reflection and verbal categorisation on digital representations as texts	Repetitive syntactic, semantic and pragmatic elements enunciated via texts (digital representations) reinforced through AIRS, adapted in users- texts and practices, online and offline

Table 5 - Levels of communication and levels of enunciation.

In summary, the first step includes the translation process from speech to text. The second step is the coding process, which presumes identifying the meaningful elements and the isotopes

within the selection of texts. This results from the interviewees' cognitive process of categorising affordances they find on social media into natural language. The third step uncovers intertextual relations of the highlighted isotopies to the structure of social media and AIRS.

Chapter five -
A methodology to address AI recommendations and case study analysis

This chapter outlines the methodological framework underpinning this research, beginning with a rationale for employing a case study approach, emphasising its relevance and suitability for the research objectives. It then delves into the identification of digital platforms, particularly focusing on AIRS and decision-making processes on social media, establishing the criteria and considerations for selecting these platforms as focal points of the study. It defines the temporal scope of the research, delineating the specific time frame within which the study is conducted, anchoring the research in the context of the digital age. Additionally, it focuses on the identified case studies, Italy, Estonia and the Netherlands, explaining the process of identifying relevant communities and their transformation from mere digital profiles to active social actors within the context of AI and social media. The chapter argues for the use of qualitative research methods, providing a rationale for such an approach in interpreting complex social phenomena. It details the methods of data collection with a specific emphasis on semi-structured interviews, discussing the rationale, criteria for selecting respondents, conducting interviews and the advantages and disadvantages of interviewing in English and native language in the Italian context. Furthermore, it introduces digital ethnography as another method of data collection, explaining its rationale and the role of personal identity in producing observation data. It evaluates other quantitative data collection methods, such as changes in body reactions and discusses the use of documents and secondary sources, explaining why this research does not employ them. The chapter also details methods of data organisation, including transcriptions, notes and explains the coding of interviews and observation data. It describes the process of theming, isotopies detection, interpretative analysis of data and the multi-method and comparative approach to data analysis. This includes examining positive and negative connotations, from isotopies to individual practices and levels of generalisation: individual, interpersonal, social and cultural practices. Finally, it also addresses ethical considerations and risk assessment, focusing on the ethics of interviews on personal experience and digital ethnography. The chapter concludes by drawing parallels between AIRS and social and cultural changes, providing a comprehensive wrap-up of the methodological approach.

5.1. Identifying the digital platforms: AI recommendations and decision-making process on social media

Given the pervasive influence of digital technology across all aspects of modern life, there is a need for a deep grasp of digital platforms, especially social media, is imperative. This comprehension extends beyond mere recognition of what constitutes a digital platform and social media, encompassing a deeper understanding of how users engage within these virtual environments. Digital platforms are broadly characterised as online or mobile-based technologies that facilitate various activities including communication, content sharing, e-commerce and social networking. These platforms range from websites and applications to more complex systems integrating various functionalities. They serve as foundational structures that host, deliver and manage content, often employing sophisticated algorithms to personalise user experiences.

Social media, as a part of digital platforms, focuses on user interaction and content creation. These platforms, including blogs, wikis, social networking sites, virtual worlds and media sharing sites, are distinguished by their user-cantered design and community-oriented features. Social media platforms allow users to share information, form and maintain social groups and develop digital personas. They stand out for their interactive nature, enabling users to engage

in direct or mediated communication through various forms of content like text, images and videos. The essence of social media lies in its capacity to foster user interactions. These interactions are multifaceted, ranging from content creation and sharing to engaging in dialogues and forming online communities. Users on platforms like Facebook, Instagram, TikTok and X, for instance, engage in sharing personal experiences, opinions and interests, thereby contributing to a rich tapestry of user-generated content. However, this research do not focus on some platforms specifically, as they defined by themselves, but rather allow theoretical and empirical findings to answer the question what social media as digital platform are in 2023.

A key aspect of modern social media platforms is the use of AI-driven recommendation systems. These systems personalise user experiences by curating content based on individual preferences and behaviours. This AI-driven personalisation affects how users discover content, connect with others and engage with the platform, often shaping their perception and interaction patterns. Social media platforms facilitate the formation and sustenance of digital communities. Users find like-minded individuals, engage in discussions and participate in collective activities, all within the digital realm. This community-building aspect is central to the social media experience, offering a sense of belonging and shared identity to its members. The sharing of content on social media varies in form and function. From simple text posts and images to complex multimedia and live streaming, these platforms offer a range of tools for expression and communication. The interaction dynamics on these platforms are influenced by their design, the nature of the content and the user community's norms and preferences.

Digital platforms, with social media as a significant component, are dynamic spaces that continuously evolve. They shape and are shaped by user interactions, community dynamics and technological advancements. Understanding these platforms requires a nuanced appreciation of how they function, the role they play in facilitating user interactions and the impact they have on the broader social and cultural landscape. As we delve deeper into the digital age, recognising and adapting to these evolving digital platforms will be essential for navigating the complexities of our interconnected world.

5.2. Identifying the time boundaries: the digital era of AI recommendations

Technological progress during the last decades is closely connected to the concept of digital literacy. The understanding of digital literacy aligns with the rapid evolution of technology. The introduction of Apple II in 1977 and subsequent milestones, including IBM's inaugural Personal Computer (PC) in 1981 and the advent of Graphical User Interfaces (GUIs), necessitated the definition of competencies in line with these technological advancements (Scher, 1984). Initially, literacy was construed as visually interpreting and communicating information, leading to the term “visual literacy” (Lankshear & Knobel, 2008). However, this scope proved inadequate, giving rise to “technological literacy,” which encompasses utilising new technologies for information production.

The 1980s marked the rise of computer literacy, emphasising comprehension of computer characteristics and applications (Gurak, 2001). Yet, it became evident that mere operational skills were insufficient as technology usage expanded. By the late 1990s, computer literacy faced scrutiny, leading to the emergence of ICT literacy (Coutinho, 2007). This transition aimed to encompass broader digital competencies beyond mere tool operation (Town, 2003). As digital technologies rapidly developed during the 1990s to the 2020s, digital literacy emerged as a comprehensive term, encapsulating the ability to comprehend and use information across varied digital formats and sources (Glister & Glister, 1997). Definitions varied, emphasising skills, attitudes and even entrepreneurial aspects (Martin & Grudziecki, 2006).

However, these definitions lacked specific crucial components, such as the creative dimension (Lankshear & Knobel, 2008).
The notion of digital literacy can be expanded by connecting it to competencies, usage and transformative potentials within a digital ecosystem (Tabusum et al., 2014; Walton, 2016). For instance, Tabusum et al. (2014) defined digital literacy as the ability to locate organise, understand, evaluate and analyse information using digital technology, extending beyond mere computer literacy to encompass broader digital aptitudes. Walton (2016) defined digital literacy as the confident and critical use of information and digital technologies to enhance academic, personal and professional development. Furthermore, the dynamic nature of technology continually reshapes these definitions, emphasising the multidimensional nature of digital literacy, including technical skills, cognitive abilities and ethical awareness (Martin & Grudziecki, 2006). Rosenblit (2011) highlighted the complexity of digital literacy, incorporating cognitive processes, civic engagement and ethical considerations essential in navigating the digital landscape. The evolution of digital literacy, from its origins rooted in visual and technological competencies to the contemporary multifaceted construct encompassing digital skills, cognitive abilities and ethical considerations, underscores the dynamic nature of technological integration to their users' lives, including the use of digital platforms and latest technologies like AIs.
The advent of digital platforms, particularly social media, has given rise to a demand for new digital literacy skills. Social media, with the primary aim of mimicking natural human communication, took a rapid rise after popularity grew among users of platforms like Facebook and Instagram during the 2010s. The integration of social media into the social practices of individuals and communities and their growing impact on social, economic and even political life (Morozov, 2011, Wolfsfeld et al., 2013) has led to the rise of digital literacy as a necessity among users. Presence on digital platforms, including social media,
Yet again, the integration of AI and AIRS into daily life is not just a technological evolution but also a cultural and educational shift requiring new skills from their users. Digital literacy, traditionally focused on the ability to use and understand digital tools and platforms, must now adapt a broader understanding of AI technologies, their functionalities, implications and ethical considerations. Rapid integration of AI technologies is not anymore just about skills of dealing with new tools but the ability to adapt to them, which may lead to a digital divide among individual and social practices and adaption of computational thinking through cognitive absorption (Celik, 2023). In this context one of the most important needs comes from shifting focus from technology to user, introducing human-in-the-loop approach.
The concept of Human-in-the-loop in relation to AI (Zanzotto, 2019) refers to the integration of human intelligence and decision-making into the functioning of AI systems. This model ensures that human operators are not merely passive observers but active participants in guiding, correcting and improving AI outputs. It is a symbiotic relationship wherein humans and AI systems collaborate, leveraging the strengths of each to achieve enhanced performance and reliability. of Human-in-the-loop approach in AI represents an intersection of human expertise and AI capability, fostering a collaborative environment where each complements the other. As AI continues to permeate various areas of social life and institutions, the importance of maintaining this human touch cannot be overstated, ensuring AI systems not only achieve technical excellence but also adhere to the ethical and moral standards that define our society.

5.3. Identifying the communities: From digital profiles to social actors

Data on digital skills can highlight possible affordances that digital environments present to their users (Correa, 2016). However, in constantly changing environments, such as AIRS-

mediated social media, users are constantly reinforced to learn and adapt to adequately regulate their perception of digital stimuli and express contextually coherent behaviours. Today's significant scope of digital experiences is created by AIRS, delivering highly personalised content, services and products (Zhou et al., 2012). They can be thus seen as an automated decision-making process aiming to be close to the human reasoning of the user. Many scholars have studied AIRS, mainly focusing on developing AI algorithms. In contrast, this research uses a semiotic approach to explore how AIRS influence human decision-making and interpretative processes. This approach focuses on the users' cognitive, axiological, emotional and pragmatic dimensions to overcome the limitations of a narrow Big Data-based approach and provide the main cultural insights on AI-driven practices online and offline. Semiotics of culture can explore the impact of AIRS on the cognitive and decision-making processes of the user and cultural value creation.

Easy access to the Internet has a significant impact on cultural integrity and the practices of groups not only around Europe but around the world. Accessing the same information simultaneously can be categorised as factual news and opinions. The Internet has provided a platform for most people to share their opinions and social media granted free and easy access to these opinions. Accordingly, AIRS of social media made it possible to valorise messages shared as opinions to become culturally valuable, sometimes overcoming the messages related to representing the facts. Finally, using AIRS on social media may increase social value by augmenting the contextual connection among algorithmic categories of the digital representation of facts and opinions.

To provide a sufficient dataset highlighting similarities and differences among users of social media and their AI-mediated communication practices, Italy, Estonia and the Netherlands were selected as case studies. These three EU countries proposed various policies, including digital literacy, institutional level of familiarisation with digital competencies, attitudes towards social media and statistical data on Internet users and daily time spent online. All three countries selected for this research defined equal access of the users to facilities, such as Internet connection, digital devices and relatively similar cultural backgrounds in social structures and communication. Italy, Estonia and the Netherlands are the countries of the EU located in one economic zone with equal access to digital resources and norms and standards for evaluating the variables. Each country has a unique position regarding digital literacy, institutional level of familiarising residents with digital competencies, basic or above basic digital skills among individuals and online social engagement practices (e.g. Ferrari et al. 2012). These three datasets (Eurostat 2019a; 2019b; 2020a; 2020b; Digital Education Action Plan 2018-2020) were used to understand through a comparative analysis how AIRS influence human decision-making and interpretation processes within different social contexts.

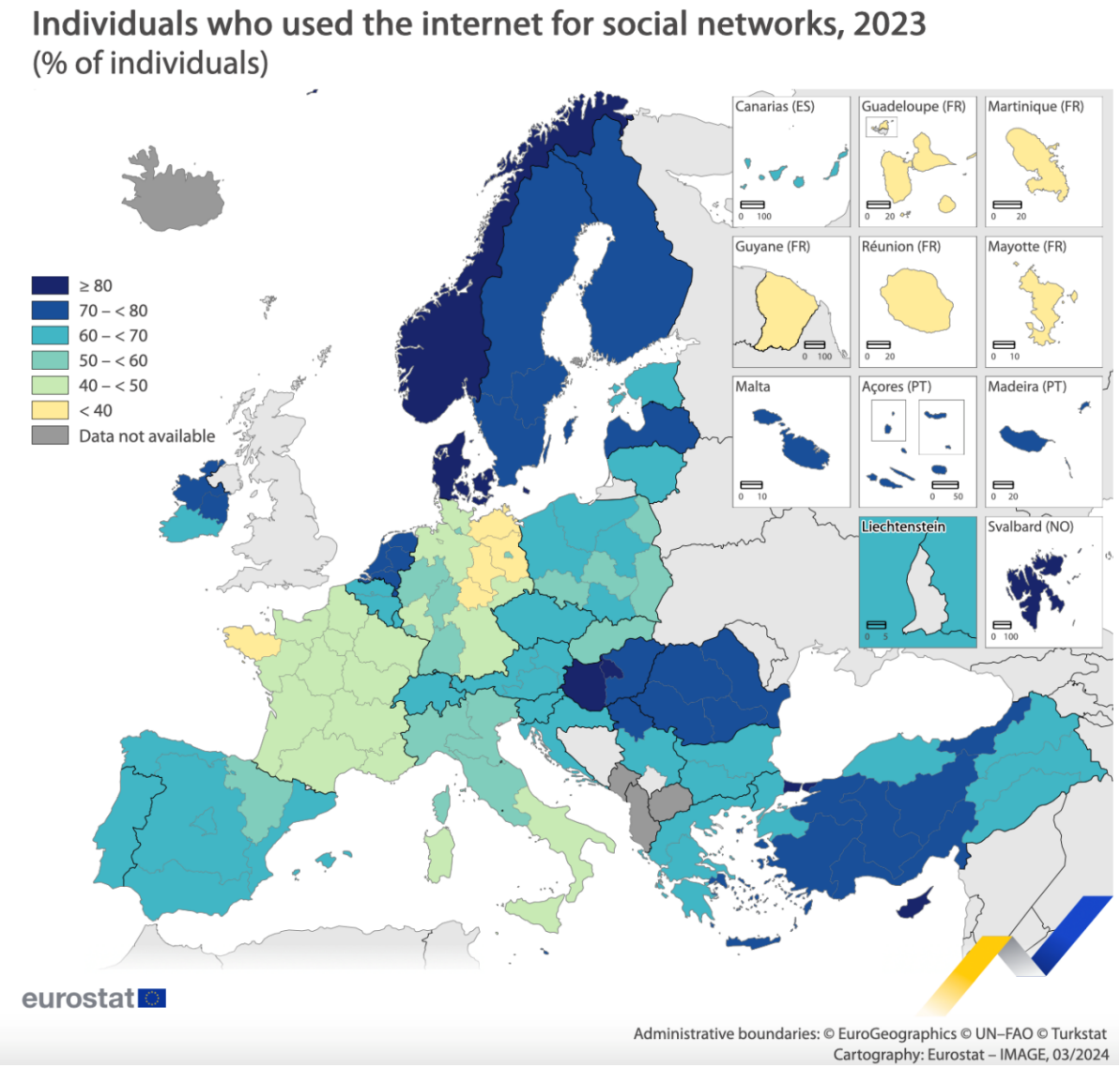


Figure 30 - Eurostat on social media use in EU countries (Eurostat 2024).

Categories on Digital literacy in EU countries	**Italy**	**The Netherlands**	**Estonia**
Presumed Level of digital literacy	*Low**	*Medium**	*High**
Institutional level of familiarising residents with digital competencies (government practices of social inclusion in ICT)	*Low* (22%)	*High* (81%)	*Medium* (67%)
Individuals who have basic or above basic digital skills	*Low* (42%)	*High* (79%)	*Medium* (62%)

Active social media participation	*Medium* to *Low* (53%)	*High* (64%)	*Medium* (53%)
Number of Internet users from the total population (by 2017)	*Low* (36,39 million)	*High* (15.88 million)	*High* (1.15 million)
Daily time spent on the Internet by people aged 14-24 (by 2016)	*Medium* (3.67 hours)	*High* (6.03 hours)	*High* (5.28 hours)

*Variables *Low, Medium and High* are defined based on the relation to the data collected in other EU countries (data falls into the category of top 3 when indicated as *High* and as *Low* when data is close to the other countries with lowest indicators).

Table 6 - Digital literacy data provided through Eurostat (2020a, 2021, 2024)

The report for the EU Commission in the chapter Graduate Outcomes (Digital Education Action Plan 2018-2020, p. 32) stated that high school graduates have higher skills in social media and digital literacy than university graduates. It suggests that there is a difference in the practices used by these two categories in the digital sphere. According to data provided by Eurostat (2020b), there is a significant gap in social media use between the age categories of 16-24 years old and 65-74 years old among those who use the Internet with the purpose of posting messages to social media sites or instant messaging, participating in social networks by creating a user profile, posting messages or other contributions, participating in social or professional networks, uploading self-created content to any website to be shared: in Estonia (65% of the population involved overall, 94% in the age category 16-24 years old, 24% in the age category 65-74 years old), in the Netherlands (71% of the population involved overall, 92% in age category 16-24 years old, 43% in the age category 65-74 years old) and in Italy (48% of the population involved overall, 79% in age category 16-24 years old, 15% in the age category 65-74 years old). Therefore, it is possible to conclude that most social media users are young adults aged 26-27 years old and younger (by 2023) who spend a significant amount of time daily on social media. Comparative analysis of data collected in Italy, Estonia and the Netherlands can provide valuable insight into how culture-specific patterns in communication might be reflected within digital platforms.

Digital literacy is a concept used in the data presented above to indicate possible training, competencies and skills that users have and that differ among different age groups. In other words, looking down at the practices that required particular skills, it is possible to attribute the knowledge to three selected age categories in the following order, based on the accessibility and necessity of access to developing technologies following criteria suggested in Chapter One:

- amount of time users have to contribute to find out how to use technology;
- stimuli - curiosity and needs users have in order to look for a solution, existing or introduced (e.g. existing needs – the needs present within daily practices, like a need for community, introduced needs – created solutions or products that stimulate needs and demand, like need to share photos online to impact own social status);
- borders or regulations can impact how users can interact with the technology, what tools are available to them in a specific time, political, economic and geographical area (e,g, current GDPR regulations in EU (since 2016) may limit tools and interactions users have online in respect to historical period or geographical areas when these regulations

are not imposed, like 200-2015 or geographical and political areas like the USA, China or Russia);
- opportunity or accessibility or affordability, including the price of technology in relation to the possibility of affording it.

Within Italy, Estonia and the Netherlands, the differences within the same age categories were found to be less relevant than the differences between the following age categories:

- Age group 18-26: Individuals in this demographic have had early access to digital devices due to several factors: a) technological advancements have led to lower prices for cutting-edge technologies compared to previous generations; b) they may experience overstimulation from technology, potentially hindering intentional skill acquisition and discovery; c) their digital environment is often highly regulated, limiting accidental discovery; d) there is a high likelihood of being able to afford the latest technology.
- Age group 27-34: Individuals in this age bracket gained access to technology during their teenage years, characterised by: a) the opportunity and time to explore technology between 2005 and 2015, before intuitive interfaces became predominant; b) a heightened need for social interactions during this developmental stage, fostering an exploratory approach to emerging technologies such as social media; c) encountering fewer regulatory constraints on their technology use, facilitating online exploration and sharing; d) despite facing lower affordability compared to younger age groups, they encountered various iterations of technologies, fostering digital skill development through a trial-and-error approach aimed at increasing productivity.
- Age group 35-55: Individuals in this age range primarily gained access to technology during adulthood, typically after the age of 20. This cohort's digital engagement is characterised by: a) limited time available for technology exploration due to adult responsibilities and commitments, as they were working adults when access to more advanced technologies became prevalent; b) lower levels of stimuli such as curiosity and social needs driving technology exploration compared to younger age groups, as working adults typically do not experience the same imperative for social approval and community engagement as teenagers and young adults (Nikitin, Schoch & Freund, 2014); c) a higher likelihood of adhering to regulations that govern technology use, potentially influencing their interaction patterns; d) despite current accessibility to technology and affordability, individuals in this age bracket did not have early exposure during their formative digital experiences, thereby limiting their digital skill development.

Factors determining the extent of digital literacy, including technological advancement and usability (as of 2022/2023)	**18-26 years old**	**27-34 years old**	**35-55 years old**
Accessibility on a regular basis at the time of the primary user experience skills development	High level of digital literacy	Medium to high	Low
Level of experience with Tech that requires advanced skills (at least a basic understanding of software/ hardware) as non-professionals	Medium to high	High	Low
Level of experience with intuitive UX/UI digital environments	High	High	Medium to high
Level of experience with compulsory tasks involving digital interactions, e.g. with digital environments, institutions, other agents, etc.	Medium to high	High	Low

Level of experience with optional tasks involving digital interactions, e.g. with digital environments, institutions, other agents, etc.	High	Medium to high	Medium to high

Table 7 - Comparative table for digital literacy skills gained and applied

5.4. The rationale for qualitative research

5.4.1. Qualitative research into the interpretation of Human-Computer Interactions

This research addresses the gap in the research on AIRS investigating how users' learning process is shaped by the affordances social media create. AIRS are essential in helping people navigate the vast volume of texts published and created on social media and other digital platforms (Wu et al., 2019). As a result, AIRS plays a significant role in how our society operates today, relying more and more on the assistance of computers for assisted decision-making. AIRS, which supplies highly personalised content, services and texts, are responsible for creating most digital experiences. They can therefore be viewed as an automated decision-making process that aims to resemble the user's human reasoning closely. Several lines of research in academia and business are investigating AIRS, especially concentrating on creating algorithmic structures (Duan et al., 2019; Mariani et al., 2022; Kang & Lou, 2022; Sharma & Shafiq, 2022). The current research introduces a comparative text analysis as a method to map the practices among young adults based on their connection to regular interaction with AIRS-mediated texts in digital environments like social media.

Digital representations are the texts that AIRS manipulate to meet social media users' needs to increase interactions. Users may receive various posts from AIRS that affect how they perceive the context of their surroundings. The uniqueness of human perception of digital images seen on social media rests in the ability to classify them in meaningful ways similar to how one would classify physically experienced objects, prompting responses accordingly (Damasio, 1999; Hodzic et al., 2009; Zink et al., 2008).

A commonly used top-down strategy that offers users pre-selected categories in a Big Data-based approach (Tinati et al., 2014) is constrained in its ability to give profound insights to engaged agents, e.g. designers, users or businesses (Grover et al., 2022; Hancock et al., 2020). With the use of Big Data, it is possible to quantify only a part of the interaction process while entirely ignoring behaviours and practices that are not quantifiably stated online, not to mention how these interactions influence behaviours in other digital and physical environments (Keleset al., 2020). To overcome the limitations of the Big Data approach, we used semi-structured interviews as the data collection method. This research used qualitative methods to generalise and model the practices that emerge on personal and social levels (Lusk, 2010). This research followed a bottom-up approach to social media practices and their reflection in social and cultural dimensions. The chosen methodology is based on data collected from the users instead of a top-down method set on design-centred pre-selected categories that impact users' interpretations and practices.

5.4.2. The rationale for extensive fieldwork in data collection

How can everyday interactions with AIRS (output) on social media Networks influence human-user decision-making process, cognition in general, personal opinions and evaluations, emotions and actions? Research questions addressed during fieldwork are:

- What are the similarities in the perception of AIRS mediated social media for their users?

- How do positive and negative reinforcers (Model user's affordances) appear in Human-Computer Interactions based on AIRS mediated context?
- What affordances users find through AIRS and what scaffolding tools on social media expressed in users- practices?

This research explores AI recommendations' role in the human-user decision-making process. It looks at the algorithms through a wider perspective than traditional mathematical modelling used in methods like Big Data, as traditional and prime approach to algorithm use in problem solving, but rather as a part of semiosis affecting users' cognitive, pragmatic, axiological and emotional states. AIRS used daily are not only connected to users by data they trained on, but also influence their interpretations, actions, practices and behaviours, during the interactions (online) and after (offline).
It adopts an interdisciplinary perspective connecting several branches of semiotics, like cultural, cognitive and biosemiotics and cultural studies related to AI and digital transformation. The innovative aspect of my research is a theoretical and methodological framework connecting these disciplines to address AIRS and human-AI relations at large. For practical purposes, the scope of research is limited to AIRS used in social media, however it can give light to the broader phenomena of AI-assisted human decision-making.

5.4.3. The rationale for a multi-method approach

This thesis adopts case studies as its foundational research strategy, complemented by a multi-method approach to address its central research inquiry: how users shape practices within digital platforms. The following section 5.5 elucidates the rationale behind selecting semi-structured interviews and digital ethnography as the chosen methods. Subsequent discourse elaborates on the various domains where the research findings hold relevance and potential for generalisation. This examination not only underscores the significance of the case study methodology but also delineates the broader ramifications of the research outcomes across diverse contexts.

5.5. Methods of data collection: Semi-structured interviews

The decision to employ a semi-structured interview approach is driven by several key factors. Firstly, the research situates Human-Computer Interaction (HCI) within the context of social media and young adults, with a focus on understanding users' perceptions, interpretations, responses and behaviours within AIRS-mediated environments. Central to this inquiry is the recognition that communication dynamics on social media entail interactions not merely between individuals but also with a set of texts mediated by AIRS agencies. From this perspective, embodied semiosis or the interpretation of signs through bodily experience, is heavily influenced by both user actions and the contextual presence of AIRS. Therefore, the chosen methodology aims to capture the nuanced interplay between users' perceptions, shaped by both their own agency and the influence of AIRS technology.
A semi-structured interview is a method that allows respondents significant freedom in self-expression that supports the chosen theory behind the aims of data collection (Schmidt, 2004, Magaldi & Berler, 2020, Adeoye-Olatunde & Olenik, 2021). This approach is proposed to overcome the limitations of frequently used top-down, often used by designer- and objective-centred business strategies within digital platforms. Creating a methodology that would represent a holistic overview of the emerging practices in the context of the social media bottom-up approach is essential to understand the impact AIRS can have. Our approach to HCI presumes that users' behaviour is expressed online and offline, guided by certain social norms,

which cannot be traced just by online interactions. Various companies, including the leaders in social media platforms, use various tools to understand how practices and personal and social values shift over time. This approach is mainly based on statistics and Big Data, when users' interactions are followed and used to predict and fulfil their needs (Bello-Orgaz et al., 2016; Duan et al., 2019; Trabucchi & Buganza, 2019; Zhang et al., 2022). There is a significant scope of the narratives and cultural texts connected to the perception of Big Data performance in society on personal and social levels. They describe a variety of attitudes, from fear and terror to a positive belief in the possible substitution of human agency in decision-making (Leone, 2023). This thesis includes a line dedicated to social narratives which are present within the repetitive texts that are culturally important for selected social groups. Various research suggests that AIRS can impact individual and group decision-making processes, enclosing their beliefs based on texts provided and contextual relations (Kubin & von Sikorski, 2021; Yao & Ling, 2020), impacting their online and offline behaviours (Tuten & Mintu-Wimsatt, 2018).

This research advocates for a qualitative semiotic approach, anchored in text analysis derived from data collected through semi-structured interviews, leveraging the concept of isotopy as its foundational framework. Isotopy, in this context, refers to the identification of recurrent elements based on shared meaningful components within a given context. During interviews, spoken language is transcribed into textual form, a process akin to translation, as described by Jakobson (1959) and Torop (1999). Consequently, the linguistic choices used to articulate experiences, such as those encountered in digital platform communication, represent a syntactic aspect of this translation, influenced by cultural norms.

The data gathered from interviews not only encapsulates users' experiences articulated in natural language but also provides insights into the textual representations encountered on social media platforms. These digital representations, whether textual or audio-visual, are curated by AI recommendations and serve as the milieu for user interactions, both direct and indirect. Through interviews, participants articulate their perceptions and interpretations of these representations, a process akin to cultural translation according to T. von Uexküll (1972), involving both verbalizable and non-verbalizable categorisations (Valsiner et al., 2023).

Selecting appropriate coding strategies is crucial for semiotic analysis. Drawing from literature dating back to the 1980s, various coding techniques have been proposed and critically examined (Deterding & Waters, 2021; Kirk & Miller, 1986; Weston et al., 2001). The texts obtained from interviews highlight both individually adopted and algorithmically generated categories, reflecting the affordances of digital platforms and the transformation of these affordances into user practices.

The questionnaire utilised in semi-structured interviews, rooted in cognitive sciences, aims to elucidate social and cultural values, represented as isotopies in participants' responses. It also considers speech-to-text translation, where personal experiences are categorised and influence decision-making. Additionally, it acknowledges the psychosomatic dimension of human communication, wherein experiences are articulated through natural language capacities (T. von Uexküll, 1972). Lotman's concept of the semiosphere (2005) is adopted to generalise findings to social and cultural spheres.

Textual analysis seeks to uncover common isotopes within texts, representing users' perceived affordances on digital platforms and beyond. Identifying central and peripheral values within these isotopies aids in mapping the impact of AI recommendations on users and the subsequent cultural transformation of individual practices into values. Ultimately, this research endeavours to elucidate how users evaluate and embrace algorithmic influence within their cultural context, offering a comparative analysis of textual contexts' perceived impact on daily practices, spanning online and offline interactions.

In summary, the research process involves the translation of spoken language into text, followed by the identification of meaningful elements and isotopes within the texts, which are

reflective of users' cognitive processes in categorising affordances found on social media platforms. Subsequently, intertextual relations among highlighted isotopies and the structure of social media and AI recommendations are examined.

5.5.1. The rationale for semi-structured interviews

Semi-structured interviews (Adams, 2015) were chosen as the primary method of data collection to elucidate users' experiences on social media. This project adheres to EU guidelines on gender equality, ensuring appropriate gender balance in recruiting respondents, as well as considering other axes of identity such as ethnicity, age, education and profession within the selected age sample. The interviews were transcribed and decoded to identify isotopies (Greimas, 1966; Eco, 1979; Eco, 1984), thereby constructing a substantiated argumentation supporting the framework on the potential influence of AIRS on users.
Given the structural composition of social media as digital environments, it is plausible to posit that social media designers have envisioned various affordances catering to users' needs for direct and indirect online communication, contextual behaviours and practices both online and offline, as well as the desire to establish and engage with communities. Lotman's classification of communication processes (1977, 2009 [1990], 2005 [1984]) suggests that similar models may exist within social media, affording users:

- Self-monitoring (auto-communication through texts)
- Self-perception and self-identification (interpersonal communication in relation to texts)
- Self-representation and self-enhancement (communication based on relations to collective cultural representations)

The semi-structured interview approach aims to elicit responses to tiered questions, designed to prompt explicit answers and confirmation of statements from respondents. The main questions focus on exploring the potential effects of AIRS, as outlined in Table 8.

Possible effects of AIRS derived from the literature	**First tier question**	**Confirmation questions**
Self-monitoring: AIRS can impact feelings and cause stress to social media users (Kramer et al. 2014)	What kind of experience do you have with other people on social media?	-In what kind of situations do you use social media? What (is a variety of feelings) do you experience while watching social media? What kind of feelings are you looking for? -When you write posts or messages, what language structures do you prefer? (e.g. long messages, various short messages, audio record, video record?) What type of messages do you prefer to receive? What kind of message form makes you not comfortable? -How many people do you follow on social media, how would you describe these people? Did online communication with someone or observing their social media behaviours impact how you think about them? -Did you ever have a conflict because of social media? What kind of conflict: communication online or face-to-face?

Self-perception and self-identification: Users do not interact with individual texts on social media but rather within an AIRS-mediated context (Yao & Ling, 2020).	How would you describe the contents you interact with on social media daily?	-Can you describe the posts you remember from your feed today? -Did you ever do something with reference to what you see on social media? (e.g. buying something or making a picture like someone else you see on social media before?) -Did it ever happen to you to choose something because you saw it on social media? Was it advised by someone you know in person? Have you ever searched for advice on social media? What kind of search was it?
Self-representation and self-enhancement: AIRS can change the online and offline practices of its users (Tuten & Mintu-Wimsatt 2018).	How do you think AIRS on social media influence you?	-Did you ever do something just because you wanted to share a representation of this experience of social media? Or because others from your social media did this?

Table 8 - The main questions used during semi-structured interviews aimed at highlighting AIRS's possible effect.

The research was set in both a face-to-face environment and online via digital collaboration tools, e.g. Webex and Zoom. During the semi-structured interviews, participants were first presented with informed consent and then guided about the structure of the interview. Then they could answer the questions most related to their personal experiences with social media and AIRS. The interviews were audio-recorded, both online and in face-to-face settings. The records were carefully transcribed and, if needed, translated into English. All sensitive information that might have led to identifying the individuals behind the interviews was carefully removed. These transcribed records are the meta-data used for this research. During the interviews, all participants had an equal possibility to choose the place and time of the interview to create the most comfortable environment. Participants were free to talk about any aspect of their experience to minimise the role of the interviewer and the priming effect (Molden, 2014). All participants (30 individuals in Italy, 30 individuals in Estonia and 30 individuals in the Netherlands) signed informed consent to participate in the study and agreed to their anonymous quotes to be used. No personal or sensitive data was collected during interviews. The following was registered for each interview: whether a respondent belonged to the age category 18-26, 27-34 and 35-55 years old, the selected country where the interviewee agreed to participate in the research. Each interviewee was assigned a coded ID, excluding accidental reference to their persona.
Semi-structured interviews as a method for data collection can provide an in-depth survey of the phenomena. The questions aimed to go through personal experiences with digital devices, experiences and practices on social media and finally, perception of AI agency. The structure of this method for data collection allows us to ask open-ended questions and receive the independent thoughts of everyone, followed by clarifying questions that would help to receive a more profound understanding of personal experiences. Also, carefully selected conditions of semi-structured interviews can help get honest and open responses to potentially embarrassing, controversial or awkward questions.

5.5.2. The criteria for selecting the respondents

In the report submitted to the EU Commission, specifically in the section on Graduate Outcomes (2020, p. 32), it was noted that high school graduates exhibit higher proficiency in social media and digital literacy compared to university graduates. This observation suggests a discrepancy in the digital practices employed by these two demographic categories.
Data provided by Eurostat (2020b) highlights a notable disparity in social media usage across different age groups, particularly between individuals aged 16-24 and those aged 65-74 who utilise the internet for various purposes, including posting messages on social media sites or instant messaging, participating in social networks by creating user profiles, posting messages or other contributions, as well as engaging in social or professional networks and uploading self-created content to websites for sharing.
For instance, in Estonia, 65% of the overall population engages in these activities, with 94% participation in the 16-24 age category and 24% in the 65-74 age category. Similarly, in the Netherlands, 71% of the population is involved, with 92% participation in the 16-24 age category and 43% in the 65-74 age category. In Italy, 48% of the population is involved, with 79% participation in the 16-24 age category and 15% in the 65-74 age category. Consequently, it is reasonable to infer those practices vary among different age categories and the influence of AI Recommendations used therein would differ for each age group.
Major social media networks like Instagram, TikTok, YouTube and Pinterest categorise their audiences into four main age groups when compiling statistics reports on users' activity (13-17 years old, 18-24 years old, 25-34 years old, 35-44 years old, 44-54 years old, 55-64 years old, 65+ years old). The rationale behind this division can be elucidated by referencing previous works on social media and search engines (Schwartz et al., 2013; Bankov, 2020):

- 18-24 years old: These users are considered native to apps, with the introduction of the iPhone by Apple in 2007 supporting app usage.
- 25-34 years old: This age group is deemed native to Web 2.0, reflecting practices related to internet use in the 1990s.
- 35-44 years old: Users in this category were introduced to Web 2.0 and apps on wearable devices during adolescence.
- 45-54 years old: Similarly, individuals in this age bracket were introduced to Web 2.0 and apps on wearable devices during adulthood.

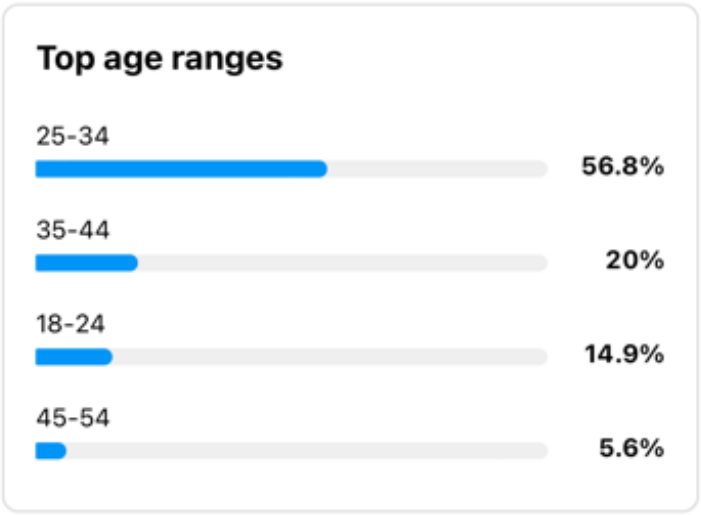


Figure 31 - Statistics on engagement, “Top age ranges” provided by Instagram tools.

To respectfully represent all the categories involved in the interactions on social media this research requires involvement of different age categories in the data collection process. The differences between the practices of different age categories on social media must be addressed on the stage of data analysis. Based on the data and age division provided by several social media platforms (Figure 31) and the data above, presented above, it is rational to propose 3 age groups for semi-structured interviews:
To represent all the categories involved in the interactions on social media this research requires the involvement of different age categories in the data collection process. The differences between the practices of different age categories on social media must be addressed on the data analysis stage. Based on above data division, three groups are proposed for research sampling as social media users:

- 1 group: 18-26 years old;
- 2 group: 27-34 years old;
- 3 group: 35-55 years old ;

5.5.3. Conducting the interviews and reducing the interviewer's effect

The aim is to collect data via semi-structured interviews to analyse how AI recommendations' solutions affected personalisation experience, how it affected users' daily practices, their users' personal opinions and evaluations, their emotions and actions and whether it might lead to adopting new behaviours and cognitive skills.
Currently most of users' practices on social media are examined by surveys and data collected based on their online experiences. Most of the data collected using these methods show the representation of digital identity embodied in the actions online. However, none of these methods has the capacity to access users' personal opinions and evaluations, their emotions and actions when they are abstaining from digital interactions.
Semi-structured interviews as a method for data collection can provide in-depth reconnaissance of the phenomena. The structure of this method for data collection allows us to ask open-ended questions and receive the independent thoughts of everyone, following by clarifying questions would help to receive a more profound understanding of some sensitive data related to personal experiences. Also carefully selected conditions of semi-structured interviews can help in getting honest and open responses to potentially embarrassing, controversial or awkward questions.
Interviews would be conducted in English language as it is the most common not-native language used in Estonia and the Netherlands and the residents of these countries choose to conduct a significant part of their interactions on social media using English language as a medium. In Italy interviews would be conducted in English and when it is not possible in Italian language, later carefully transcribed and translated to English. The analysis of data is conducted using the English language as a medium.
Each question of the interview is constructed to make a respondent comfortably express their own interpretation of a phenomenon and further questions on how and why would help to enlarge the respondent's perspective and exclude overinterpretations from the side of the interviewer. To minimise the interviewer effect, the interviewer should:

- avoid expressing own opinion on the topic;
- provide a comfortable environment to a respondent, allowing them to choose the place and time of interview most suitable for them;
- present an informed consent form and explain to an interviewee their rights and responsibilities;

- minimise the influence on the respondent and avoid the framing effect (Denscombe, 2017),
- active listening and imagining other perspectives;
- stepping back from a situation to determine whether it has any moral implications;
- using a familiar terminology to discuss problems and issues, better allowing interviewees to provide their own definitions of phenomena;
- avoiding euphemisms, metaphors, comparisons;
- accepting personal responsibility and practising humility and openness to other points of view.

During the interview, two main obstacles can interfere with the quality of results. First, sometimes, a respondent may not fully understand the question or avoid answering it for some reason. Both can be intentional but lead the respondent to address another topic or question instead of providing the data necessary for the research. Second, the personality of the interviewer can impact the answers. An interviewee may feel social pressure or willing to create a positive impression or self-representation, be shy or dislike an interviewer, which can negatively affect the quality of the interview data. Therefore, the questionnaire was developed considering these two aspects. It addresses several key points for data collection for this research in several questions indicated as the first-tier questions. They are phrased to lead a respondent to provide honest answers based on their personal experience. The second tier questions aim to clarify and lead interviewee to categorise their experiences through linguistic capacities.

Introduction and ice breaking questions		**Key points for data collection**
First-tier questions	*Second-tier questions*	*Main focus for data collection*
How do you use social media?	Guess how much time you spend on social media / compare with data provided by app or wearable device?	This question should examine the perception of time, if it can be distorted during online interactions, when users emerge into an environment it is important to note not only *special* immersion but *temporal* as well, it can signify the quantitative to the qualitative aspect of social media role in their daily practices
	When did you have first computer? What your first experience with digital devices was? What were you doing with it? When did you have your first wearable device?	This question focuses of digital literacy education that can start at different ages, with different circumstances and can influence practices and attitudes that can play role in interpretation, in particular in categorisation process
	How often do you use social media? What kind of social media do you use? For what purposes?	This question encourages the categorisation process of the experience with the tools of natural language, focusing on the structure of the platform, the syntaxis
	When did you start to use social media consistently, what platforms do you use and what are the favourable? How	This question encourages the categorisation process of the experience with the tools of natural language,

	would you describe the role of social media in your life?	syntaxis of platform and semantic and pragmatic aspects for user
Deep-dive questions on social media structures		
What kind of experience do you have with other people on social media?	In what kind of situations do you use social media? What (is a variety of feelings) you experience while watching social media?	This question encourages the categorisation process of the experience with the tools of natural language, axiological dimension, possible semantic and pragmatic aspects
	With how many people do you communicate online on a daily basis in respect to face-to-face communication? What are your preferences and why? What was the last post you saw on social media?	This question encourages the categorisation process of the experience with the tools of natural language, focus on the structure of the platform, the syntaxis
	Do you use social media during your time with friends/ family/ other daily activities? What do you think about others using social media in these kinds of situations?	This question focuses on the practices and sentiments connecting digital and physical experiences
	What kind of feelings do you experience when you are on Instagram/ TikTok/ YouTube, etc? What kind of feelings are you looking for?	This question encourages categorisation through natural language of sentiments, emotional and axiological dimensions
	How many people do you follow on social media, how would you describe these people? Did online communication with someone or observing their social media behaviours impact how you think about them?	This question focuses of how interviewee approaches and differentiates communication in digital and physical immediate environments
	When you write posts or messages, what language structures do you prefer? (e.g. long messages, various short messages, audio record, video record?) What type of messages do you prefer to receive? What kind of message form makes you not comfortable?	This question explores how interviewee adapts and adopts the practices offered through digital environments and how close or far they are from social practices they used to within their social group and culture
	Did you ever have a conflict because of the social media? What kind of conflict: communication online or face-to-face?	This question explores how affordances can be found and how it can impact communication process
Deep-dive questions on AIRS mediated experience		
How would you describe the contents you interact with on social media daily? Can you describe the posts you	Creators of AIRS claim that they can provide better personal user experience based on the data collected. Would you be ready to give more and more data about yourself in order to improve AI algorithms and do you	This question explores how users understand their privacy in the context of Big data approach and whether they look for affordances to satisfy own needs based on their understanding of privacy and Big data.

remember from your feed today?	believe that it would improve your experiences?	
	Did you ever do something with the reference to what you see on social media? (e.g. from buying something to making a picture like someone else you see on social media before?) / Did it ever happen to you to choose something because you saw it on social media? Was it advised by someone you know in person?	This question meant to examine whether users acknowledge how digital environments mediated by AIRS aim to navigate their choices.
	Do you restrict any data from the recommendation algorithm? If yes, what parts of your data would you prefer not to share?	This question addresses once again how users understand their privacy in the context of Big Data approach and whether they look for affordances to satisfy own needs based on their understanding of privacy and Big Data.
	What communication tools do you prefer (including structural classification by social media platforms: ports via news feed, stories, image, video, reels, shorts, etc.)?	This question meant to provide data on how close communication practices online to ones used in immediate physical environment as a part of social and cultural communication practices.
	Have you ever searched for advice on social media? What kind of search was it? (hashtag, influencer, question, stories/ profile/ group, etc.) How trustworthy do you find opinions you know exclusively via social media? What were your feelings about it?	This question meant to examine whether users acknowledge how digital environments mediated by AIRS aim to navigate their choices and whether online practices impact their core values, later expressed also in immediate physical environment.
Conclusive questions		
	Did you ever do something just because you wanted to share a representation of this experience of social media? Or because others from your social media did this?	This question meant to examine whether users acknowledge how digital environments mediated by AIRS aim to navigate their choices and whether online practices impact their core values, later expressed also in immediate physical environment.
	How do you think AI recommendations on social media influence you?	Conclusive question which requires general reflection on the experience; it is already in parts answered in the previous part when interviewee is asked to reflect on own practices online one by one.

Table 9 - Questions for semi-structured interviews with key points for data collection.

The series of questions posed in the first part of the interview is planned to encourage reflection on one's experience with communication online throughout the years and especially on the role of digital environments like social media. The questions supposed to evoke one's retrospective analysis of own experiences, feelings and needs to give a better understanding how a person defines social media and use them, in past and today.

The series of questions posed in the second part of the interview, examines whether users acknowledge how digital environments mediated by AIRS aim to navigate their choices and

whether online practices impact their core values, later expressed in an immediate physical environment. On the one hand, the repetitive question should provide more detailed data on whether a user's behaviour online the result of cognitive process is, on the other hand, it meant to highlight the role of AIRS through the similarity of practices described by respondents.
During the interviews, most respondents were happy to share their opinions and experiences on social media use. The location for an interview was always chosen by a respondent, which varies from university settings, cafes and other public and private settings, like the researcher's accommodation, to ensure comfort and the desired level of privacy. Based on the interviewee's consent, they were offered a meal or a beverage as a form of appreciation for their contribution to the research. All interviewees gave their consent to be audio-recorded. Apple Voice Memos were chosen for the recording process based on the quality of the sound obtained. It was used on an Apple device and stored exclusively at Università degli Studi di Torino's virtual hard drive connected to the researcher's university account.

5.5.4. The advantages and disadvantages of interviewing in English

Interviewing in English, particularly in a global research context, offers several advantages. Primarily, it facilitates a wider reach, allowing researchers to engage with a diverse participant pool spanning different geographical and cultural backgrounds. This is especially pertinent in multi-national studies where English serves as a common lingua franca, enabling smoother communication across varied linguistic landscapes. Additionally, conducting interviews in English can ensure consistency in data collection, particularly important in comparative research studies. It allows for a standardised approach to questioning and can simplify the subsequent stages of data analysis and interpretation. However, this approach has its drawbacks. Non-native English speakers might face challenges in fully expressing their thoughts, nuances and cultural subtleties in a second language. This language barrier can lead to misinterpretations or superficial understandings of their responses, potentially skewing the research findings. On the other hand, interviewing in a participant's native language offers significant advantages, particularly in terms of depth and authenticity of the responses. Participants are likely to feel more comfortable and confident, enabling them to express complex ideas, emotions and cultural nuances more effectively. This approach fosters a more empathetic and inclusive research environment, often leading to richer, more detailed qualitative data. Moreover, it can enhance the trust and rapport between the interviewer and interviewee, crucial in sensitive or personal subject areas. However, this method also presents challenges, particularly in terms of resources and logistics. It requires the researcher to be fluent in multiple languages or to employ skilled interpreters, which can be costly and time-consuming. Additionally, the process of translation and transcription is fraught with the risk of losing subtleties or introducing biases, potentially impacting the reliability and validity of the collected data. These challenges necessitate careful consideration and planning to ensure the integrity and depth of the research are maintained.
Consequently, this research endeavours to afford interviewees the opportunity to participate in their native language whenever feasible. This approach is rooted in the recognition that such inclusivity not only enriches the data quality but also respects the diverse linguistic backgrounds of the participants. Additionally, this thesis acknowledges the predominant role of English in digital environments, particularly on social media platforms within the European Union. This widespread use of English as a lingua franca in digital spaces is not merely a linguistic observation but also a factor that potentially influences users' online interactions and the development of their digital and communication skills. By considering this, the research aims to explore how linguistic preferences and proficiencies might shape and be shaped by, the digital landscape and user behaviours within it. This dual focus on native language inclusivity

and the pervasive influence of English in digital contexts ensures a comprehensive understanding of the interplay between language, technology and user interaction in the modern digital era.

5.6. Methods of data collection: Digital ethnography

Social media provide opportunities not only to collect data and analyse it with the different quantitative methods but also for day-to-day ethnographic immersion. The ethnographic method conducted on social media Networks has proven the possibility to access different social groups (Wang & Liu, 2021). Following the aims stated in the digital ethnography would provide audio-visual and textual materials through users' posts (including photos, videos, stories, reels, etc.), likes, comments, shares, subscriptions and overall profiles. This information would help to map digital representation of respondents and their digital behavioural practices. The data collected during digital ethnography would be use for mapping in relation to the main outcomes of the analysis of semi-structured interviews and identified isotopies. In order to draw a comparison between the results of two methods of data collection a statistical analysis would be conducted on the level of correspondence between opinion and behaviour and on the hierarchy of frequencies of response categories between the respondents.

1. Whether users learn from automated AI **decision-making process**:
• how do the repetitive structures of AIRS influence users' **perception and interpretation** skills?
2. Whether AIRS have impact on their personal **opinions and evaluations**:
• how a message conveyed on social media is perceived by a human-user? • what is the role of the AIRS output structures in the users' valorisation process?
3. Whether AIRS have impact on users **emotions**:
• do AIRS play a role in the need for empathy or its expression? • can AIRS create a sense of community for the users? • do users in interpretations and feelings influenced trough suggested structures of AIRS mediated environment? • can AIRS structures cause stress reactions?

Table 10 - Expected knowledge to gain from fieldworks regarding users' opinions and interpretations.

To collect data for subsequent analysis in this research, this research employed a method of digital ethnography. Social media offer the opportunity to gather and analyse data using various quantitative and qualitative methods based on ethnographic approaches (Ardévol & Gómez-Cruz, 2014) in this research was modified to suit the needs of this research. This method for data collection implies observations of users' behaviours and changes within digital environments mediated through AIRS used there. A specific aspect of this approach underlines its similarity with traditional observation practices borrowed from ethnographic research and anthropology. However, it also acknowledges two main elements:

- the data that can be observed and collected is mediated through personalised AI recommendations, unique to every user and researcher as well; that also implies the significance of a researcher's personality and own interests as processed by a recommendation's algorithm in use to a specific digital platform or environment;
- the objects of interaction represent texts produced by other users, which can be considered as a form of their enunciation mediated by a recommendation algorithm in use to a specific digital platform and not direct behaviours.

Therefore, the method of organisation of the observation diary (Appendix III) is organised by day based on digital encounters with the texts and individual evaluation of these events based on the tools available (statistical data available on platforms like likes, views and reception through reposts, comments, other types of interactions, citing and reproduction).

5.6.1. The rationale for digital ethnography and the role of personal identity in producing observation data

The use of digital ethnography within this research occupies a pivotal role, significantly contributing to the nuanced analysis of the structure and dynamics of digital environments. This methodological approach facilitates the development of theoretical constructs that underpin the study. In this context, digital ethnography aligns closely with the method of active participant observation. It necessitates the researcher's immersion within the digital milieu, requiring them to engage actively as a component of the environment to garner authentic data. This engagement is not merely observational but participatory, offering a depth of understanding that static observation cannot.
Furthermore, the inextricable link between personal identity and data generation in digital ethnography is an aspect of this research method that should be consider. In digital realms, especially those tailored by AI recommendations, the observer's personal identity intricately influences the nature of the data collected. These digital environments are inherently personalised, with each user's interaction being shaped by AI-driven algorithms that reflect individual preferences and behaviours. However, this research proposes a methodological approach to minimise the observer's personal biases impacting the AIRS. This is achieved by strategically limiting active interactions within the digital space, such as likes, shares and engagements in specific topics or searches driven by personal interests. By adopting this approach, the research aims to mitigate the influence of the observer's personality on the data, striving for a more objective and representative understanding of the digital landscape under investigation.

5.6.2. Evaluating quantitative data collection methods: Changes in body reactions and why they are not used in this research

The data collection methods in cognitive and behavioural sciences offer a variety of approaches to measure the impact of AIRS in digital environments, which can open immense research opportunities. They can vary from body measurements, like changes in heartbeat, blood pressure and various hormone levels, to designing laboratory-controlled settings that verify the effect and interpretation process among users.
Various tools are available today to follow the changes in users' bodies, including unconscious reactions that can contribute to decision-making process. For example, Tobii (Tobii Pro Spectrum at 600 Hz. or Tobii Pro X2-30 screen-based eye tracker) eye-tracking device used in

several experiments in measuring eye movement during interactions with digital devices (Dutceac Segesten et al., 2022) and autonomous systems (Lin et al., 2022).
As demonstrated in the experiments confirming the correlation between stressful stimulation and stress anticipation (Pulopulos, 2018) a rise in heart rate, blood pressure and cortisol levels can indicate stress reactions that can affect individuals' decision-making, even when they may not categorise it as relevant. A similar approach might have been innovative in application to the effects that AI-mediated digital environments may impose on their users, causing them cognitive stimulation and leading to stress reactions, even though their physical self and immediate environment may not presuppose any elevation of hurt rate, rise of blood pressure and production of cortisol hormones. Even though it is possible to hypothesise these types of effects can be caused by AI-mediated environments, the received data can also indicate other types of stimulation present in the immediate environment or connected to personal interpretations of individuals. Therefore, the method of semi-structured interviews and digital ethnography, where users are invited to express their own decision-making process through the provided linguistic tools, is more accurate for this research and allows qualitative interpretations based on semiotics as an umbrella science.

5.7. Methods of data collection: Documents and secondary sources

Access to the documents like code of AI algorithms used on commercial digital platforms like Instagram, Facebook, TikTok and others, can be challenging due to commercial secrets, non-disclosure business agreements and other boreoarctic obstacles. These impediments often obscure the vital underpinnings of AI systems, particularly those employed in social media recommendation engines.
Even though many algorithmic solutions are available to public and professionals through sharing platforms like GitHub and pieces of algorithms created by various developers and designers, can be used in different areas to provide adequate solutions, AI algorithms, especially those driving content recommendations on social media platforms, are closely guarded trade secrets. Companies maintain strict confidentiality to protect their intellectual property and competitive advantage. The proprietary nature of these algorithms often leads to a paucity of accessible information, posing significant challenges for researchers.
The primary barrier to accessing AI algorithms is their status as commercial secrets. Companies invest heavily in developing these algorithms and, therefore, are reluctant to disclose details that could be leveraged by competitors. This protection is often enforced through intellectual property rights, limiting the scope of research into these proprietary systems. Researchers seeking access to these algorithms often encounter non-disclosure agreements (NDAs) and extensive bureaucratic processes. NDAs legally bind researchers, limiting their ability to share findings, thus impeding the broader dissemination of knowledge. Additionally, bureaucratic red tape can delay or completely deny access to crucial information. Given the restricted access to primary documents, researchers often turn to secondary data sources. These include published research, media reports and analyses by industry experts. While these sources provide valuable insights, they come with their own set of challenges. Besides, secondary sources may not always provide a complete or accurate picture of the AI algorithms in question due to intentions of the companies and businesses behind them. As one of the “mission statements” for Facebook is to unite and connect people, which do not explain the commercial business model employed by Meta platforms Inc. (see Figure 32). Their media reports can be biased or lack technical depth and academic research might be outdated due to the fast-paced evolution of AI technologies. Therefore, assessing the reliability and bias of these sources is crucial.

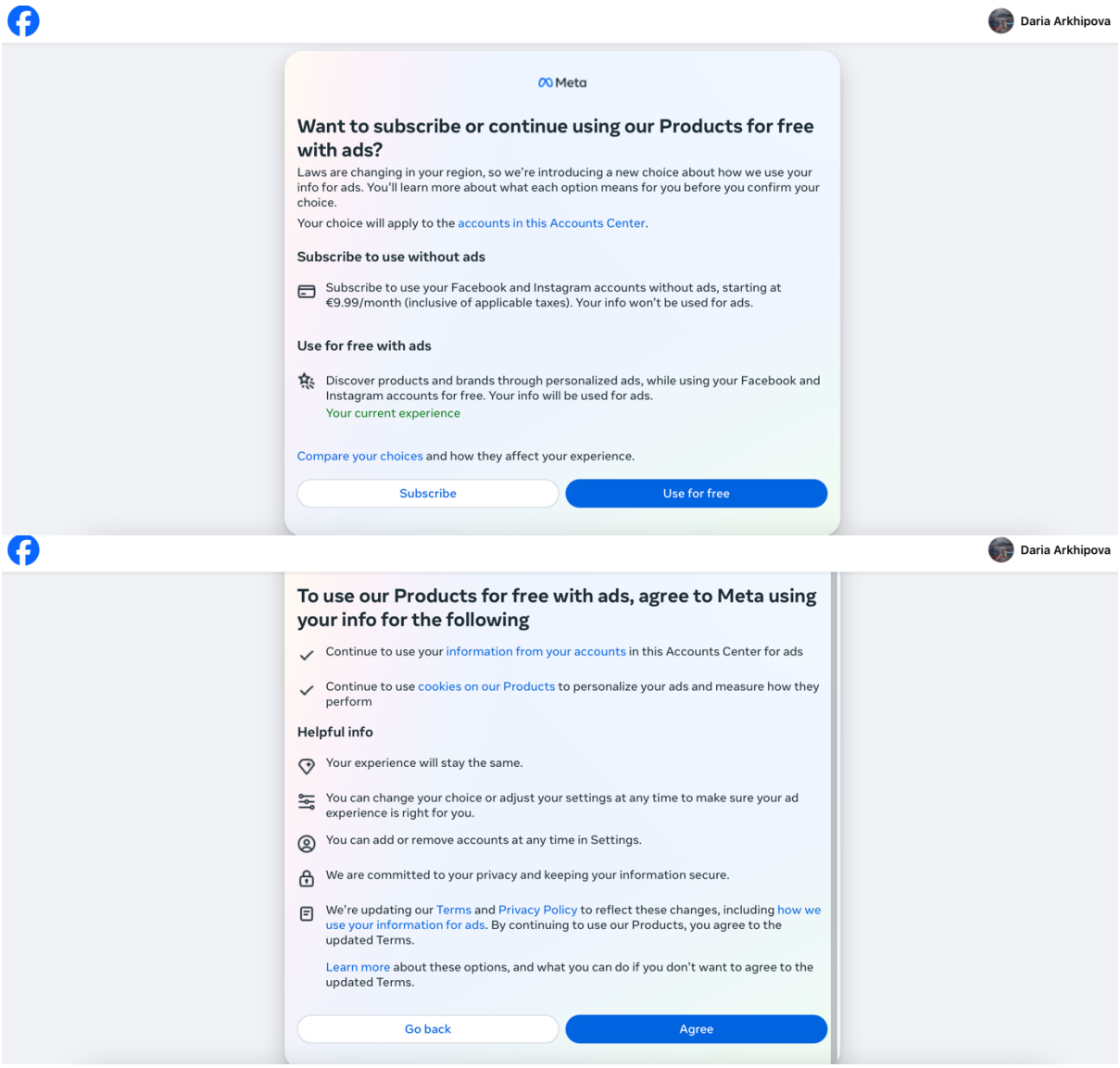


Figure 32 - A user's agreement to continue use of Facebook profile with adds for free.

The use of secondary sources also raises ethical and legal concerns. Researchers must navigate copyright laws and ensure ethical use of information, particularly when dealing with data about users' online behaviour. This aspect becomes even more critical when considering the privacy implications of social media data. Therefore, this research seeks innovative methodological approaches to study AI algorithms in social media effectively. Instead of searching for access to documents and secondary data sources as collaborative projects with industry partners, this research developed datasets focused on users' behaviour, collected via digital ethnography and semi-structured interviews.

5.8. Methods of data organisation

The data collected for this research required extensive organisation. Two types of data were considered to produce a supporting argumentation for this research: semi-structured interviews and the observation diary based on the methods of digital ethnography. The interviews were collected, stored and saved at the first stage of analysis, as presented in Appendix II (interview

sample). An entry from the observation diary can be found in Appendix III (observation diary based on digital ethnography).
The interviews were transcribed thanks to the software included in Microsoft Word and then manually proofread to match interviewee speech recorded. Transcripts reported interviews word by word, including language mistakes, filler words and hesitation marks. A time code was inserted at the speech of interviewee and each change of speaker between researcher and respondent. Long pauses and information not specifically mentioned were included in square brackets. Square brackets and italicised text were used to indicate non-verbal communication, such as gestures and laughter (e.g. [expanding arms] or [laughing] in the extract of an interview included in Appendix). The speech transcribed from the recording is not suitable for textual analysis, since some sentences left incomplete, had repetitive elements or insignificant information that could involuntarily expose interviewee's personality. Therefore, each document with transcribed speech was translated to a text with assigned relevant questions. Moreover, during the interviews it could occur that interviewee was asked one question but provided the answer to another or multiple questions, intended in data collection methodology designed for semi-structured interviews. On one hand, a method of semi-structure interviews is intended to provide a volunteer interviewee majority of freedom and discovery in the process of self-reflection on own experiences. On the other hand, before transferring the answers to a comparative table of datasets and used to coding, theming and analysis, it is important that the data collected in form of the answers is:

- anonymised;
- translated into English language;
- translated into a text suitable for the textual analysis;
- ordered to key questions.

Then each interview is transferred into a comparative table by country (Italy, Estonia, the Netherlands), where each assigned a code name based on (interview code) – age category – country code, e.g. 1-1826-it (see extract from dataset below, Figure 33).

	A	B	C	D	E
1			18-26 years old		
2			1-1826-ee	2-1826-ee	3-1826-ee
3	Introduction and ice breaking questions		24-22-ee	8-26-ee	13-21-ee
4		Guess how much time you spend on SM/ compare with data provided by app or wearable device?	1-2 hours/ 1 hour	30 min -1 hour	1-2 hours/1,5 hours
5	How do you use SMN?	When did you have first computer? What your first experience with digital devices was? What were you doing with it? When did you have your first wearable device?	I definitely started using a computer at quite an early age. I think it was like 7 or 6, but it was mostly for games. I think like old games on my dad's computer or my grandfather's old computer. But my first smartphone, I think, was when I was like 13. It might be off by three years or so, but around that, it's definitely later. Yeah, but in the beginning, mostly for games. And just like killing time.	I remember when I was a kid, we had a family computer and I used to play some games which were at the time CD-based.	I started to use a computer when I was 7 or 8 years old, mainly for video games, and my first phone I got when I was 10. It had buttons, I played snake, it was the best game. And sometimes, I got time to play other games on my parents' phones. I had the phone mainly for my parents' needs so they could call and communicate with me.
		How often do you use SMN? What kind of SMN do you use? For what purposes?	For communication and for events, I use Facebook to see what my friends are up to and Instagram. I used to like looking at memes and such content on Instagram as well, but I quit that because it took too much of my time. It was quite addictive. I also use YouTube for Like just killing time or Looking at news and such, but I don't really participate in the social media aspect of it. Also, I used to use a bit of Reddit. But also mostly just scrolling, not the social media	I use quite a lot of Facebook, but it is also because it overlaps with my work responsibilities. I think I already have a sort of habit of checking if there is any notification. I use a specific Social media app for beers and other crafted drinks. It works for me and my friends as any other type of Social media. You can create a profile there, post what you drink, add a photo and write a description or review, and you can also see what your friends drink. I think, in a way, this app did replace other social media because I can	My first Social media would be MSN, which I used on my home computer. Maybe I was 13 or 14, then later I had a Facebook account, Instagram, Twitter, and Snapchat, but now I do not use them at all. I use it to see other people. Twitter, I used to waste time. I never posted on Twitter, but I read there daily for about 2 hours. I used to post on Snapchat, sometimes quite a lot. There were mainly my friends and people I knew personally. And the fun part there is that you can see who is watching your posts, so I was posting and hoping that specific people

Estonia | The Netherlands | Italy

Figure 33 - An extract from dataset based on semi-structured interviews.

5.9. Coding interview and observation data

This section details the methodologies applied in coding interview transcripts and field notes. Initially, it presents a three-tiered coding structure employed to systematically organise both interview and observational data. Following this, the section delves into the process of thematically analysing the data, a critical step that emerges from the coding phase. Concludingly, it articulates the significance of isotopies in the progression towards a more interpretive analysis of the data, thereby enhancing the depth and understanding of the research findings.

5.9.1. Levels of coding interviews, observation data and simple body reactions measurements

The organisation of data from interview transcripts and field notes was meticulously carried out using coding methods, as recommended by Saldaña (2009). Saldaña defines a code as "a word or short phrase that symbolically assigns a summative, salient, essence-capturing and/or evocative attribute to a portion of language-based or visual data" (idem: 3). He perceives coding as an "interpretative act", aiming to unearth "repetitive patterns of actions and consistencies in human behaviour as documented in the data" (idem: 5).
The coding of interviews and digital ethnography data was systematically structured through identified isotopies, with themes crafted based on the hypotheses developed in previous chapters. The codes were categorised into three sequential tiers, ranging from the broadest to the most detailed. The initial tier, summative codes, encapsulates overarching concepts or types of social actions, as in the Table (below). Derived from a 'first cycle' of coding, these codes enabled an initial interpretation and organisation of extensive data segments (idem: 45). The second tier comprised a more extensive set of codes underlining the relationships of theoretical findings and hypotheses to the data collected. These codes were primarily influenced by the literature reviewed in Chapters Two and Three and the theoretical framework outlined in Chapter Four. The final tier included codes that surfaced directly from the fieldwork, capturing specific instances or scenarios pertinent to the real-world implementation of AI in social media contexts. This layered coding approach not only enriched the data analysis but also ensured a comprehensive understanding of the multifaceted dimensions of AI-mediated social media interactions.
The collected data is organised based on the question-answer relations to 1) self-monitoring, 2) self-perception and self-identification and 3) self-representation and self-enhancement. Relatively, self-actualisation (including self-monitoring, self-perception and self-identification) refers to the cognitive and sentimental dimension of AI-mediated user communication, self-enhancing and self-representation refer to the axiological dimension and scaffolding practices can be identified through the pragmatic dimension. The practices identified as a part of scaffolding relate to hypotheses proposed in Chapter Three if AI-mediated environments influence the pragmatic dimension as:

- Adopting and fitting into an environment with incomplete knowledge about it .
- Multitasking and presence in multiple environments at the same time.
- Categorisation as a syntactic element of the environment which does not provide affordances for full expression to effectively communicate.
- Perception of others in social media.
- A feeling of control and stress anticipation.

1st tier of codes and identified isotopies	2nd tier of codes and identified isotopies	3rd tier of codes and identified isotopies	Organised list of codes and themes
Concepts or types of social actions	Hypotheses to data	Interview highlighted insights	List of findings sorted from broadest to most detailed

Table 11 - Highlighted levels of codes from interviews.

The three levels of codes, represented in the Table 11 allow to create categories of "outcomes" (Saldaña 2009: 13) which help to provide analytic reflection on data collected during the interviews and can be compared to digital ethnography data.
The coding process was based on defining isotopies and the common meanings used in speech-to-text (interviews-transcribed-to-text). The meaningful isotopies were defined based on the context of the individual interviews, as unique texts and then all 90 interviews together. The choice of wording to describe the meaningful isotopy was influential in the degree of emotional self-description to highlight the degree of narration reflecting digital representations on social media.

5.9.2. Theming: topics, isotopies detection, interpretative analysis of data

The process of analysis of semi-structured interviews requires a methodological approach, which would, on the one hand, allow to approach 90 texts created based on self-descriptive interviews qualitatively and, on the other hand, provide a more profound knowledge of the field of HCI that could not be achieved through statistical analysis.
Addressing all the issues stated above, it is favourable to go through each point individually.
This research connects theoretical contributions, which were expressed as hypotheses up to this point, with empirical analysis of the data collected during fieldwork. This should highlight a qualitative approach to studying HCI, like relationships between users and AI recommendations, in opposition to dominant methods applied today, like Big data approach, rooted in statistical analysis. The meaning and interpretation of collected data through semantic analysis unavoidably rely on correctly identifying sememes within the texts following the interview process. According to Eco,

> "a text establishes its topic by reiterating blatantly a series of sememes belonging to the same semantic field (key words). In this case these sememes are obsessively reiterated throughout the text. At other times, on the contrary, these sememes cannot be statistically detected because, rather than being abundantly distributed, they are strategically located". (Eco, 1979, p. 26)

Considering that interviews were conducted in English, as non-native language for some respondents and some were translated to English from native language of interviewees, a possibility to statistical analysis of this data would be less accurate than following qualitative approaches available within semiotics paradigm.
To grasp meanings conveyed within semi-structured interviews-based texts, it's essential to look at overall theme and the way interviewees present themselves, their ideas and experiences, creating a semantic representation. This includes understanding the basic building blocks of text-responses (syntagms) and how they relate to the overall topic and questions. Some of the resulting from interviews texts prove to be complex, with different levels of topics, such as sentence-level topics, topics within a short sequence of text (discursive topics) and overarching themes that span the entire text (narrative topics). These layers guide interpretation on different levels from the details to a bigger picture. Moreover, some interviewees in their responses

apply the same terms-words to different concepts or vice versa, use different terms to describe same of similar concepts, which can be inferred only through the multiple level analysis in respect to central themes.
The process of identifying these themes and how they connect (isotopy) is crucial for understanding the text in depth. This involves picking out and focusing on specific words and their meanings (semantic properties and lexemes) to piece together the overall message or narrative structure of the text. Think of it as detective work, where you're piecing together clues to reveal the bigger picture. This approach not only helps in understanding the text's surface level but also uncovers deeper layers of meaning.
The concept of isotopy, traditionally rooted in the idea of repetition as posited by Greimas (1983), describes the recurrence of fundamental meaning traits within texts, ensuring their coherence and homogeneity (Pozzato, 2001; Kourdis, 2012). Umberto Eco broadened this definition, encompassing a range of semiotic phenomena as facets of textual coherence. Eco redefined isotopy, moving away from mere repetition to a concept of 'direction.' He described isotopy as "a constancy in going in a direction that a text exhibits when submitted to rules of interpretative coherence" (Eco, 1992, p. 65).
In this research, isotopies facilitated an exploration of the potential connections among themes identified within the semi-structured interviews and digital ethnography data. These themes were systematically compared both within individual interviews and across different cultural contexts (Italy, Estonia, the Netherlands), as shown in Figure 34. This comparison extended to the hypothesis build on the literature reviewed in Chapters Two and Three and the conceptual framework outlined in Chapter Four. By linking these themes to the theoretical underpinnings, isotopies contributed to an interpretative understanding of how AIRS on social media might influence user decision-making.

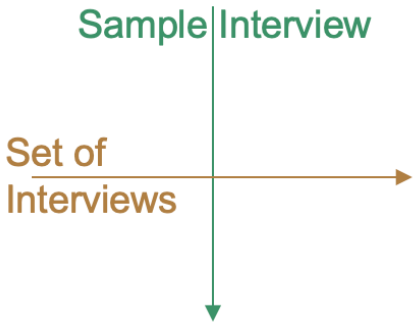


Figure 34 - Isotopies analysis on the intersection of each interview in the context of others.

Chapter Nine delves into isotopies common to both interview and digital ethnography data. This comparative analysis is crucial for validating hypotheses and drawing generalisations at individual, social and cultural levels. The semi-structured interviews probed into users' opinions, beliefs and emotional responses, encompassing cognitive, axiological and emotional dimensions. This analysis considered the interplay between the substantive content and the narrative structures employed by respondents. It also considered respondents' hesitations and contradictions (Heyl, 2001, p. 375), thereby offering a nuanced view of user experiences and perceptions within AI-mediated digital contexts. Therefore, the analysis of these interviews focused not only on users' knowledge, evaluations and emotional reactions but also on their personal experiences within AI-mediated social media environments.

5.10. A multi-method data collection approach and comparative data analysis

Data used in this research is supplied through texts. Fist, the texts that are resulting from semi-structured interviews with 90 volunteers in Italy, Estonia and the Netherlands in three age categories. Second, from texts, collected online during digital ethnography on the digital environments that can be identified as social media. The analysis of these two types of texts aims identifying repetitions that can be directly or indirectly indicating impact of AIRS on their users. These repetitions, as discussed in the Chapter Four, isotopies (Greimas, 1966), could encompass a broader semiotic phenomenon, defining it as coherence across different levels of texts resulting from interviews and digital ethnography. Identification isotopies at different levels (as shown at *Levels of coding interviews, observation data and simple body reactions measurements*) can give deeper understanding of how AIRS can impact individual, as well as social and cultural practices.
Identification of positive and negative connotations can be done through the context of individual interviews, as a part of interviews within an age group and through all selection of texts.

Individual interview as multi-level text →→→→→	→Two or several interviews in one sample category (age/ geography) →→→→→→→	→Interview text as a part of all texts (interviews and texts collected online)

Table 12 - Steps in analysis of semi-structured interviews.

Identification of positive and negative connotations highly relies on the theming process and categorisation and, therefore, is connected to the process of narrativization through texts. The narrativisation process is not the main scope of this research because it requires a separate methodological apparatus. However, it is important to highlight that in the context of social media where natural communication is substituted through texts as a media for communication, users might perceive text representations, e.g. digital representations, as if they would be real people or events without considering the medium. This issue is addressed mainly in the Chapter Three. Nevertheless, it is important to underline the phenomena of narrativization of own experiences through the text, reinforced by digital environments' structures and AI recommendations and how positive and negative connotations are identified within it.
Chapter Four describes the approach to isotopies as a semiotics analysis of the text. The data supplied for this research during fieldwork mainly focus on the texts that result from semi-structured interviews conducted with 90 volunteers. Isotopies identified through the interviews translated into texts propose categories and individual and social practices for the interviewed individuals and their social and cultural context. These isotopies validate hypotheses proposed in the theoretical framework of this thesis as well as shed light on the findings mainly outlined thanks to the fieldwork and multimethod approach.
Common isotopies traced through the interview texts outline common practices among individuals which might indicate common social practices that emerge online and adopted in other environments, like immediate physical environment. Repetitive isotopies, highlighted in different interviews, in one or several samples based on age and geographical sampling, can be considered an indication of AIRS impact of the social media users' individual practices, which can be a part of larger social and cultural signification.
Drawing parallels between AIRS impact on individual practices and social and cultural changes can be challenging. However, this approach is equally valid as Big Data approach commonly used today for data analysis, because it provides qualitative methodology and argumentation on how users approach AI-mediated digital environments and interpret their experiences

holistically. The Chapters Two and Three reviewed theoretical findings which might suggest that interactions with AI-mediated environments can be perceived and interpreted altogether with immediate physical environment and therefore impact users' actions, behaviours and practices. The uniformity of digital environments like social media, yet their personalised qualities through AI-augmentation, can created similar effects on users by placing them in similar conditions and conveying meanings and narratives curated through algorithmic nature of AI.

5.11. Ethical consideration and risk assessment

This research was conducted under the EU regulations, designed based on the relevant literature sources and received University of Turin Ethics committee approval and was verified by the Personal Data Protection Office (see Appendix I). During 2020-2022, the development and design process of this research included training provided by University of Turin and University of Tartu on FAIR data, Research Ethics and training in writing proposals for the Ethics research committee. The main task was to develop a methodological framework allowing the collection of necessary data that could enrich findings, correspond to the criteria required by tools of qualitative and quantitative approaches, including cognitive sciences and possibly be executed in a short period of three years of the Ph.D. programme. The main risks that important to highlight during the development can also provide important insights into the limitations of this research that were to be overcome and impact the final work, the case study chapters (Six, Seven and Eight) and the findings (Chapter Nine), as well as recommendations for further research.

Chapter six -
Case study: AI recommendations in Italy

6.1. Describing the Italian context

This chapter presents the first part of the case study analysis based on the data collected during fieldwork in Italy. The main task of this chapter is to analyse the semi-structured interviews and digital ethnography data to provide insights at three levels of coding (based on theoretical framework concepts that are confirmed in relation to the data and standing-alone insights suggested through fieldwork) and theming, as findings supporting the theoretical contribution of this work.

Figure 35 - Map of geographical location of case study, Italy.

Italy is one of the three countries chosen for the fieldwork research (Figure 35), along with Estonia and the Netherlands. On the one hand, the choice of Italy supports the relative cultural similarity between these three countries - the location in one geographical, economic and political area. On the other hand, its unique features include large heterogeneous population (59 million), digitalisation of community at various levels based on geography, accessibility, economic, social and cultural backgrounds.
The digital environment available to Italian community and the way it used on daily basis rely on many factors like geography of the country, neighbouring communities, linguistic landscape, accessibility to digital devices and platforms, institutional and economic background, basic communication needs. Italy, together with the Netherlands, is one of the founding member states of the EU. Italy shares border with Switzerland and France, on the north and west and Austria and Slovenia on the north-east. Italian linguistic landscape is diverse, it was highly influenced through historical formation of Italy as a country, including importance of local dialects. Dialects and regional languages, used by population, vary from region to region. As for example, the most spoken local languages like Neapolitan highly used in region Campania (75,2%), as well as other local dialects and languages in regions Basilicata (69,4%), Sicily (68,8%) and Calabria (68,6%) (Istat, 2017, p. 6). The official and commonly

used language in Italy is Standard Italian based on the Florentine dialect of Tuscan. On social media many Italian users prefer Italian, rarely English.
During the 1980s and 1990s Italy maintained one of the leading roles in economic and political relationships, which has impacted a need for digitalisation. Digitalisation in Italy started in the 1980s with rise of ICT technologies for business and manufacturing. During the 1980s and 1990s Italy was one of the leading ICT environments among the countries of Southern Europe (Iammarino et al., 2001). However, Italian digital space is not homogeneous and vary from region to region with similar patterns in use and practices from the north to the south of the country.
Italy is divided to twenty administrative regions, which mainly correspond to historical cultural traditions as they were formed and have not only differences in institutional approach, but also different practices among citizens towards technology.
The top-down services that can and used on the territory of all Italy through digital devices are SPID (Sistema Pubblico di Identità Digitale) – type of digital ID access public and private services and CIE: (Carta di Identità Elettronica) -– a type of mobile ID. These tools are integrated into Italian digital space often in compulsory way, meaning that to use some of the public services citizens must utilise SPID. However, it also finds a significant resistance from the side of population due to relative complexity and non-user-friendly design. There is a significant discussion regarding difficulty of adoption of digitalisation of public services from the side of public administration workers as well as citizens (Maldera, 2018). During last four years due to effects of COVID-19 some institutions, businesses and individuals adjusted their practices towards digitalisation tools, yet it is manly relevant to the northern part of Italy and less spread in southern regions. The data highlights that some communities at the south of Italy do not have stable access to the Internet (PA Digitale, 2023). Based on the data provided through official channel of the EU on the Digital Skills and Jobs Platform of the European Commission, “86% of Italian workers affirm they do not have the digital skills needed for the world of work of the future” (Kralj, 2023).
The use of social media as a medium for communication can be characterised through translation of practices into digital: from personal level, like popularity of long vocal messages on WhatsApp that imitate conversations with disregard to personal borders (e.g. to listed to a prolonged vocal message one must either use shared public audio space or seek for a private environment); to public domain, like emotional involvement of the audiences based on the oppositions of misjudgement and fears, etc. (Girardelli et al., 2021; Taddeo, 2023). These phenomena are not unique to Italian context, yet they are largely represented and play a significant role in social divide (Boccia, 2017).
Digital environments of Italian social media include various digital personalities that may impact local and international followers. Many of the most followed Italians use English but tend to produce significant number of contents in Italian language. This way influencer and digital personality @chiaraferragni (29 million followers), gaining her popularity abroad, tends to balance at least 50% of contents between English and Italian, stressing on her background as an Italian. Other Italian-based influencer Khaby Lame, after becoming a leading digital personality on TikTok for comic videos (with more than 160 million followers), continues focusing on content using body language and gestures and which includes only a short caption in English (Figure 36). Another two influencers sharing Italian and Latin-American context are @gianlucavacchi (22 million) and @elettralamborghini (7 million), mainly based on their music career and lifestyle.

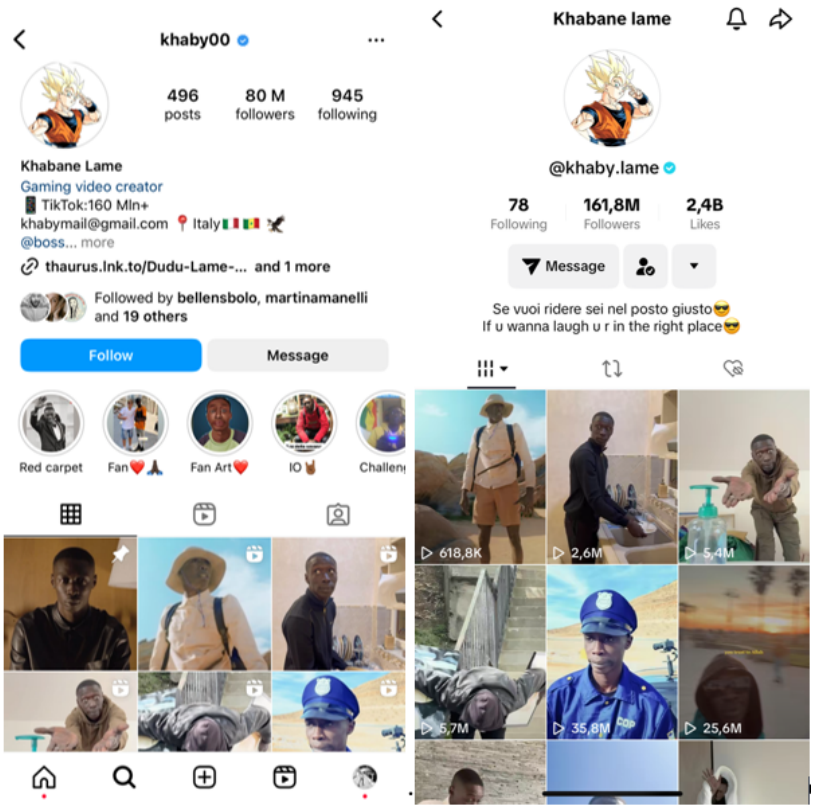


Figure 36 - Instagram and TikTok profiles of Khaby Lame.

There is no significant and consistent involvement of institutions and businesses into the practices Italian users choose on digital environment like social media at the local level. There are single events of pro-institutional activities from influencers as leaders of opinions, however it cannot be considered as a communication strategy. Often the involvement of institutions and businesses on the level of social media remain formal and shallow in the engagement.

6.2. AI recommendations' role in social media: The users' interpretations, actions and interactions in the selected age groups

Isotopies from the interviews that are highlighted – the first tier of codes and identified isotopies (Concepts or types of social actions). Selected isotopies compared to the theoretical framework – the second tier of codes and identified isotopies (Data vs Hypotheses). Selected isotopies that appeared in the interviews but were not suggested through literature review and theoretical framework – the third tier of codes and identified isotopies (Interview highlighted insights). Finally, the list of codes and themes concluded from isotopies highlighted through the fieldwork, interviews and digital ethnography. They are organised at cognitive, sentimental, axiological and pragmatic levels. The sentimental level represents a self-description process of the emotional states of the users, which falls below cognitive levels when users realise the impact of communication on social media but still need to enunciate it fully through linguistic categories. It can impact their interpretations, but they do not attribute their decisions to this level. The cognitive level represents various levels of interpretations that are attributed to the categorisation process through the tools available to proceed with decision-making. The axiological level represents values, individual, social and cultural, highlighted during interviews. And finally, the pragmatic level refers to the practices indicated in relation to AI-mediated digital environments online and offline.

One of the key findings from the fieldwork involving semi-structured interviews is that certain respondents displayed a greater involvement and efficiency in categorizing and articulating their digital experiences. Notably, some narratives from these interviews stood out, as they were articulated more clearly by other respondents using terminology that effectively captured the underlying isotopies, aiding in the theming process.

6.3. Findings among the age category 18-26 years old in Italy

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "I like to share content like stories or posts sometimes, **but I don't post a lot and I use it mostly to inform myself**". (4-1826-it) "The way one presents online is sort of part of your life, so one should be very careful in sharing online. **I am cautious in what I publish,** especially photos. Then people are curious in what you are doing there and it obviously draws their attention to what you want to represent there. I think people are judgy in general and **I am trying to be careful about what others may see on my profile**, because it can influence what they think about you. This is also I try not to have my relatives on Socials, because I do not want to be exposed in the same way to everyone". (5-1826-it)	-social pressure and social conformity to central values, vulnerability	-adopting and fitting into an environment with incomplete knowledge about it	- "I try not to have my relatives on Socials, because I do not want to be exposed in the same way to everyone" - limitations of AI-meditated environment that can influence immediate physical environment	-at the cognitive level: Theme: overstimulation and multitasking -at the emotional/ sentimental level: *Theme: Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection* -at the axiological level: *Theme: from personal to public space (through aesthetics)*
Self-perception and self-identification: "When the war started in Ukraine, I was constantly on social media, updating myself on the news. **I had this feeling that I needed to know more stuff about**	-Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection	- a feeling of control and stress anticipation		-at the pragmatic level: *Theme: Impact own moods, mental and physical conditions,*

what was going on. The more anxious I felt, the more I tried to find out about it. But then **I stopped because it did not give me anything, just emotional rollercoasters.** Following the war in Ukraine through social media made me feel it more personally, it definitely had big impact on my emotional involvement and empathy". (1-1826-it) "I don't really like my face on social media. I guess **I sometimes feel like I am not enough. I like to see posts from** others, know what is happening in their life and it gives me a feeling of sort of communication, like I am involved in their life. But sometimes, **I also have a feeling like there is a need to express myself** to let others know how I am doing. But there are so many ways to do it, besides sharing my face. So sometimes I will make a photo of what I see, a landscape or some moment. It doesn't have to be something special". (2-1826-it)				*disembodiment through AI-mediated enunciation, AIRS on social media emotional contagion as a coping tool*
Self-representation and self-enhancement: "I have **several accounts,** one is for everyone and one is private. And one is just for me, as a personal diary. I would feel **overwhelmed** if I had everything on one account". (2-1826-it) "When I feel lonely, I sometimes feel the need to pick up my phone and **distract myself** with social media. Or when I am anxious". (8-1826-it)	-distracting oneself from physical environment stimuli with AI-mediated digital ones -overstimulation and multitasking	-overstimulation and multitasking		

Table 13 - Examples from interviews in age category 18-26 years old highlighted isotopies and themes in Italy.

6.3.1. Theme: From personal to public space

The question of personal and public space in Italian culture is well explored through semiotics and cultural studies research. The study on the merge between these two spaces, representing a definite binary opposition in many European cultures, shows how the street becomes part of the house and the house is a part of the street in Italian southern regions (in Marrone & Pezzini, 2008). In some old towns of cities like Naples, Bari, Catania, Trapani and Palermo, the personal space of the family, like a living or dining room of the house, often overlooking the street, during summertime, becomes part of the public street or square. A similar merge between the personal and public domain in communication in Italian culture can be followed: the topics discussed and the physical space in position between individuals conversing. However, this communication practice needs to be reflected in the digital ethnography and interviews highlighted users aged 18-27 years old They tend to expose their identity online less than other age categories on purpose. All 10 interviewees underlined the fact that posting private photos and digital representations that include one's face, body or immediate surroundings can be dangerous as an immediate threat or a threat in a long-term context. Therefore, the majority indicated that their self-identity is expressed online through different images, mainly digital representations, which in associative relations through colours, shapes and aesthetic qualities reflect their moods, ideas and interests but do not point directly to their personality.

> "If I would lose my account, I would be sad, but only because there are some posts from years ago. But I don't feel like an owner of it. Zuckerberg owns it, we are visitors here. Same goes for the algorithm. It can be useful, good and even work for your own needs, but it is just an illusion of control. As someone who deals with social media professionally, I know that there are various ways to interact with recommendations to make them favour your content, recommend it to others and help you grow on the platform. But this is rather a game where rules are constantly changing. Because they surely don't want you to be smart pants and manipulate what is going on there". (2-1826-ee)

In the discussion on the intentionality of digital representations shared on social media, many used the term "aesthetics" to align one's own perception of reality, presumed rules of self-representation and the possibility of impacting one's own social reception for other users or the digital environment itself. For example, sharing images using some aesthetic can elevate how peers perceive one, rather than posing a unique individual representation of one's life. Moreover, some interviewees (4 people) indicated that some aesthetics align with not stated but presumed qualities, e.g. "That girl aesthetics" presupposes that a person not only follows a routine of self-care through healthy eating, working out, studying and beauty aspects, but also has extraordinary positive personal qualities, like being kind, charismatic, welcoming and supportive.

6.3.2. Theme: Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection

Compared to other age categories and tools used on social media, this theme is mainly valid for younger users, those between the ages of 27 and 35. only in the last years adopted similar values towards own digital representations shared online as a part of privacy protection. In the interview 3-1826-it, the respondent shares an observation about a situation that happened to a

high school teacher when ten years after breaking up, her ex-partner posted a porno video of her on his friends' WhatsApp group, which later was reshared online in public access and went viral. Consequently, a teacher loses her job and can no longer teach at a school. 3-1826-it comments (see also Apendix III for this interview sample):

> "*…noi della nostra generazione, curiamo la nostra immagine online… dipende dal fatto che vogliamo proteggerci dai giudizi che altri daranno di noi, perché siamo fragili. Alla fine c'è, dal mio punto di vista, l'online è uno dei pochi posti in cui ci è dato di esprimerci, ma è anche uno dei posti in cui stiamo più visti in qualche modo*" (eng. The way our generation taking care of our image online… depending on the fact that we want to protect ourselves from the judgments that others will make of us, because we are fragile. In the end, from my point of view, online is one of the few places where we are able to express ourselves, but it is also one of the places where we are most seen in some way".

The isotopies of vulnerability of a user in AI-mediated space encouraging for continuous engagement appear cognitively and sentimentally challenging through the interviews: on one hand users feel encouraged to interact, on the other hand every interaction online can lead to overexposing and have negative effects within digital and immediate physical environments.

6.3.3. Theme: The influence of AI-mediated enunciation on emotional states, mental and physical well-being and disembodiment: The role of AIRS in emotional contagion on social media as a coping mechanism

Respondents in the age category 18-26 years old largely indicated how they use AIRS to impact own cognitive states, focusing on own emotive and cognitive conditions. However, the other significant effects of AIRS mentioned relate to the users' physical changes in order to fit into AI-mediated environment as a part of immediate physical one, as shown in this example:

> "I have to say that today there is a lot of talk on social media about all these important social issues, from women abuse, women rights, which are absolutely should be discussed. But also about nepo babies, privilege, even such thing as a beauty privilege. It is like you get better life just because you are beautiful. But I would pose it a little differently. Since I started to follow these dominant trends on social media and change the way I looked to appear more like girls on Instagram, all these influencers, I really noticed people to treat me differently. I have to say that I am probably exactly the same person and I don't feel any particular more beautiful. It is just what people see on social media change the way they think world should be these days". (10-1826-it)

From this part of interview with 10-1826-it, it is possible to highlight a practice of changing a physical self. Interviewee 3-1826-it also indicated that the perception of beauty of female face has changed for them over last years since AI-mediated image of female face online looks like one that underwent plastic surgery interventions. According to 3-1826-it, seeing these images online suggested through AIRS make them notice more people who had some cosmetic faced alterations in their immediate physical environment and compare own facial features and digital representations. This brings less motivation to share digital representations of own face online.

6.3.4. Theme: overstimulation and multitasking

A feeling of control and stress anticipation comes hand in hand with overstimulation by AIRS and multitasking. As in interview 1-1826-it, where interviewee talks about keeping updated on

events of the war in Ukraine based on AIRS, they expect to gain a feeling of control through digital representations they encounter, taking them as facts of immediate physical environment. Instead of achieving a feeling of control through influencing own perception of digital and physical environments, they obtain the contrary emotional state of being overstimulated and exposed to the need to multitask to solve own emotional response.

6.4. Findings among the age category 27-34 years old in Italy

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "[…] And then arrived Facebook. I was also a little on Myspace for music purposes. […] It was interesting to observe, because **you could see how some parts of peoples' personalities would emerge in the different contexts** of different social media". (14-2734-it) "**Today we all watch more or less the same things recommended by algorithm** because it is based on the previous results of my search. We all get involved in the same loop. People should discover the things which they don't like as well". (15-2734-it)	-user's digital personalities are result of decision-making process	- AIRS force categorisation process on users based on its syntactic elements within digital environment	-digital environments together with AI tolls can impact decision-making process behind one's experiences and digital self-representation	-at the **cognitive** level: *Theme: AIRS shape and enclose environment* -at the emotional/ **sentimental** level: *Theme: AI--mediated digital environments like social media as addiction* -at the **axiological** level: *Theme: AIRS impact on self-identity perception within environment, perceived as hybrid (merged between online and offline)* -at the **pragmatic** level:
Self-perception and self-identification: "[...] in a sea of people who use social media having reactions from others is not a banal thing, one who created it is a genius. It is also a form of recognition. It is not qualitative; it is more quantitative. But it is also important for one's identity. Also, **algorithm takes these reactions as a part of recommendation to show you to more people, to put you in connection with others**	-reaction, like likes, perceived as qualitative indicators for a user-s identity	- AIRS impact perception of self and others	-AIRS as communication tools can impact social relationships	

who might have forget that they even had you as a friend. Obviously, sometimes it results in junk communication, but this is another thing". (14-2734-it)				*Theme: AIRS cause overstimulation and multitasking*
Self-representation and self-enhancement: "Besides being **addictive,** social media can bring benefits and **help to overcome some problems**. I remember that I was talking for the first time to my partner through Facebook, it helped me to overcome being too shy and nervous. If not Facebook I would have a problem to open up and have more social connections, who are also present now in my life, not only online". (14-2734-it)	-social media can be addictive - social media can enhance users' capacities		-AIRS on digital environment can change their function based on users' intentionality	

Table 14 - Examples from interviews in age category 27-35 years old highlighted isotopies and themes in Italy.

6.4.1. Theme: AIRS impact on self-identity perception within environment, perceived as hybrid

The theme shared in the group 27-34 years old shares focus between a possibility to enhance own personality, using tools provided through social media and the danger to be trapped in the addictive behaviours reinforced through these digital environments.

> "I remember no one really know how to use Facebook and I was adding at the very beginning all the famous people, Italian singers and musicians. It was fun time. Now I use mainly Facebook, way less than before, but I do publish sometimes, mainly for professional purposes. Or to work on my 'digital persona', to create a certain imaginary. I would love to stop using Facebook, but unfortunately it is still one of the main tools to impact your digital presence in the world. But I obviously recognise how social media make me loose time. This is also why I use Instagram, TikTok, Twitter [X] as a looker, sometimes. As a toxic environment should be used because it harms more than brings benefits". (14-2734-it)

19-2734-it comments on how merge between digital and immediate physical environments had significant impact on their self-identity and self-representations. Moreover, the interviewee 19-2734-it highlights that this merge allows to impact social relationships through enhanced digital representations to create a meaning, which might not be present within their daily environment:

> "[…] in 2016 if you post something on social media it was becoming truth for others. If you would want everyone to think that you are in relationships with someone it was enough to put an occasional post about them and a photo together".

6.4.2. Theme: AI-mediated digital environments like social media as addiction

The isotopy of negative addictive interactions between users and AI-mediated digital environments like social media is largely present in specifically among respondents aged 27-34 years old, but also notice in other age categories. The specifics of the negative reception of AI-mediated digital environments like social media connected to isotopy of losing control.
The metaphors repeatedly used in interviews to describe it “rabbit hole”, “drug”, “addiction”, “cheap dopamine”, “toxic”.

> “I think surprisingly social media still works thanks for a psychological element. When people feel alone, sad, bored, they go to social media. They think that now maybe I will see some funny video and it will help me to feel better. But in the way we interact with these platforms, for example with TikTok, it represents addiction. The way you scroll videos recommended by algorithms and wait that next video will make you feel better. I definitely can recognise that I would scroll social media searching for some particular sensations”. (14-2734-it)

The indicated effects of AIRS on social media, reflected through fieldwork results, show that users anticipate experiencing positive emotional response to the digital representations they encounter online. The anticipation reinforced through personalised AIRS that supposed to meet users’ expectations. This theme correspond to a practice of spending time on AI-mediated digital environment like it would be a physical place.

6.4.3. Theme: AIRS cause overstimulation and multitasking, need to detach

One of the main focuses of age group 27-34 years old is loss of privacy through constant need to be available 24 per 7 to other individuals. This privacy is understood not like loss of the sensitive private data but loos of private time when one can withdraw from interactions on digital environments.
According to digital ethnography results from the posts the users in this age category used to share in the previous 10-15 years, mainly from 2006 to 2016, did represent the behaviours online sharing almost each moment of their immediate physical environment to digital one. However, with introduction of AIRS on social media, that aim to raise users- engagement, users recognise the need to detach due to overstimulation.

> “I don’t like calls, it is difficult to me to make calls. I prefer clear messages which explain well the main point. In this case it is better to use longer messages than short ones. I think written text is better because it gives you time to read what you wrote and reflect on it. This idea of immediate response is horrible. Because to respond with attention one needs time. Reasoning takes time”. (14-2734-it)

AIRS stimulate users to be continuously engaged with new elements of the environment, which requires attention and cognitive effort, if each text approached individually. This could explain why AIRS can bring a feeling of irritation, stress and fatigue to some users.

6.4.4. Theme: AIRS shape and enclose environment

The recurrent isotopy related to process of discovery appears in half of the interviews, mainly in the age category 27-34 years old and older. The users in this age category acknowledge the role of AIRS in the selection of the texts they encounter online. They tend to describe it as a negative effect of AIRS, in comparison younger users (18-26 years old) who purposely looking

for repeating elements and texts which allows them to have better control on their experiences online.

> "I obviously would like to believe that they [AIRS] do not influence me, but probably as everyone in this world when you get exposed to the information it affects you somehow. And the fact that this is moderated today by the algorithm which tend to show you something on the basis what you already did see or what people with who you are connected have seen, makes it a very closed environment". (14-2734-it)

6.5. Findings among the age category 35-55 years old in Italy

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "Depending obviously what is considered as social media, are dating apps also social media? On Facebook first everyone was a friend and also worked as a dating app, but a couple of years ago **I did clean my friends list**, to leave only people I know and communicate. I downloaded TikTok but I never really used it". (21-35-it) "Relaxation and ease, I guess. I feel like our life today is sometimes overcomplicated. And when **you see how something is done online, you feel like you can do it too**. It is not always true, but at least it lifts this feeling of being stuck in your mind". (25-35-it)	-ease and control		-tools for control immediate environment through digital one	-at the **cognitive** level: *Theme: Filter bubbles and echo chambers* -at the emotional/ **sentimental** level: *Theme: Self-enhancement and social promotion* -at the **axiological** level: *Theme: Trustworthiness and advise seeking*
Self-perception and self-identification: "I like funny videos. But also, since **I have TikTok, I get a lot of videos about my health condition where other people share their experiences**. And it makes me feel having a community, but also gives me new information which I didn't know before, because it is what you	-united communities based on shared experience	-AIRS impact perception of self and others	-AIRS can help to experience a supporting community through contextual elements within environment	-at the **pragmatic** level: *Theme: motivation and control*

learned only from others and not from doctors". (30-35-it)				
Self-representation and self-enhancement: "Today one may see many things online, it is also very helpful in discovering new things you may not even think they exist. **I think what one sees online definitely impacts the reasoning for choosing something**. But obviously, I like to know many opinions before I do some important decisions. When for example, like going for a restaurant, trying new places, it is definitely good". (21-35-it)	-AIRS mediated discovery and choice	- AIRS force categorisation process on users based on its syntactic elements within digital environment	-self-distancing from AI-mediated digital environments	

Table 15 - Examples from interviews in age category 35-55 years old highlighted isotopies and themes in Italy.

6.5.1. Themes: Filter bubbles and echo chambers

Interviewees in the age category 35-55 years old mainly use Facebook as a main communication tool, less Instagram and LinkedIn. Facebook appears to be a social media of interests, where peers are present and it is easy to follow communities of the interest and be updated on the recent news, e.g. favourite Football club. In less extent used Instagram, mainly to follow personalities or family members. And partly LinkedIn was mentioned as relevant in professional field. In this extent Facebook, in comparison to Instagram and LinkedIn, has syntactic structure that allows a user to keep in touch with communities. It happens that Facebook AIRS create a selection for users mainly based on communities' information than the updates from peers and friends.

> "I am following pages and communities, I go there when I want to know news. But in personal communication, I prefer to go out for aperitivo or just a beer". (21-35-it)

At this extent AIRS and the syntactic structures of Facebook can create personalised filter bubbles and echo chambers that can impact users' perception of the immediate physical environment, especially what regards politics, hobbies and interests.

6.5.2. Theme: Trustworthiness and advise seeking

In this age category many respondents in Italy confirmed that they would rather use AIRS on social media as a tool to improve their immediate physical environment, like finding places for eating, travelling through experiences other share online. None of the respondents specify that they attain any intentional actions to impact their digital persona that relatively would influence their social relationships. For the users in age category 35-55 years old AI-mediated digital environments are secondary to immediate physical one.

Several respondents mentioned that they chose their summer vacation location or a restaurant based on the videos they have seen on social media, at least once. Going with deeper investigation how they would identify whether they have any tools to approach trustworthiness of the texts they encounter online, the responses were focused on the fact that these are typically situations when the information is provided through the sources that look credible, get second verification through other sources and not based on high stakes decisions, mainly entertainment, small purchases and leisure places, like restaurants.

6.5.3. Theme: Self-enhancement and social promotion

Self-representation online is rarely focused on creating a digital persona or curation the texts that represent one unless it is part of the professional interests.

> "Sometimes I see posts of people I don't really know well and their posts online make me feel like it would be nice to go out sometimes, but sometimes vice versa, you think that it is better to avoid certain topics with these people. Also, sometimes I see posts of some people and think: wow, you really had a lot of time to write all these! Well, I also think about what I post online, I try to keep it easy and not to bother much. Indeed, I don't post every day and a lot. I don't want to look ridiculous. But sometimes just come a good photo and then I post it". (21-35-it)

Social media considered as leisure and domain for younger users which impact the time and engagement with AI-mediated environments.

6.5.4. Theme: motivation and control

The relationships on social media are considered as secondary to immediate environment. The communication practices are based on individual interactions rather than digital environments, in respect to younger age categories. There is also less emerging through online practices that allows emotional distancing from the digital environments and AIRS effect. In the case of the fieldwork conducted in Italy these results can be partly result of the practices within the culture that include in less extent the use of social media and other AI-mediated digital environments.

6.6. Discussion: Results from fieldwork in Italy

The results of the interviews conducted in Italy reveal nuanced insights into the interaction between users and AI-driven digital environments across different age groups. These findings offer valuable implications for understanding how individuals navigate social media landscapes and the impact of AI recommendations on their behaviours and perceptions.
The interviews shed light on the prevalence of Italian language use among social media users, indicating a strong preference for local linguistic environments despite the incorporation of English-based terms in online interactions. This underscores the significance of cultural and linguistic context in shaping users' digital experiences and communication patterns. Moreover, the discussion highlights the pronounced influence of social pressure on younger users (18-26 age group) within digital environments. These individuals prioritise meticulous profile curation and view AIRS as essential tools for managing their online exposure. The emphasis on seeking private online spaces reflects a desire for control over interactions and underscores the role of digital environments in shaping social relations and face-to-face interactions.
In contrast, users aged 27-34 exhibit a somewhat diminished concern for profile curation and AIRS manipulation, with a focus on streamlining online interactions through "cleaning" their

friends list. This suggests a shift in priorities towards more pragmatic uses of social media, particularly in terms of consumer practices, while still acknowledging the negative effects of AI-driven environments. Interestingly, respondents aged 35-55 primarily utilise social media as an information source but may overlook the influence of AI recommendations on the content they encounter. This highlights a potential gap in digital literacy and underscores the need for increased awareness of the mechanisms driving online information dissemination.

Furthermore, the discussion reveals a consistent preference across age groups for consulting friends and family over online audiences when seeking advice, particularly for personal matters. While platforms like Ask may facilitate private communication, they are primarily utilised for discreet conversations rather than open advice-seeking.

Overall, the results underscore the complex interplay between users and AI-mediated digital environments, influenced by factors such as age, social pressure and digital literacy. These findings provide valuable insights for understanding users' behaviours and perceptions in the context of evolving digital landscapes.

Chapter seven -
Case study: AI recommendations in Estonia

7.1. Describing the Estonian context

This chapter presents one part of the case study analysis based on the data collected during fieldwork in Estonia. The main task of this chapter is to analyse the semi-structured interviews and digital ethnography data to provide insights at three levels of coding (based on theoretical framework concepts that are confirmed in relation to the data and standing-alone insights suggested through fieldwork) and theming, as findings supporting the theoretical contribution of this work.

Figure 37 - Map of geographical location of case study, Estonia.

Estonia is one of the three countries chosen for the fieldwork research (Figure 37), along with Italy and the Netherlands. On the one hand, the choice of Estonia supports the relative cultural similarity between these three countries - the location in one geographical, economic and political area. On the other hand, its unique features include a relatively small population (1.3 million in comparison to 17,5 million in the Netherlands and 59 million in Italy), digitalisation of community at various levels and relative homogeneity of access to digital environments among the population.

The digital environment available to Estonian community and the way it used on daily basis rely on many factors like geography of the country, neighbouring communities, linguistic landscape, accessibility to digital devices and platforms, institutional and economic background, basic communication needs. Estonian has unique cultural and linguistic landscape, accessibility to digital tools and economic backgrounds. It is notable that Estonia is a part of the EU space since 2004. It is geographically located in the north-east and shares a border with Finland in the north, Russia in the east and Latvia in the south. Estonian Republic was part of the USSR until it gained independence in 1991, after 50 years of German and Soviet

influence. The linguistic groups in Estonia are represented by Estonians (67,8%), Russophones (22,2%) identifying the Russian language as their mother tongue and other ethnicities that include native non-Estonians, economic and political immigrants (about 10%). The Estonian language is the official language of the country. However, a significant part of the population can speak English at a very advanced level. The cultural context in the 2020s relevant for this research highlights a significant influence on the English language used in many spheres of life, with approximately 76% of the population speaking English fluently (Eurostat, 2024b).

Active digitalisation in Estonia started around 1998, when the Estonian Parliament adopted the development strategy of the Estonian e-Government based on the Principles of the Estonian Information Policy. This included initiating a digital transformation to increase the efficiency of its processes and how efficiently it delivers public services and full coverage for digital mobile phone networks in the country and ensuring a secure data exchange environment. This was essential in ensuring that Estonian citizens and residents could access the Internet and develop the necessary skills. About ten years later, in 2005-2010, almost all of Estonia's territory was covered by network access free of charge. In a 2007 interview (Spiegel Online, 2007), Estonian former prime minister Mart Laar commented that infrastructure allowing users to connect online through wireless coverage, primarily free of charge, reached a significant extent, influencing all institutions and infrastructure of the country. The right and accessibility to the digital environment and digitalisation were also implemented at schools and universities, allowing and reinforcing new communication and education methods. The services that can and highly used through digital devices are ID card, Residence permit card, e-Resident's digital ID, Digital ID, Mobile-ID, Diplomatic Identity Card, Smart-ID for private sector.

Estonia's digital transformation model attracted a lot of attention from other governments; for example, in 2014, former US President Obama visited Estonia and one of the purposes of the visit was to discuss the e-governance system's efficiency in providing public services. The project e-Estonia was significant enough to resonate with all of Estonian society and aimed to bring together all actors, such as institutions, services, banking systems and citizens. Moreover, based on the texts available (Heller, 2017), it significantly contributed to the national identity as well as the individual identity of Estonian residents, not only citizens but also those who decide to live in Estonia and be part of the community. The transparency of the bureaucratic system, allowing residents to effectively conduct a significant number of activities online, from paying taxes to opening a company, facilitates economic and social relations that encourage different aspects of social innovation and proactive behaviours. This fact is significant to this research with respect to openness to digital behaviours, online and offline, including risk-taking actions like opening a company, e.g. start-up, connecting with strangers, etc. The size of the potential members of the environment (the population of Estonia is 1.3 million) can play a positive part in this process.

Engaging with residents through social media is a common practice to encourage their trust and use of digital services properly. Figure 38 below shows an Estonian influencer @dr.skarlet, who is Estonian-Russophone, carrying her Instagram profile in the English language, who partnered with Tervisekassa, a Public and Government Service and health organisation and *TEHIK*, the Health and Welfare Information System Canter and Government organisation.

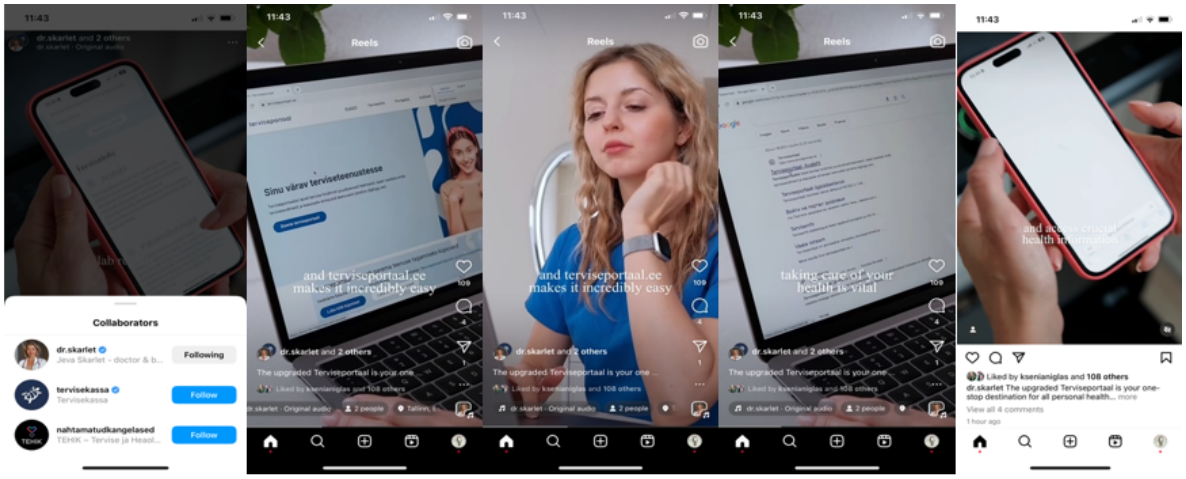


Figure 38 - Video of Estonian influencer @dr.skarlet and Tervisekassa and TEHIK, to promote use of public health digital services.

Jeva Skarlet, a doctor and blogger leading influencer profile on Instagram @dr.skarlet, has 12,8 thousand followers and shares about her life through Medical school at University of Tartu, her work at Tartu Hospitals, her personal life like travelling, design of her home and family and fashion preferences. Her age category falls into the 18-27 years old group. However, the communication tools she uses on Instagram are focused on self-representation through personal texts, like photos, videos and text mainly in English and include the representation of her body and daily routines. However, all her posts remain very formal, not engaging or manipulating highly emotional responses from the audiences.

social media are not considered the main communication channels for Estonian institutions and organisations, yet they are used extensively. During the last 10 years, attendance to social events has often been performed through Facebook tools for attendance registration; in other words, to attend the event, sometimes to waive a participation fee, one should have been registered online through the event's Facebook page, consenting the use of their private data. Other social media use cases for educational and communication purposes include the use of posts on social media by Marketing offices of Higher Education Institutions to attract and organise prospective and current students, especially foreigners. In doing so, they engage student representatives to share positive narratives and stories through their social media and the official social media of Archimedes Foundation @studyinestonia (Figure 39). Archimedes Foundation is an organisation created by the Estonian government in 1997 to coordinate and implement different international and national programmes and projects in the field of training, education, research, technological development and innovation. On their Instagram profile they provide various information which can be interesting or a call-to-action for prospective students, using infographics, representations of social life in Estonia, as well as personal stories of students who act as ambassadors for creating positive narratives through the texts, which contain their personal digital representations (e.g. their face and body and the way they perceive their daily routine in Estonia).

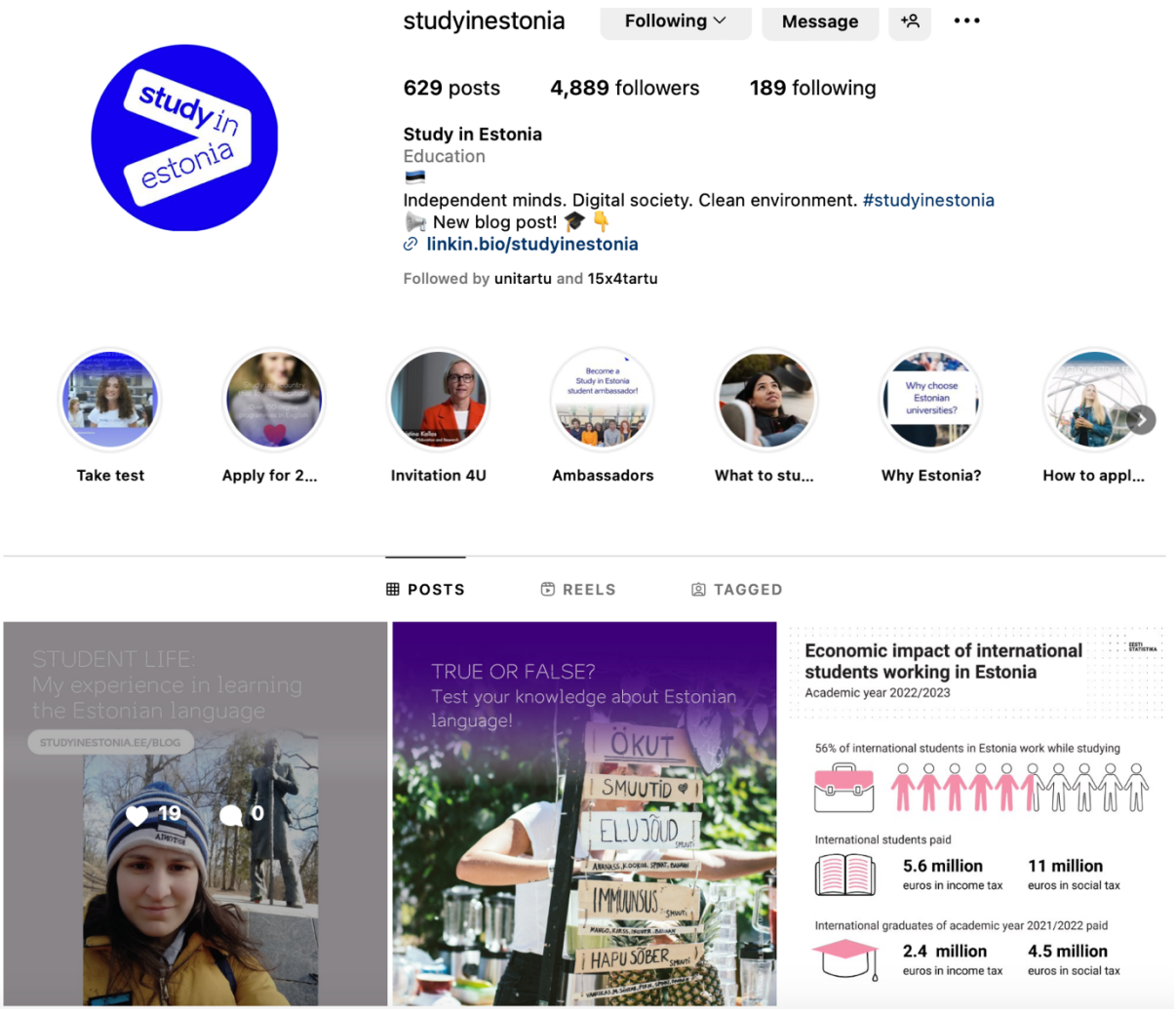


Figure 39 - @studyinestonia Instagram profile

7.2. AI recommendations' role in social media: The users' interpretations, actions and interactions in the selected age groups

The isotopies identified from the interviews conducted in Estonia are organised into different tiers. The first tier includes initial codes and identified isotopies related to key concepts or types of social actions. The second tier compares these selected isotopies to the theoretical framework, focusing on data versus hypotheses. The third tier consists of isotopies that emerged during the interviews but were not suggested by the literature review or theoretical framework, providing new insights. The final list of codes and themes, derived from the isotopies highlighted through fieldwork, interviews, and digital ethnography, is organised across cognitive, emotional or sentimental, axiological and pragmatic levels. The sentimental level represents the process of self-describing emotional states, which users recognise but may not fully articulate through linguistic categories. While these emotions may influence their interpretations, users typically do not attribute their decisions to this level. The cognitive level encompasses various interpretations that guide the categorisation process through available decision-making tools. The axiological level highlights individual, social, and cultural values that surfaced during the interviews. Finally, the pragmatic level refers to the practices identified in relation to AI-mediated digital environments, both online and offline.

7.3. Findings among the age category 18-26 years old in Estonia

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "When I was using Instagram, it **was frustrating**. Because sometimes, **it would be suggesting some post that was so stupid or ridiculous that I would check it out and then the algorithm would keep proposing similar posts to me**. But I do not like it at all". (2-1826-ee) "**I don't have any problem with the recommendation algorithm, I even find it helpful.** Once, I needed a new sofa, **I purposely searched for a sofa** I liked for two days and then the algorithm just kept recommending the options I liked. And **I found the sofa I have now,** like in two weeks". (6-1826-ee)	- acknowledgement of the role of AIRS during interaction on social media as prevailing or central; -identification of reasoning behind the AIRS different from own needs;	-feeling of control and stress anticipation: AI recommendations reasoning in decision-making process can be significantly different from their users' decision-making, which can inflict AIRS imposing certain texts, context and even environments on social media users;	-"training" and manipulating an algorithm to fulfil the need of control over digital environment, possibly influencing immediate physical one;	-at the **cognitive** level: *Theme: Division between proper and online identity, Disembodiment through AI-mediated enunciation* -at the **emotional/ sentimental** level: *Theme: Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation: AIRS on social media emotional contagion as a coping tool* -at the **axiological** level: *Theme: perception of the opinions as facts*
Self-perception and self-identification: "My friend edits her photos a lot, I don't think that's a necessarily a bad thing because you can see that it is edited. Real skin doesn't look like that. The problem is when you cannot spot that it was edited. […] My pictures on Instagram never look perfect, so I don't try to take the same photo over and over again. **I prefer to post things which are around me,** share the beauty of the world that I experience". (7-1826-ee)	-use of AIRS in order to impact self-identity;	- categorisation of digital representations through AIRS-mediated elements of the environment; - perception of self and others in social media;	-confusion on threshold between digital environment and immediate physical one;	

Self-representation and self-enhancement: "Obviously, **it is common to try something that one sees on social media**. Once I tried to eat watermelon with mustard, because I saw it on social media, it was a huge trend. But **it is always good to evaluate what can be an interesting experience and what crosses that borderline to being dangerous and harmful**. Obviously trying to evaluate social media is not harmful to you if you pick and choose what kind of information you consume and consider trustful. But **it can lead you to a good discovery.** But I still try to cut on endless Reels content, because sometimes **it makes me feel addicted and lose my time**". (1-1826-ee)	-use of AIRS to impact own image online and fit into social groups promoted on digital environments; -discovery through AIRS on digital environment; -evaluation of digital environments as harmful/ addictive/ time consuming;	- adopting and fitting into an environment with incomplete knowledge about it	-affordances of AIRS to promote trustworthiness of digital representations;	-at the **pragmatic** level: *Theme: identifying trustworthiness*

Table 16 - Examples from interviews in age category 18-26 years old highlighted isotopies and themes in Estonia.

7.3.1. Theme: Perception of the opinions as facts

Identificatio0n of opinion as facts on social media can be considered as a conflict in communication. It can highly rely on the syntactic structure of the digital environments that do not allow users to express themselves through limited tools of enunciation. It can also be caused through the social conflicts that transformed into digital environments from immediate natural one.

> "I think all the conflicts online come from people voicing their opinions online too much based on their assumptions and not knowing anything about the situation. Even outside social media, people think their opinions matter so much that they should express them. I think people learned they could do anything online and would not face the consequences. And often, older people behave very aggressively and rudely online. I think they still think that just because they are older, they know better and need to teach others, but they may not know anything about it. Social media is the place where older people argue about the things they know nothing about with other people like them, who do not know anything on the topic too". (4-1826-ee).

Several respondents pointed out that the behaviours, like one in the interview sample presented above, according to them, is attributed to the older users who are not acquainted with the "accepted common rules" of online communication that is considered central today. From the contextual description of the interviews, these "accepted common rules" are focused on the inclusivity and diversity and acceptance, both in respect to behaviours and digital

representations, e.g. no bulling, body positivity, gender fluidity, freedom of expression. However, in comparison to AIRS approach, unless it is moderated by designers, algorithmic processing tends to exclude rather than support inclusivity and diversity. Unless the concept of "inclusivity" within the axiological dimension is attributed to a specific value, e.g. gender fluidity, where specific textual elements stand for the patterns that algorithm follows.

7.3.2. Theme: identifying trustworthiness

The question of trustworthiness to communication on digital environments rise due two main factors: a possibility for everyone to share digital representations as a fact of the reality and lack of tools to verify the information that easily spread through syntactic tools like AIRS.
In the examples from the interviews, it is possible to note that younger users have an experience with digital environment leading them to identification of substitution of factual aspect with emotional. And therefore, avoidance of overstimulation arises a practice.

> "I really don't like when people use too many emotions in their posts. You can feel how fake it is. Lately, for example, on YouTube, everyone has been thinking they should show fake enthusiasm about whatever they discuss. So, whenever I feel like someone is trying to push some emotions on me, I stop to watch or read. Sometimes, it can happen that someone is sharing their life story very emotionally, which can be useful to me on Reddit because everyone has nicknames and does not use real names, but it is a rare case". (4-1826-ee).

The practice of avoidance of overstimulation on digital environments can be also connected to how AIRS manipulate elements of digital environments based on the engagement. It can be compared to which often used to New Media (e.g. TV and printed media) sensational approach to titles, often misleading and targeting on engagement rather than informing.

> "I always try to verify what I see on social media through trustworthy sources. But sometimes things look incredibly ridiculous that there is not even a need to double-check. The problem is that is you spend even some seconds looking at these things algorithm will keep proposing it to you over and over again". (3-1826-ee).

> "I would say that click-based posts make me very suspicious. For example, on YouTube, if a video has many views or some intriguing thumbnail or title, I would probably think that this is just someone trying to get attention but not necessarily offering something meaningful in their content". (5-1826-ee)

Click-based, also used with term clickbait, post is a term used to describe the posts that received a significant number of views and engagement (likes, shares and reposts, comments) from audiences. Clickbait is a type of element (usually a post) designed to gather clicks on the search engine pages that use AI recommendations. Clickbait elements created in attempt to generate traffic through engaging audiences through sensationalist or shocking headlines to attract attention which statistically convince AIRS to recommend these posts to even more users.

7.3.3. Theme: Division between proper and online identity, Disembodiment through AI-mediated enunciation

Both interviews and digital ethnography suggest that users aged 18-26 tend to post and share less on digital environments like social media, in respect to older age category group 27-35 years old. One of the reasons for this behaviour can be in fear of social pressure as well as acknowledgement of inability to control the process behind explosion of own digital persona

and signification and indexical relationships that can be attached by other users or syntaxis of digital environment.

> "I try not to post anything online. I had an account on Facebook with posts, but then I deleted it and opened a new one without any posts. I like that people do not judge me based on what they see online but try to know me better through direct communication with me". (4-1826-ee)

7.3.4. Theme: Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation: AIRS on social media emotional contagion as a coping tool

Digital environment can manipulate or be used to purposely impact ones' emotional and sentimental dimensions. Two main approaches can be highlighted to impact of AIRS on users based on the agency that based on the intentional engagement between AIRS and users of digital environment. The first approach represents use of AIRS to modify the environment in order to receive specific results that may impact one's moods, cognitive and even physical dimensions. As presented in the interview samples below, users may feel affected by elements of digital environments that selected for them by AIRS. This represents active engagement and active reception of AIRS results.

> "I think they [AIRS] do [influence me] because of the priming effect. But we are more aware today of the possibility of these effects. I have a passion for things that pop up in my feed. But even when I close the socials, I still may spend an entire day thinking about those things, trying to evaluate if I need it. And when I finally manage to put it away from my mind, it often reappears on my socials. I guess it does not show me what I should buy and how I should live my life, but it makes me think about all these little attributes which I may already like and it makes me want them. It is not always easy to put away something you want, especially if it appears so accessible through social media". (2-1826-ee)

> "Lately, I think AI recommendations have shaped my desire to choose the parts of my hobby. I watch videos who do the same things on YouTube and it is mainly about how people use it, so I get very inspired and almost always buy new tools for my hobby". (4-1826-ee)

The second approach stands for a practice, as presented in comparative table, e.g. "I don't have any problem with the recommendation algorithm, I even find it helpful" (6-1826-ee), when users engage with AIRS in order to modify their digital environment to be adjusted through AIRS on its own to present possible expected outcomes. This presents active engagement and passive reception of AIRS results.

7.4. Findings among the age category 27-34 years old in Estonia

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes. related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring:	-limiting time online,	-felling of control and	-perception of digital environments as	-at the **cognitive** level:

"**I am trying to limit my time on Instagram** and other social media, I think they are very bad for your **mental health**". (14-2734-ee) "I remember using social media all the time and **every time I had a fantastic moment in my life, I would think that I needed to take a picture of it to post online**. It reached the point when I would remember my life mainly through these photos I shared online and not as something in my memory. And it was horrifying. Then I realised that I needed to avoid Socials. Life is about experiences and having them together, not about sharing the photos online". (13-2734-it)	-avoidance of digital environments	stress anticipation, -incomplete environment to fit in;	negative/limiting type of substitution of the immediate physical environments, -perception of loosing control over own reaction to engagement on digital environment;	*Theme: Self-care through self-representation;* -at the emotional/ **sentimental** level: *Theme: Self-victimisation to negative AI-mediated categorisations* (are perceived negatively and evoke negative connotations towards self-identity); -at the **axiological** level: *Theme: self-identity through categorisation, at extreme cases polarisation in algorithmic processing; ctegorisation of social media as negative, evil, harmful.* -at the **pragmatic** level: *Theme: self-identity through self-representation (creating narratives online through which contribute to social self-representation and individual identity)*
Self-perception and self-identification: "**social media makes me feel frustrated about myself.** It is like I am shooting heroin in my arms, I know it is bad but I feel very bad about it. You know, my life is fine, but if I analyse my actions, it's not a good action. It's something that I would aim to get rid of from my life". (14-2734-ee)	-social media are bad, compared to drugs and addiction	- felling of control and stress anticipation,	-identifying itself through digital representations	
Self-representation and self-enhancement: "[…] Once **I went for 40 kilometres on bike. It started to rain and then my application stopped recording this and I couldn't even then post it.** I did plan this whole journey not only to post something, I also wanted my fitness tracker to count a lot of calories and also it failed to do that. […] I like doing sports. Of course, I'm doing it for myself, but this **possibility to make a post is a great motivation for me**, it was a way to promote myself—for example, my art. So, for example, I would like to record". (12-2735-it)	-using digital environments to convey digital representations as facts of reality	-self-enhancement through the syntactic tools of digital environments	-perceiving digital representations shared on digital environments as facts of reality	

Table 17 - Examples from interviews in age category 27-34 years old highlighted isotopies and themes in Estonia.

7.4.1. Theme: Self-identity (including self-victimisation) through AI-mediated categorisations

All users in this age category, explicitly in the form of a statement or a doubt, indicated adverse effects of social media and tools used on digital platforms, like AI recommendations. The theme of social media having negative connotations was highlighted in all 10 interviews in this age category. Eight interviewees indicated the need to withdraw from social media use from time to time, identifying it as "destructive", "addictive", "toxic", "harmful", "cheap dopamine", etc. Most of interviewees (7 out of 10) indicated that at some period of their lives, they deleted their online profile to avoid the temptation to participate in social media and protect themselves from its harmful effects. The harmful effects often were connected between social representations online and perceived self-identity in relation to mental health. Two interviewees indicated that while having a social media account, they struggled to live their daily life, participate in daily activities and be emotionally present without comparing themselves to the digital representations they encounter online or thinking about how the moment of their life can be converted into a digital representation, as shown in the interview samples:

> "I remember constantly posting about everything that was happening in my life. It felt like if I would not post about it - like it never happened. I was writing about my university days, feelings and everything". (12-2734-ee).

> "I think this constant stimulation from social media is the problem, which I also think is getting serious in society and it's affecting me as well, is that the attention span is getting shorter and shorter and I really hate that and I hate that I am affected by that". (14-2735-ee)

> "I was 22-23 years old when I first heard my friends talking about how it is important not to have social media. And now, six years later, I completely understand why they chose not to include social media in their life and I also decided to go off Facebook and Instagram a couple of months ago. Now, when I need to reach someone or they need to reach me, we have to call each other, making our relationships more alive". (13-2734-ee)

AIRS impact on self-identity perception within environment, perceived as hybrid (merged between online and offline).

7.4.2. Theme: self-identity through categorisation and algorithm

Interviews confirm that users can recognise AI recommendations' impact behind the categorisation process when some dominant patterns, which, intern align with others. The process of polarisation attaches negative connotations and characteristics to events or individuals which they may not possess, as mentioned in one of the interview sample:

> "During COVID, I spent a lot of time on socials, observing the lives of others. And at some point, I felt like I did not live my life anymore. All the things I was seeing online, also from people I didn't know, reading awful things like many are struggling... I felt fortunate that I still could have my job and salary, but the aggression many shared online towards the COVID restrictions was immense. Social media did construct in me feelings of guilt and shame just based on the factors of how COVID was represented through social media because there are some dominant narratives towards vaccination. It was like if one does not get vaccinated, they also are racists and monsters who kill people. It was not about freedom of choice. The polarization of social media can create and assign all the other qualities and narratives through algorithms, making everyone even more biased". (13-2734-ee).

The example of COVID reception online and social policies mediated by AIRS within social media confirms that these tools can be highly manipulative, based on the statistical approach of algorithms or designers' inputs and intentions.
Polarisation on social media is often connected to echo chambers or filter bubbles when users get enclosed in an axiological segment of a digital environment that supports and reinforces their thoughts, beliefs and ideas. However, the example from the interview above sheds light on a more profound question of self-identity. On the one hand, users receive strong and sometimes aggressive confrontations from the other side of binary opposition to their own. On the other hand, users and AIRS reinforce and unite the categories, which could be in associative relations to form binary opposition. Following the example from the interview, a person restraining from the vaccination process during COVID on social media was categorised and could be assigned other qualities like "Trump supporter", "racist", etc. On the other hand, the categorisation process on the same side of axiological binarism can receive favourable qualities that are not present (see Chapter Eight in parallel to fieldwork on the Italian case study).

7.4.3. Theme: Self-identity through self-representation and others-representation

The set of 10 interviews conducted in Estonia, together with the set of interviews in the Netherlands and to less extent in Italy, suggest that users in the age group 27-34 years old have a specific approach to self-identity based on what they see as digital representations shared by others. This age category of users, based on the data analysis, should have acquired digital literacy skills starting at age 12-14 years old, using digital environments like social media. However, despite almost 10-15 years of experience of interactions they show significant engagement with all digital elements (AIRS- mediated texts and context) as they would be real facts of immediate physical environment.

> "… since the war started [refers to the Russian-Ukrainian war started in February 2022], I try to be very selective in what I see on social media and what accounts pop up in my feed because I feel extremely sad about all the events in Ukraine. My friends and family are constantly online, following every update, but I cannot do it. I feel terrible; I start to be very depressed and cannot do my work and cannot function normally, basically. So, I like to search for something that will cheer me". (from 12-2734-ee)

Another example showing how AIRS can trigger the feeling of guilt and impact behaviours online and offline of the users provided in the interview 11-2734-ee:

> "For the first months of the war (Russian -Ukrainian war 2022-now), I did not feel like posting my dog or anything from my house. I also only reposted some anti-war-related stuff. It felt wrong to share that one can go to cinema or enjoy life in any way when something like that is happening in the world. So right now, I'm posting positive content as well. But it still feels like I need to share about what is going on there, that maybe I could help someone".

The users in this age category tend to categorise their immediate natural environment through digital ones:

> "We constantly compare ourselves to our group to fit in; it is a natural reaction and it happens on deeper levels than just conscious realisation. When I am on social media, I feel like comparing myself to the entire world, like a game you cannot win, so you always feel like you are not enough. I always tried to follow only people who would inspire me and bring positive energy to my life, yet it was about 1000 people. In my professional field, there is sort of toxic way to show off to support their career, underlying some unrealistic and sometimes crazy standards, not only professionally but in daily life too". (13-2734-ee)

Therefore, adjusting to AIRS-mediated digital environment first as a centre of the semiosphere and then apply these perceived central elements to their immediate natural environment. Based on these results, it can be suggested that their anticipations regarding natural environment can be very different from AIRS mediated elements, which indeed can result in negative attitudes towards social media as part of own daily activities.

7.5. Findings among age category 35-55 years old in Estonia

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "TikTok is very impressive […] **The algorithm is so advanced that it is very easy to get hooked up to the system** of these videos. I am often being played by algorithms, being hooked up […]. **TikTok takes a lot of your attention, your full attention so you escape from this world**". (23-35-ee)	-unwilling escape and detachment from immediate physical environment;	-multitasking and switching between several environments at the same time	-asynchronicity between digital and immediate physical environment can bring various feelings and impose cognitive overload on users;	At the **cognitive** level: *Theme: perception of the opinions as facts* At the **emotional/ sentimental** level: *Theme: AI-recommendations can cause overstimulation and impact decisions*
Self-perception and self-identification: "I went to Bali and **went to all these places where everyone takes these photos and I did the same thing.** So yes, that is an exact example that I saw people posting these beautiful pictures In Bali and **I went to the same place and took the same**	- creation of information bubbles and echo chambers as a negative tool, a limitation; -limited attribution of AIRS effects on	-categorisation process is oriented to AI-mediated environment which prevent users in discovery or impose values in their daily activities;	-AIRS as a narrowing tool, instead of the tool for social diversity and inclusion	

photo. […] I definitely have people that influence me online". (21-3555-ee) "I feel that **social media convinces us that our values do not matter** for our happiness and that we can be happy only if our lives correspond to what we see online. **A personalised algorithm does not bring diversity; it brings you a slimmer world perspective. It is very dull**". (23-35-ee)	the interactions within digital environments;			At the **axiological** level: *Theme: AI-recommendations can be a source of motivation as well as enclose their identity, leading to predictable decision-making*
Self-representation and self-enhancement: "I often **feel quite insecure about myself when I am on social media,** especially ones like dating apps. **Dating apps are very algorithm-driven and to find good dates there, one should correspond to these dominant narratives in the photo and in the description of the profile**. We, as gay people, have all types of our own apps. But it often makes me feel insecure because top profiles are always the guys showing naked muscles in their photos. I don't feel comfortable with that. But **people like it and the more people like it, the more algorithm will suggest it** to others". (23-35-ee) "People did become psychologically weaker during COVID time and it was one of the main reasons for social media rise. But **people are not ready to be bored anymore and immediately go on social media**. But **being bored is good. It is where a creative process begins, where people start to analyse. I think AI recommendations on social media make us lose this essential part of our lives**". (24-35-ee)	-exclusion based on syntactic structures of digital environments and AIRS	-AI recommendations encourage multitasking and presence in multiple environments at the same time	-overstimulation from AI-mediated environments help users from boredom, while depriving the cognitive processes that may occur in this condition: analytical and creative reflection on their experiences.	At the **pragmatic** level: *Theme: AIRS as a professional tool*

Table 18 - Examples from interviews in age category 35-55 years old highlighted isotopies and themes in Estonia.

7.5.1. Theme: perception of the opinions as facts

AIRS are a narrowing tool that aims for exclusion, instead of the tool for social diversity and inclusion. Moreover, in case when digital representations interpreted by users as facts of the reality, it can create asymmetry within the AIRS work as a tool.

> "I often encounter so-called 'trolls' when I post or comment on something online. These days, people misunderstand entirely that comments online are just opinions, not truth and opinions can be different. Not only is their opinion valid, but so is their opinion. The opinion is not fact. One can see it, especially on Facebook. I think it is very immature to behave this way online, especially to express toxic behaviours online". (23-35-ee)

7.5.2. Theme: AI-recommendations can cause multitasking and overstimulation

The example from the interview 23-35-ee shows how change between immediate and digital environments can lead to different negative effects that perceived and categorised as such by users. In the interviews the respondents in this age category often used "we" or "them", referring to users of younger generation.

> "I think COVID made us all weaker and using social media was the only escape from going mad in this unpredictable environment. But as soon you are online, you get surrounded by all this information which you did not even think to find and it shapes your expectations of reality. And the more you look at it, the more your reality becomes the way it is shown through the screen of your phone. I think it really can affect our moods and the way we react to the world when we put away our phones". (23-35-ee)

This finding is also supported by a study on the presence of appealing media destructions show positive correlation between attention problems and computer-based multitasking, in high extent for children and less for adults (Baumgartner & Sumter, 2017).

7.5.3. Theme: AIRS as a professional tool

Digital environments like social media can be used as a tool serving particular needs of the users. The interview sample highlights how AI-mediated social media can facilitate her work and add new elements to it:

> "In terms of motivating myself to do something professionally, like needing the motivation to get myself to the gym, more inspiration for a certain I don't know workout routine or if I'm looking for something new to help develop my skills. There's also so much information on social media, specifically Instagram, that I look at others. I obviously follow what others do on social, but I am not chasing the trends that make others look good. My professional field is small, so it is easy that someone can be recommended through the friends-in-common on social media, for example. But probably you have already heard about them. It just gives someone else more and more control of the access". (21-3555-ee)

Other I interviewees also indicated various ways in which they use AI-mediated social media to impact their professional development, from sharing digital representations of workflow to

connection with colleagues and other professionals, as well as monitoring activity of competitors and younger employees.

7.5.4. Theme: trustworthiness and AI tools

The tools to identify trustworthiness used in this age category finds its similarities with traditional interpersonal communication as well as traditional media. Level of literacy and education stands for trustworthiness of the digital representations, especially expressed in the natural language texts, as shown in the following interview samples:

> "I prefer to read posts and messages which are well-written. The text, which has grammar errors and all the types of mistakes which are not that relevant for younger people, makes me feel like this is just someone not educated and makes me discard the information this person tries to convey". (24-35-ee)

> "It is essential to me that the things people share online are written in a good, correct way. When I see many mistakes in the post it makes me think that person even did not read what they wrote. And it definitely leaves a desire not to trust the posts which have even simple grammatical mistakes". (25-35-ee)

In comparison to the responses in the age group 18-26years old, who focus mainly on the emotional component of the text which is also part of the loop when users are placed within click-based evaluation by AIRS, the respondents in age category 35-55years old focus on the classic methods that can be applied to new media like newspapers and TV. However, with new AI tools like LLM, correct grammar identification can be automatically adjusted, which is rather indicates use of AI tools than individual involvement of a human user.

7.5.5. Theme: AI-recommendations can be a source of motivation as well as enclose their identity, leading to predictable decision-making

This theme is identified in all the age categories. However, the interviewees in the category 35-55years old shown less emotional and sentimental involvement with these effects. On one hand, they appear to acknowledge less the effects of filter bubbles and echo chambers in their online interactions, categorising it through of the life spheres, like hobbies, work, political views. On the other hand, this categorisation allows them to experience it less holistically, less as a part of the environment and more as an element that can be used when necessary.

7.6. Discussion: Results from fieldwork in Estonia

Fieldwork results based on the semi-structured interviews and digital ethnography in Estonia show correlation between practices users adopt and their involvement with interactions on AI-mediated digital environments. The analysis mainly focused on the similarities rather than differences and aimed to find correspondence between theoretical findings and whether they are confirmed in the practical reception. Most respondents of all age categories specified that interpersonal interactions face-to-face that get interrupted with use of the AIRS notifications from social media, updates, occasional checking of the contents, is perceived as rude and unrespectful. However, some of the respondents admit that they tend to check their phone for notifications, including ones from AIRS.
Interviewees in the age category 18-26 years old highlighted role of the sentimental analysis in their interaction with AI-mediated digital environment as a tool to approach trustworthiness of

the digital elements they encounter online, as well as using AIRS as a tool to satisfy own needs, including intentionally impacting own moods and cognitive and physical states.
The users aged 27-34 years old show less intentionality in their interactions with AIRS in respect to younger or older users. They tend to enunciate a passive position towards the influence of AI-mediated digital environments, even though they aim to enhance own digital representations and use it within their social relationships.
Based on the theoretical criteria and digital ethnography, the age category originally highlighted as 35-55 years old in the Estonian context can be divided into two groups with an approximate age range of 35 to 42 and 43 to 55. This division reflects the data collected from the interviews and differences in needs and practices, therefore axiological and pragmatic dimensions, which may indicate the difference in AIRS impact on interpretation and decision-making processes. This way, representatives from a younger group (35-42 years old) highlighted that they used proto-social media like MSN and forums during their high school years and many met people with similar interests online who later became their friends with whom they continue to develop relationships, also in face-to-face. This group is leaning towards adopting practices highlighted within younger age groups like 18-26 years old and 27-34 years old in adopting some of the communication strategies they use online and creating connections with younger users, especially on the digital platforms that specifically purposed for dating and meeting other people. The interviewees from this age category (5 people), in different ways, hinted or directly expressed that excessive use of social media is harmful, like the age group 27-34 years old. On the contrary, representatives of the age group 43-55 years old prefer physical contact prior to online communication.
There was not highlighted any significant correlations between local social and geographical environment, which supports that AIRS can affect unification of practices and attitudes for digital environments users. Most interviewees confirm that they acknowledge how syntactic structures of social media and AI-recommendations as a sorting and promoting tool can impact their decisions, as shown in the interview sample:

> "Basically, [when looking to purchase a product] I can use Reddit as my starting point. I will read some threads, see what people think about this topic and then I will pick the top opinions. Then I will do additional research. For example, if I choose some products, I can see what they recommend. it can be quite useful. It also can be very confusing, since in the end I end up sometimes buying things I even never thought to buy. It just keeps recommending related products and reviews and you fall for it. Also, it has possibility to rate for the best advice and it would be the first thing you see. It really has this impact on your trust". (14-2734-ee)

The results of fieldwork suggest that the level of intentionality in the interactions on AI-mediated environment is significant and can impact outcome of these interactions. The categorisation process influenced through AIRS has significant acknowledged effect on the users younger than 35 years old, however can have some unacknowledged effect on all the users.

Chapter eight -
Case study: AI recommendations in the Netherlands

8.1. Describing the Dutch context

This chapter presents one part of the case study analysis based on the data collected during fieldwork in the Netherlands. The main task of this chapter is to analyse the semi-structured interviews and digital ethnography data to provide insights at three levels of coding (based on theoretical framework concepts that are confirmed in relation to the data and standing-alone insights suggested through fieldwork) and theming, as findings supporting the theoretical contribution of this work.

Figure 40 - Map of geographical location of case study, the Netherlands.

The Netherlands is one of the three countries chosen for the fieldwork research (Figure 40), along with Estonia and Italy. On the one hand, the choice of Italy supports the relative cultural similarity between these three countries - its location in one geographical, economic and political area. On the other hand, its unique features include a large but rather homogeneous population (17,5 million) regarding digitalisation at various levels based on geography, cultural and linguistic landscape, accessibility to digital tools and economic backgrounds.
The digital environment available to Dutch community and the way it used on daily basis rely on many factors like geography of the country, neighbouring communities, linguistic landscape, accessibility to digital devices and platforms, institutional and economic background, basic communication needs.
Dutch geography, cultural and linguistic landscape, accessibility to digital tools and economic backgrounds, it is notable that the Netherlands has been a country of the EU since 1958, located in the north-west and shares a border with Germany, Belgium and the UK, which allows cultural and economic influence within territory and population. Official language in the Netherlands is Dutch, but according to The Netherlands Scientific Council for Government Policy (WRR) (Jennissen et al., 2018), an independent government advisory body, one in five Dutch people has at least one parent who was born abroad. In 1972, 9.2% of the population had at least one foreign-born parent. That number rose to 22.1% by 2016. This has significantly influenced linguistic diversity in the country and impacted the integration of the English language as most used foreign language (Eurostat, 2024c).

Digitalisation results and basic digital skills in The Netherlands. The Netherlands ranks 2nd in Human Capital out of 27 EU Member States in the 2022 edition of the Digital Economy and Society Index (DESI), after Finland and Denmark. The territory of the Netherlands is one of the top countries for connectivity, allowing users to have a possibility to access digital environments and remain connected instantly. This way the Dutch digital space is mainly homogeneous in terms of availability of access to the Internet and digital services for citizens. Centralised digital services on institutional level that can and are used include DigiD as digital ID and eHerkenning (for businesses), login system and digital signatures. According to the EU report on Digitalisation and Digital Services in the Netherlands (Eurostat, 2021a) the digitalisation strategy consists of cooperation in developing the national strategy with representatives of universities, expert centres, national employer organisations, individual companies, municipalities and a range of private initiatives working on digital applications.
Many Dutch residents use English language as a medium for their communication online, making their posts in English. Majority of Dutch social media influencers gain popularity on Instagram and YouTube producing videos and other type of contents in English and growing their audiences worldwide. Among most followed Dutch digital personalities on YouTube and Instagram are Make-up artist and transgender @nikkietutorials with almost 20 million followers (Figure 41), a model and personality @romeestrijd with 8.3 million followers, a digital personality @negin_mirsalehi with 7.1 million followers and others. In comparison to Estonian social media environment where digital personalities on average have from 10K to 100K (e.g. thousands) followers, the impact these users have on local and word's communities can be considered more profound and comparable to some Italian influencers and digital personalities, like Chiara Ferragni with 29 million followers and Khaby Lame with more than 80 million.

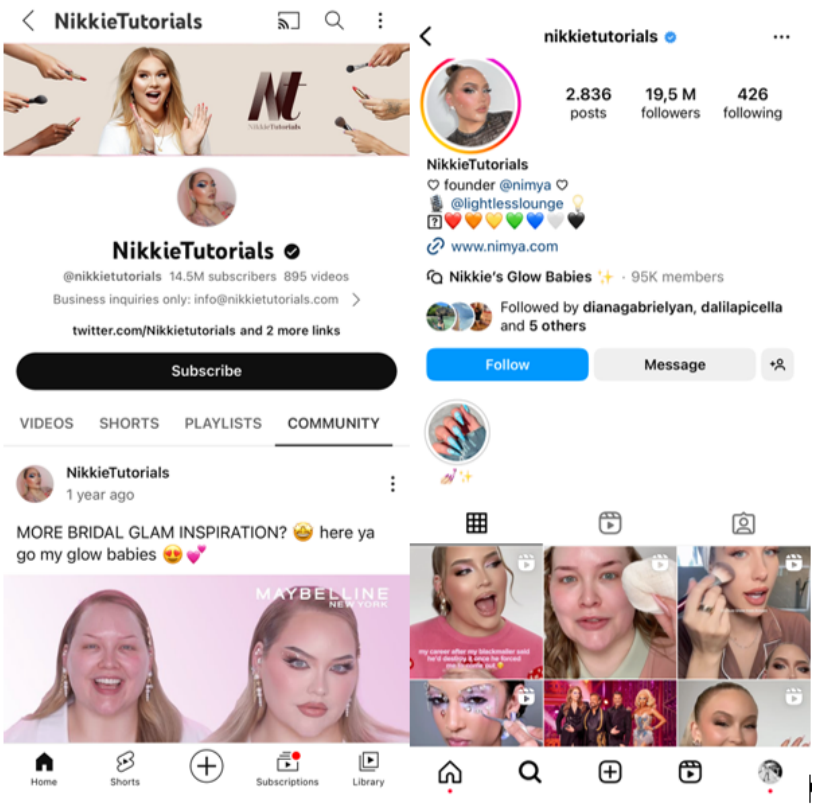


Figure 41 - YouTube and Instagram profiles of @nikkietutorials.

8.2. AI recommendations' role in social media: The users' interpretations, actions and interactions in the selected age groups

Similar to Chapters Six and Seven, the isotopies from the interviews conducted in the Netherlands are divided into three tiers of codes. The final list of codes, based on fieldwork, interviews and digital ethnography, is categorised into cognitive, emotional/sentimental, axiological and pragmatic levels. The sentimental level reflects users' emotional states, which influence interpretations but aren't directly linked to decision-making. The cognitive level covers the categorisation process for decision-making. The axiological level addresses values, while the pragmatic level relates to practices in AI-mediated digital environments.

8.3. Findings among age category 18-26 years old in The Netherlands

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "I am very **selective in what vibe I want to create on my Instagram**. It should be a **safe place**, encouraging me and **making me feel better about myself**. I want my algorithm to stay very personal to me". (3-1826-nl) "During lockdown, I felt very isolated and burned out because of university and workload. And on Social, everyone just writes how the university is supposed to be the best years of your life. So I started to look for the people who may feel like me and people reached out to me, thanking me that I shared my story and that they felt the same about this pressure". (10-1826-nl)	-adjusting social media as an environment, -make algorithm personal, -social media should be a safe place through use of AIRS, -creating community around needs,	-AIRS as a tool of social media can offer a feeling of control over the environment as well as increase anxiety through stressful stimuli; -AIRS can impose categorisation process over digital representations of individual and social activities (e.g. attending university should be a positive experience and one should feel grateful and happy about it)	-"training" and manipulating an algorithm to fulfil the need of control over digital environment, possibly influencing immediate physical one (e.g. I want my algorithm to stay very personal to me);	-at the **cognitive** level: Theme: Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation, AIRS on social media emotional contagion as a coping tool -at the **emotional/ sentimental** level: Theme: Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection -at the **axiologica**l level:
Self-perception and self-identification:	-avoiding open engagement	- AIRS can impact	-avoiding possibility of	

"I am more an observer. I prefer not to post because **I do not like to be exposed**". (4-1826-nl) "**I really like to see things I relate to** on social media, which makes me feel better. I don't follow perfect people, like exercising all the time or eating healthy all the time. Toxic perfection and toxic positivity, like Kardashians, is what's not for me". (3-1826-nl)	with texts and digital representations, -AI-mediated digital representations should correspond to own identity,	perception of self and others,	being exposed, protecting own personality as venerable,	*Theme: use AIRS as syntactic tool on digital environments to transform private to public domain* -at the **pragmatic** level: *Theme: using AI-mediated digital environment to impact social status;*
Self-representation and self-enhancement: "I have six posts on my Instagram and sometimes I post stories. **I want it to be exceptionally curated to create the right impression on those visiting my page**. Sometimes, I post something in solidarity, like about women's protests in Iran or educational materials. I just want to help and I think this is the most straightforward way to bring more people to this problem". (10-1826-nl)	-enhanced self-representation, -need to meet social values translated through AI-mediated social media	- AIRS force categorisation process on users based on its syntactic elements within digital environment	-self-representation in relation to social and AIRS highlighted issues, e.g. at the time of interview Women rights in Iran and protests when women were cutting their hair on camera to post on social media was one of the top topics	

Table 19 - Examples from interviews in age category 18-26 years old highlighted isotopies and themes in the Netherlands.

8.3.1. Theme: Using AI-mediated digital environment to impact social status

During the interviews respondents in the age category 18-26 underline the importance of certain "rules" or "aesthetics" that is preferable to follow on social media. They refer to each post and groups of posts that create their profiles as united text. The same time, users acknowledge the need to share representations of the objects that surround them rather than self-representations of own body.

During the interviews the questions on why and how users choose what kind of text to share on social media was first approached with a confusion. Only 2 out of 10 respondents went on with explanations, when some others asked for some time to think on the topic. Later all developed a reflection on the fact that they indeed perceive certain standards that should be met based on the platforms' environment, unique to LinkedIn, Facebook, Instagram. All confirmed that they would prepare similar but unique texts to correspond aesthetics and purpose of each planform.

Here an example of how an interviewee explains his user behaviour approaching their Instagram profile:

> "I want […] to create the right impression on those visiting my page. Sometimes, I post something in solidarity, like about women's protests in Iran or educational materials. I just want to help and I think this is the most straightforward way to bring more people to this problem". (10-1826-nl)

It also can provide an explanation on how AIRS impact on self-identity perception within environment, perceived as hybrid or merged between online and offline.

8.3.2. Theme: The influence of AI-mediated enunciation on emotional states, mental and physical well-being and disembodiment: The role of AIRS in emotional contagion on social media as a coping mechanism

The respondents aged 18-26 years old during the part of fieldwork conducted in the Netherlands stressed and clearly articulated how important is to intentionally engage with AIRS in order to create a digital environment that would correspond to their needs, often emotional and social and even sometimes compensating immediate natural environment that cannot be adjusted accordingly, "I really like to see things I relate to on social media, which makes me feel better". (3-1826-nl).
Three respondents focused in their answers on professional social media like LinkedIn. They highlighted that AIRS within this type of platforms are not significant for the process of discovery, suggesting selections of relevant texts to them, but rather intended to be used to promote their own profile and digital representations. Interviewees specified that they create specifically for these digital environments the posts that promote and enhance own professional identity and can be relevant to find good job opportunities in future.

8.3.3. Theme: Anxiety towards dominant elements suggested by AIRS/AI-mediated social standards and rejection

This expresses anxiety towards social pressure and comparison through AI-mediated categorisation, which is also common theme in the interview data of age group 27-34 years old

> "I obviously post something sometimes, hoping someone particular will see my post. Obviously, when they do not react or do not see it, I can feel a little sad. I play different sports, so I will take photos of me playing football or basketball so that everyone can see that I am good at it. […] I usually do not post right away but spread the posts during the time. So, people can follow anyways my social life, but it looks like a have something to do all the time. I do not post everything at the same time". (10-1826-nl)

The practice to create digital persona based on digital representation using AIRS and other syntactic tools eventually is a part of communication process where social media take a central place. The throughout attention to own behaviours online as well as needs to approach both digital and immediate environments as one. This can bring significant cognitive load as well as anxiety to adapt and fit into environment with incomplete knowledge about it.

8.3.4. Theme: Use AIRS as syntactic tool on digital environments to transform private to public domain

Users in the age category 18-26 years old use various digital environments based on their needs and tend to acknowledge having different behaviours unique to each platform. Following up with exploration questions all the respondents confirmed that they would choose a specific digital representations and texts based on the platform they use and according to the audiences they would want to reach.

> "Yes, surely, I want my photo to look a certain way when I post it. I may use some filter or colour correction, but it is rare for me to pose in a particular way. I prefer to post photos of things around me. When I travel somewhere, for example. I want my profile to be aesthetically pleasing". (6-1826-nl)

8.4. Findings among age category 27-34 years old in The Netherlands

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "I feel that sometimes social media manages to predict my interests well and suggest some interesting news, concerts or events. And then **I obviously feel satisfied to be exposed to the things I like.** But it does not happen proportionally to **the time I waste there**". (19-2734-nl) "Surely, today before buying something, we go on social media and search for reviews and recommendations. I definitely can confirm that **social media did impact my purchases**". (14-2734-nl) "Social media today become one of the biggest **sources of information**. Also, many share information they know, so **they are experts in it or have experienced it first-hand**. Sometimes, I would see information about new areas for cycling and I would go there to try it. And, of course, it relate to travelling destinations. **Before, we were trusting tour operators and today,**	-AIRS can help productivity or lead to wasting time/money -social media can negatively affect time management	- AIRS force categorisation process on users based on its syntactic elements within digital environment	-personal experiences as an expert opinion	-at the **cognitive** level: *Theme: Self-victimisation to negative AI-mediated categorisations (self-identity)* -at the emotional/ **sentimental** level: *Theme: Social pressure translated and augmented through AIRS on social media* -at the **axiological** level: *Theme: self-identity through self-representation and others-representation*

we are looking for photos online". (20-2734-nl)				-at the **pragmatic** level: *Theme: impacting algorithm to impact yourself*
Self-perception and self-identification: "I use Strava a lot as a social media platform. And it feels a little weird to brag about how fast you can go or how far. Your results are **compared** automatically to those of other users and your friends can see them, too. You can also **compare** your results to pro users. Sometimes, **it is a reason for me to motivate myself** or send a message to my friend who did a nice ride so that I can cheer them up with kudos". (20-2734-nl)	-AI-mediated social comparison as motivation tool	- AIRS impact perception of self and others		
Self-representation and self-enhancement: "I am trying to **keep my feed polished** to see more interesting personalities in my professional field and I follow some people to educate myself. But I guess when you see someone's life online, **it influences you differently than if it were happening on the streets**. Also, on social media you see only a part, only what people want to show. And you cannot choose for yourself what you can notice about their life". (19-2734-nl)	-perception of digital representations through AI-mediated environments influences differently than objects from immediate physical one	- AIRS force user to adapt and fit into environment with incomplete knowledge about it	-"keeping feed polished" as intentionally interacting with AI-mediated environment to minimise stimuli from it	

Table 20 - Examples from interviews in age category 27-34 years old highlighted isotopies and themes in the Netherlands.

8.4.1. Theme: Self-victimisation to negative AI-mediated categorisations

Interviewees in age category 27-34 years old stressed how time spent on social media is central to their perception of AIRS influence on them. From their comments it is possible to conclude that the concerns arise around passivation of their agency within digital environments. They appear to lose control over the time spent online which impacts their daily practices within immediate physical environment.

> "YouTube takes too much of my time. And deleting the app does not help because it is connected to all other Google services. I use LinkedIn and YouTube and I received most of my information from news services. Now I think maybe I should go to the Mastadon service [Mastadon is a German social network for code sharing and programming]. But it would be

> just another social media from which I would not have any benefit but mainly spending my time". (19-2734-nl)

The respondent 20-2734-nl stresses that personalisation features of AIRS are perceived far from a tool that functions towards users' interests or aiding decision-making process.

> "I used to have Facebook, Instagram and Twitter [X], but I deleted my accounts because I think they take too much time. It was mainly about people's opinions and nasty comments and mainly sad and destructive. I would like to have nothing to do with these people or random content that is supposed to correspond to my interests, but it is about wasting time anyway". (20-2734-nl)

8.4.2. Theme: Impacting algorithm to impact yourself

AIRS impact perception of self and others and AI-mediated social comparison as motivation tool.

> "The on Strava algorithm allows me to follow your friends and even professional cyclists. I never really met people through Strava, but we had an opportunity to follow one professional cyclist and follow his road and compare our results to his". (20-2734-nl)

AIRS can categorise the texts users engage with in digital environments and find similar content to foster continuous interaction. Since most of these texts primarily represent other users, individuals and their self-representations, they can influence how users perceive themselves in this context. Users who actively participate on digital platforms often report using AI-mediated environments as sources of motivation or to shape their perceptions of reality. However, it's important to note that not all texts users interact with reflect a conscious choice, as some may not directly align with their interests. Several interviewees, like 19-2734-nl, indicated that often they may find themselves engaging with texts that they would not want to see, but also find repulsive.

> "At some point I realised that I have too much rubbish in my news feed on Instagram, so I decided to follow some organisations that focus on nature and ecology, so I was trying to change my algorithm. I also was trying to do the same thing on YouTube to avoid ASMR videos, like dirty toe nails, but in a time it pops up again". (19-2734-nl)

ASMR stands for autonomous sensory meridian response; a term used to describe a tingling, static-like or goosebumps sensation in response to specific triggering audio or visual stimuli. These sensations are said to spread across the skull or down the back of the neck and, for some, down the spine or limbs. When experiencing ASMR sensations, some people report pleasant feelings of relaxation, calm, sleepiness, etc. ASMR videos on social media usually represent repetitive and snoozing sounds, representations of actions and movement. Cleaning objects, including human body, tapping in various ways on microphone, cutting soft objects in equal pieces enunciated through the filmed digital representations or created through the use of AI tools – all these can be considered ASMR. ASMR is a type of elements in digital environments easily recognisable through AIRS, that therefore can be easily proposed to the users that can be categorised as potentially relevant audiences.

8.4.3. Theme: Self-identity through self-representation and others-representation

AI-mediated digital environments like social media provide tools for self-identity and self-representation that could not be avoided. In fact, one cannot engage with texts on social media without creating a profile. Even in cases when an individual prefers not to post anything, not to share any digital representations on digital environment or makes own profile private, this still stands for one's identity online and how others perceive them.
Users in age category 27-34 years old were one of the fist most active users of social media when they appeared at first 10-15 years ago. The ethics behind ones' identity online were not regulated well yet. In their interviews many identified themselves as early users and with a negative connotation shared the experiences like this:

> "I remember that Facebook had the function of status about ten years ago. And I was using this tool to share about anything I was doing at the time, completely disclosing to the entire world my locations and all the sensitive information. I obviously do not do it these days. I do not even update my WhatsApp status".(14-2734-nl)

AI-mediated digital environments is requiring to create a self-identity for a user and providing tools to do it can lead to limitations in communication. 14-2734-nl stresses in their interview that various behaviours can be applied by individuals in different contexts based on the environment. However, within a digital environment, even if it is different segments of it, like groups on Facebook, for example, users' behaviours and actions are still exposed to everyone for a significant amount of time. This way when cultural context changes one's texts and digital identity of 10 years ago can result in severe judgements and phenomena of being "cancelled".

> "Through time, I realised that it also makes sense to post less online because some family members or friends would be taking what I write too seriously. Or vice versa, they would post something and you discover a side of them which you may would prefer not to see. I would just try to distance myself from that digital part of their personality. It is not exactly different personalities; it is rather just different contexts in which people behave. When Facebook started, we were mostly only young people and we would be just ourselves as friends. But then parents joined. And obviously, you do not want to act with your parents as you act with your friends. People have different personalities based on with whom they are interacting; it is normal". (14-2734-nl)

8.4.4. Theme: Social pressure translated and augmented through AIRS on social media

Before social media introduces AIRS the users would mainly see the posts from their friends, peers they were connected to, mainly in chronological order how they were posted. Users where mainly exposed to the same or similar environment to their immediate physical one. Since social media became AI-mediated digital environments, to keep users engaged, it became crucial to introduce users to more elements which they could interact. This lead to explosion of users to extended digital environments which presumed to be similar or equal to immediate physical ones. In this extend digital representations mediated through AI would not be standing anymore to a real objects meaningfully but rather create a signification on their own reinforced and augmented by AIRS. This led to a distorted perception of the reality, as noted by 20-2734-nl.

> "I think there is a lot of influence [from AI recommendations on social media] which is related to the status, what you should want. When I was younger, I thought that I should wish for an expensive car and it would make me very happy and successful". (20-2734-nl)

8.5. Findings among age category 35-55 years old in The Netherlands

Examples from interviews	1st tier of codes and identified isotopies (Concepts or types of social actions)	2nd tier of codes and identified isotopies (Data vs Hypotheses)	3rd tier of codes and identified isotopies (Interview highlighted insights)	Organised list of codes and themes related to cognitive, sentimental, axiological and pragmatic levels
Self-monitoring: "I remember chatting on Facebook from my first job office all day every day. Now I obviously not doing it. **I realised how much time I spend there**. But also, I have other life and other responsibilities. And these days when I get notifications from Facebook about what I used to post 15 years ago, I feel so ashamed: writing in bad language, not spelling words properly, oversharing private things with everyone. And I think it is not cultural, it is evolution of social media We are more mindful today, also because Internet doesn't forget". (23-35-nl) "I closely follow the situation in Iran through social media and I feel very compassionate to Iranian women. I see that others here in Netherlands feel it too, **but unfortunately it is not the post on social media that going to change the rights people have.** I think **it is frustrating**. And not only about big problems like women rights, but also in the discussion with other parents about neighbourhood playground". (22-35-nl)	-Aiming to spend less time on online interactions -division between digital environments and immediate physical environments ("but unfortunately it is not the post on social media that going to change the rights people have")	- AIRS impact perception of self and others	-Mindfulness: Internet doesn't forget	-at the **cognitive** level: *Theme: Disembodiment through AI-mediated enunciation* -at the emotional/ **sentimental** level: *Theme: Using digital representations as narration to categorise experience* -at the **axiological** level: *Theme: trustworthiness and AIRS* -at the **pragmatic** level: *Theme: Self-representation and self-enhancement*
Self-perception and self-identification: "I mainly follow my friends on Instagram. I	- Anxiety towards dominant elements suggested by AIRS/AI/mediated	- AIRS force categorisation process on users based on its	-Using digital representations as narration to	

remember during corona times I was working from home and my children were at home as well. So between work and playing with them I took a photo and posted it online, obviously face without make up, in pyjamas. And I remember people reacting strangely. **I also know people who post things online that I know to be very different from their reality.** I don't know if it is about any internal conflict for these people, but it feels like **they are trying to fill something inside with these posts online**". (23-35-nl)	social standards and rejection	syntactic elements within digital environment	categorise experience	
Self-representation and self-enhancement: "I think on social media many **people just hide things under the carpet**. Even more, they use social media to attract attention to some facts and opinions and to hide other sides of their personalities and activities. I think it is very well visible in famous people and politicians". (25-35-nl)	-fitting into AI-mediated digital environment as part of social context	- AIRS impact perception of self and others -AIRS force user to adapt and fit into environment with incomplete knowledge about it	-use digital representations to highlight the relevant parts of one's identity	

Table 21 - Examples from interviews in age category 35-55 years old highlighted isotopies and themes in the Netherlands.

8.5.1. Theme: Disembodiment through AI-mediated enunciation and Using digital representations as narration to categorise experience

The isotopies that correspond to the themes of disembodiment through AI-mediated enunciation and use of digital representations as narration to categorise experience are highlighted through the second-hand experience. In other words, interviewees describe these behaviours not as their personal experience of the AI-mediated digital environments but as observed behaviours of the others. The themes of disembodiment through AI-mediated enunciation is referred to younger users when they engage with social media and become irresponsive to stimuli of immediate physical environment, e.g. do not respond when someone talks to them or do not even hear that they were called. At this extent, to interviewees, users

demonstrate more involvement with the enunciation tools online than with the tools provided with their immediate environment and physical presence.
The theme of using digital representations as narration to categorise experience, as described in the example above given in the interview 25-35-nl, represent deliberate use of AI-mediated enunciation to create narratives and meanings behind digital representations. This can be done to impact others' opinions as well as own interpretations of the facts or events of reality.

8.5.2. Theme: trustworthiness and AIRS

Isotopies highlighted through the interviews in age category 34-55 years old, show that these users tend to approach similarly the practices that are central in their daily life and the practices that expressed through digital representations. They tend to interpret practices of digital environments as the practices of immediate environment, in comparison to younger users who tend to differentiate the digital practices from ones central to immediate physical environment. This may lead to similar approaches used in identifying the degree of trustworthiness in the texts they encounter online.

> "I have to say that social media did change my life because I met my husband. Obviously, the recommendations algorithm back then was very basic, it was mainly location oriented. Probably today it would not work the same way because today AIRS are rather involving a user in sort of game, to increase interactions and not finding the optimal result. And back then, when I met my husband, my profile lasted less than a week because we were recommended to each other right away". (25-35-nl)

8.5.3. Theme: Self-representation and self-enhancement. Disembodiment through AI-mediated enunciation and using digital representations as narration to categorise experience

Users in this age category use social media and AIRS less to self-monitoring and self-identity and more often for self-representations and self-enhancement. On one hand, using digital representations as narration tool to categorise experience and to highlight the relevant parts of one's identity as a practice.

> "I wanted to do a photoshoot with my children for a while. And not only to post it online, just to have the photos. I am not sure if making a photoshoot is totally inspired by social media, but the fact that I wanted us all to have the same outfit definitely is impacted by all the photos I saw online. […] I obviously would like to tell that I am aware about the influence of what I see online. But I guess it goes way deeper, sometimes even on unconscious level". (23-35-nl)

On the other hand, using AI-mediated tools as narrativization tool to categorise experiences, as specified in comment of 23-35-nl, it can be used to reframe and add new meanings to experiences. It can be noted from the isotopies highlighted during interviews with interviewees in age category 34-55 years old that the practice of changing meaning of experiences through digital representations as categorisation is perceived as type of dishonesty in communication.

> "I have some friends who I follow on social media, they are Christians so they cannot share anything negative about another person online, because it is the same type of sin as badmouthing. But then out of nowhere you would see that this person puts some quote from bible about being strong, about resilience. And of course, everyone understands that something is going on, they this is sort of request for help. But obviously you would not ask directly about the relationships of other people". (24-35-nl)

8.6. Discussion: Results from fieldwork in the Netherlands

Fieldwork conducted in the Netherlands sheds light on how users navigate social media to find opportunities for connection within their communities and smaller groups, whether online or in their immediate physical surroundings. Similar to findings in Estonia and Italy, the results of semi-structured interviews and digital ethnography in the Netherlands reveal significant correlations between local social dynamics and local communities' contexts. Many participants confirmed using social media platforms and receiving AI recommendations predominantly in the English language.

Respondents in the 27-34 age category emphasised their use of AI-mediated environments to influence their emotional and physical well-being. They leverage tools provided by AI to construct digital environments and personas that resonate with them, utilising AI recommendations on social media as a coping mechanism to mitigate anxiety stemming from dominant social standards suggested by AI or mediated environments.

A prominent trend observed among this age group is the utilization of AI-mediated digital environments to enhance social status. Notably, the correlation between needs, practices and communities emerged as a key takeaway from the 30 interviews conducted with Dutch residents, transcending age categories. Several respondents across different age groups referenced practices typically associated with younger demographics, driven by the need to stay connected with their communities.

Among respondents aged 27-34, two distinct groups emerged: one demonstrated a heightened awareness of the impact of AI recommendations and digital representations on their lives, while the other minimised their use of selected digital environments, focusing only on platforms that directly catered to their specific needs, such as sports-related platforms like Strava. Users in the 35-55 age category exhibited practices similar to those observed in Italy and Estonia, leveraging AI-mediated digital environments for professional development and emphasising the importance of trustworthiness in online interactions. The phenomenon of disembodiment was discussed in relation to the social practices of younger age groups, with users in the 35-55 category perceiving certain online expressions, such as political views or social activism, as self-directed actions mediated through AI, rather than genuine social engagement. In summary, Dutch users demonstrate a heightened awareness of how AI recommendations operate within digital environments and intentionally engage with them to achieve desired outcomes.

Chapter nine -
Comparative analysis of the use of AI recommendations

9.1. Differences and similarities between Italian, Estonian and Dutch fieldwork results

The fieldwork held in three countries of the EU helped to shape the definition of what kind of digital environments can be understood as social media and what role AI agents, like AI recommendations, can play in the communication process and users' decision-making. First, the definition of social media interviewees provided and digital ethnography suggest can differ from the self-description of these platforms. Second, the use of a platform that can be considered social media largely depends on the users' needs. These needs can rely on the social and cultural environment of their daily life, as well as be imposed through the tools used on social media, such as AIRS. Third, the acknowledgement of the tools within communication acts users attain that have AI origins not always conceptualised on the linguistics levels, yet many realise it through their reflection and guidance by these tools.
Correspondence between AIRS categories and human-user categories is a dual learning process in which, on the one hand, algorithms are intentionally improved frequently via machine learning. On the other hand, users engaging with AI agents in digital environments adapt in various ways. Therefore, algorithmically high-valued categories can impact how central values are formed within a culture by shaping users' practices.
The factor of high use of English in Estonian and Dutch communities, in respect to Italian community, did not highlight significant differences between use of AI-mediated environments in the results of semi-structured interviews and digital ethnography. On the contrary, despite difference in operative natural language users highlighted similar effects resulting in their experiences and practices.
Categorisation through natural language in self-description process reflected how volunteers able to perceive, recognise, interpret their interactions on AI-mediated digital environments like social media. Some interviews provided very accurate description which allowed connect highlighted isotopies into themes. Some other interviews were not specific in the categories that users referred, but rather affirmative in the broader sense.
During the interviews and digital ethnography several differences between Italian, Estonian and Dutch communities were noticed. Some of these differences can be attributed to cultural specifics, e.g. some Italian users, especially in the age categories 27-34 years old and 35-55 years old highlighted that they would prefer to send and receive long vocal messages as communication medium, when some participants in the Netherlands and Estonia identified it as annoying and "podcast". However, this research is rather interested in similarities brought on users' interpretational and decision process through AI-mediated environment. Therefore, the focus remains on shared isotopies and themes highlighted during interviews and how they can relate to AI-centred themes in decision-making process.

9.2. Users' interpretations of AI-mediated digital environments like social media: Digital literacy among different age groups

This research presents comparative analysis in how AI-mediated environments can influence perception and interpretation of their users, from theoretical point of view and as data collected during fieldwork and its analysis. The revision of the fieldwork conducted in Italy, Estonia and the Netherlands highlights that the presumed levels of digital literacy and familiarisation with ICT, as often considered in the UX approach on the institutional levels, as suggested through

Big Data results, can vary from the practices adopted by the users and the decision-making process behind these practices.
The question of digital literacy towards achieving sustainable AI is relevant in many aspects and is highly discussed in this thesis. However, the understanding of the phenomena of digital literacy, based on theoretical premises and empirical results, should be approached in a profound way. In relevant statistical data (e.g. Eurostat, Big Data approach), digital literacy is understood as familiarisation with digital tools and the ability to interact with them, following the model of alphabetisation literacy, meaning the ability to read and understand, write and express thoughts in a specific context. However, the principles of digital literacy are different based on the results of this research. It is also remarkable that the same person can have different levels of digital literacy in different time periods, adapting them to their own needs, mainly in relation to their own dominant community and not to a set of skills learned.
Highlighted correlations between theoretical hypotheses and fieldwork results underline that ultimately digital literacy and practices users choose are rather dependent on the communities they settle in, digital and from immediate physical environment and not the age or background experience with digital tools or environments. Digital devices today have two main characteristics which decrease relevance of the previous experiences with digital tools and environments. First one, they develop very rapidly and new digital environments can be radically different from precedent ones, therefore require fast adaptation from the users with significant effort to find affordances that correspond to their needs. Second one, users approach digital tools and environments based on their needs which are stimulated first through their immediate natural environment and then reinforced through online, eventually creating a loop for a user where necessary skills are acquired in order to keep this loop effective and adopted to the needs.
Digital literacy as a factor considered in understanding users' intentions and interpretations can be understood as a variable that changes based on the state of art of technology, as well as users' needs. These needs can be individual, based on own mental and physical states, social, as social recognition and acceptance, as well as cultural, related to the central practices that are dominant for a society and shifted to the digital dimension.
AIRS can have different effects on different age categories of users, based on their experience with digital devices and digital literacy and relative practices based on their needs and possibility to find affordances within the environment and offered tools. Culture studies and sociology literature has proposed the division between generations to explain differences in behaviours and practices users show in their online interactions. This division is also highly used in design of UX/UI of AI-mediated digital environments, to meet the needs and expectations of selected age groups based on their temporal-cultural background, practices and system of beliefs. Similarly, the terms Generation Z, Millennials, Gen X and Boomers are largely used in texts and digital representation creating cultural narratives and as textual categorisation on social media. In a similar way this research proposed division to three age groups as a part of methodology for the fieldwork case studies, based on their familiarisation and experiences with digital environments and AIRS resulting in practices.
During the fieldwork conducted in Estonia, the Netherlands and Italy, findings have confirmed some of the findings in the literature about the differences between Generation Z, Millennials, Gen X and Boomers as social media users. However, some findings led to novel insights to how different generations interact with AI-mediated environments and agents and especially why their decision-making process unfolds differently in presumably the same environments.
Young adults aged 18 to 26, commonly known as Generation Z or digital natives (Williams et al., 2012). Some scholars define digital natives as those born after the widespread introduction of digital technologies, roughly around the late 1990s (Verčič & Verčič, 2013). However, it's important to note that the extent and way digital technologies are utilised can vary greatly

depending on factors like accessibility and frequency of use. Therefore, Generation Z are the individuals who grew up with access to digital devices and the Internet during their childhood and adolescence. Individuals aged 18-26 recognise that two years of pandemic-related restrictions due to COVID-19 profoundly impacted their social interactions and communication habits. This aspect is particularly noteworthy considering that this age group is typically undergoing crucial stages of personal development, whether in high school, college or early career phases during the time of social isolation and rise of AI-mediated digital environments. Given the pivotal role of digital platforms in the lives of Generation Z users, it's reasonable to infer that the use of AIRS on these platforms has exerted significant effects on various aspects of their cognition, values, emotions and pragmatics (Arkhipova & Janssen, 2024).

Millennials typically defines them as individuals born between the early 1980s and mid-1990s. Within this framework, Millennials are often characterised as a generation shaped by the rise of digital technologies, though they were not necessarily born into it as digital natives (Howe & Strauss, 2000). Instead, Millennials were adolescents during a period of rapid technological advancement and integration into daily life. They experienced significant shifts in technology and communication during their formative years of late adolescence and early adulthood. While not inherently digital natives, millennials adapted to developing digital technologies together with analogical tools, playing a significant role in shaping how different aspects of their life in relation to education, work and communication. Their experiences have influenced the evolution of learning environments and workplace dynamics, stressing on collaboration, connectivity and innovation (Alsop, 2008; Tapscott, 2009).

Practices on Millennials derive from their needs shaped by the experiences, including 2008 financial crisis and, more recently, the COVID-19 pandemic. These events have reshaped their values and social interactions, also their behaviours online (Dharmesti et al., 2021). Digital technologies, including AIRS, played important role in how Millennials enunciate their decision-making process. In the context of the results of the fieldwork it is possible to suggest that Millennials can be divided to Late Millennials and Early Millennials. This division is rather influenced not only through an age category, but mainly through the core practices of the community. Some Millennials express behaviours that are closer to digital natives and consider the group of younger individuals as their peers and others are more related in their needs and practices to elder groups. In this extend having similar practices to Generation Z and Generation X.

Representatives of Generation X are considered individuals born between the early-to-mid 1960s and the early 1980s. Generation X navigated the transition from analogue to digital technologies as young adults. People of this generation experienced the advent of personal computers, video games and cable television, marking the beginning of a digital revolution that would continue to reshape society in the decades to come. Their formative years were characterised by a blend of traditional and emerging media, shaping their need in media consumption habits (Manovich, 2001; Jenkins, 2006).

Texts shaping the digital environment today often discuss Boomers or Baby Boomers, often attributing their characteristics to Generation X. However, the Baby Boomer generation, describing individuals born between the mid-1940s and the mid-1960s, is rather less represented on social media as active users' groups and less explored in this research.

There are differences between these age groups which can be attributed to different affordances they find on social media. There are different needs the representatives of these generations have and therefore different affordances they find on AI-mediated digital environments. Moreover, majority of respondents aged 27-34 and 35-55 years old, reflecting on their experiences with social media and other digital environments though the questions of how their use of various social media like Facebook, Instagram, YouTube and other platforms like

MySpace, Orkut and Hyves changed during last ten years, indicate the shift between practices often to the opposite, like “I used to post a lot of photos all the time on Facebook but now I post very rarely” (15-2734-it).
Most users, based on the fieldwork results, assign intentionality of affordances they find to their own needs. Some interviewers mentioned in their interviews that intentionality of the affordances they find on social media and especially through AIRS come from designers of these digital environments. Some also focus on the other users who contribute to the digital environments with contents that aim to commercial benefit employing AIRS to own profit. This type of elements of digital environment, like digital representations and users’ behaviours, mainly recognised and categorised by respondents based on their own perception and interpretations. Needless to mention that this type of affordances assigned highly negative connotations.
Responding the question on whether users are keen to provide more information about their preferences, the answers among respondents have divided to two parts: when users show “They are listening already to everything” (26-35-ee), “No, I don't think so. And I better not to provide any extra information, but I guess these days it is absolutely impossible to have privacy and companies can get any information about you and your habits that they need” (11-2734-it).
In fact, the interviews with 90 social media users in 3 countries aged 18-55 years old showed that there is no clear division between based on the age difference but rather on the dominant social groups’ users involved. If individuals spend significant time, online or physically with a social group where the dominant age falls into one of the generational categories (Generation Z, millennials, Gen X and Boomers), these respondents indicated in their interviews values and practices that are primarily found in these age categories. For example, if a person, 32 years old, mainly interacts in groups where the average age is between 20-25 years old, they indicated more practices and central values, as well as core self-identity enunciation practices, through their online behaviours and reasoning, that is closer to Generation Z. This way findings indicate that digital literacy, as indicated for different generations in Eurostat data (2020a), plays a minimal role in the adaptation of social practices, scaffolding and learning and majorly dependent on the chosen environment, including AI-mediated environment. A significant change in technology as a matter of practice can be connected to the introduction of search engines (e.g. Yahoo, Google) and digital platforms for creating, exchanging and sharing various digital representations as texts (Myspace, Orkut, Hyves, Tumbler, etc.) and wearable devices which can be highly personalised with access to the Internet (e.g. iPhone smartphone by Apple). The common accessibility to this type of wearable device marks a specific historical timeline for individuals born between 1996 and 2010 (Dolot, 2018; Turner, 2015). This division is not solely based on the age difference but rather on the context in which individuals had grown and which shaped their experiences influencing the practices with a digital medium. In our work, we define how different generations as a part of society with access to digital devices, e.g. personal computers and wearable devices, at an early age. They also could access social media in early adolescence, which might influence their communication practices.
The isotopies and themes indicated from the interviews point to common effects noted by the users. All of them are highly connected and can be based on perception and affordances that users may find within digital environments.

9.3. Generalisations from fieldwork results: Different age categories in Italy, Estonia and the Netherlands

Generalisation analysis of highlighted isotopies into general practices on social and cultural levels underlines the connection of the processes, where one is necessarily interdependent with another. In this research, the following general social practices, uniting them into a

complementary model of operative categories between AIRS and users in identified age categories, as presented in Tables 22, 23, 24.

Categories (individual and social value) for 18-26 years old	**Affordances (individual and social)**	**Practices (social and cultural)**
Openness to AI tools: Self-enhancement and social promotion	Need to control AIRS	Training AIRS, e.g. in intentionally selecting and adjusting algorithm's settings and output results until it performs as desired
Motivation: Impact of digital environments on the perception of the physical environment	Need to create informational echo-chambers	Monitoring the digital environment in order to maximise it's effect on oneself
Overstimulation and multitasking through cultural texts	Digital representations are perceived not as individual texts (e.g. a post) and not as a community, but as a digital environment for a particular user	Perception of oneself within the collection of texts, where their meaning is implied by their common elements, but each individual text rarely significant (scrolling the feed of posts fast without paying attention to each post separately)
Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation: AIRS on social media emotional contagion as a coping tool	Manipulate own moods and emotional states by emerging into digital environments	Users scroll their selected AIRS-mediated social media to deal with socially marked as negative emotions (anxiety, anger, boredom, sadness) to reach desired emotional and cognitive conditions
Use AIRS as syntactic tool on digital environments to transform private to public domain, e.g. use of aesthetics, to overcome individual (vulnerabilities)	Based on the observations of online behaviours practiced by elder generations, especially millennials, users seek to adopt AI-mediated digital environment to satisfy their need for public communication yet minimising individual exposure.	As digital environment merge into immediate physical and perceived and interpreted as one, users find optimal practices to protect themselves from possible effects of AIRS and digital environments.
Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection	Contrary to the personalisation, individualisation and diversity, AIRS create clusters from data and lead to more standardisation, which users can bind as a reference point.	Proved to be more vulnerable to social pressure than elder generations due to constant exposure through AI-media ted digital environments, users follow trends they exposed through AIRS at higher extent than ever before, e.g. songs used on TikTok and promoted through AIRS become top charts songs worldwide in few weeks.

Table 22 - Possible generalisations of AIRS' impact on social and cultural practices in Generation Z.

Interviewed social media users highlighted similar isotopies, which indicated high stress anticipation and anxiety as a practice (Table 22). At his point of research, it is difficult to hypothesise whether this is a cause of the impact of AI-mediated environments where AIRS overstimulate their users, causing them to anticipate stimuli or it is the result of AIRS training process where algorithms follow the need of a user. However, the prevalent repetition of this highlighted practice can indicate that both factors are interdependent, augmenting one another. This way, AIRS' use of social media impacts Generation Z users to experience stress due to social pressure, adapting to standardisation of representations and identity and employing AIRS to own needs by aiming to emotional regulation by purposeful stimulation and purposeful stimulation, even creating coping mechanisms to deal with misinformation. Users 18-26 years old have a high awareness of the echo chamber and filter bubbles effect (Terren & Borge-Bravo, 2021; Wolfowicz et al., 2021) when an Internet user is exposed only to the selected information, which corresponds to a narrow topic and often aligns and to amplify user's own views and opinions (Guess et al., 2018). They, on purpose, attempt to shape digital environments and stimuli to create a desired distorted world, shaping their perception of it. Young adults claim to "train algorithms" to show only desired messages. To achieve this goal, they may carefully select the AIRS, using the function "do not show anymore" and intuitively search for prospective messages that interest them. The experience of stress and exhaustion when the environment is not treated mindfully and the effects of being exposed to unexpected information can have adverse effects. As a solution, some mention a process of training algorithms, purposely searching for the relevant digital representation to create a digital environment that should correspond to desired results. In this case, young people do not look for AIRS to show them what they like but rather prefer to create an environment that would bring them to their desired future version of themselves. Some stated that this way, they would be following a person they are not interested in as an individual but from whom they would like to learn certain skills. This way, the highlighted isotopies suggest that young people aged 18-26 feel social pressure to acquire new skills through digital platforms due to social pressure mediated by AIRS.

AI is acknowledged and accepted as an element of the environment. Most users who participated in the interviews stated that they accept the data collection process about their activities online as unavoidable. However, they prefer not to overshare personal information online, feeling exposed and vulnerable. Even the representation of own face can be considered a potential threat that can be used in the future. Young adults are open to AIRS used on social media, but they feel the need to control it with the tools they have. These tools are highly based on own perception of a digital environment. The commonly used answer "I go on social media just to distract myself from something" in most cases implied to the situations of physical surroundings when respondents experienced emotions and feelings marked as socially negative or unpleasant, e.g. boredom ("...when I wait in a line", "...while in the bus"), anxiety ("...before the exam", "...during self-isolation period"), anger, sadness, loneliness ("...I need a community of people who share my beliefs"). This way, individuals may use AIRS to impact their identity and perception of themselves in the digital environment. Furthermore, as a feeling of identity is holistic, it necessarily affects general attitudes about oneself.

Categories (individual and social value) for 27-34 y.o	Affordances (individual and social)	Practices (social and cultural)
Impact social status and relationships through	Millennials exercised different tools of social media and AIRS observing the effects on their online	Use of digital representations can create misleading perception of the environment

AIRS manipulations of digital representations	communication as well as social relationships and social status, which lead them to a common practice of using digital representations that are favourable to their goals of social interactions.	and others; involved purposeful use of AIRS to impact others; perception of oneself.
Self-enhancement	Millennials use AI-mediated digital environments to impact their immediate physical ones.	The merge between digital and immediate environments with AIRS that can amplify exposure to different social groups and add new syntactic connections is used to enhance and augment own social status.
Anxiety towards social pressure and comparison through AI-mediated categorisation	Through a constant presence on AI-mediated digital environment users can achieve sense of community and social support, that also can lead to social anxiety.	Many users share mainly favourable digital representations of themselves, however, perceive holistically digital representations of others which leads them to social comparison and unrealistic mental images of their immediate environment.
Self-identity as Self-victimisation to negative AI-mediated categorisations	Millennials use social media as a tool to shift own perception of hierarchies in their communities, often resulting as victims to it, based on their own perception.	social media has changed during last 15 years revealing unwanted effect for individuals and communities, which has significant impact on how users who shared their identities 15-20 years ago feel about their past behaviours and current presence online.
Substitution of natural communication through digitally mediated one	AIRS and other AI-tools on digital environments can be user to improve one's communication skills	Use of AI-enhanced digital representations is a common practice on various digital environments.
Multitasking	Enhancing productivity through multitasking in AI-mediated environments: leveraging the power of simultaneous actions for increased efficiency and perceived productivity.	Based on the needs multitasking is employed as a positive feature of AIRS as a tool for enhancement, as well as negative leading to cognitive overload, fatigue, exhaustion, as multitasking requires simultaneously made multiple decisions.

Table 23 - Possible generalisations of AIRS' impact on social and cultural practices in Late Millennials.

Millennials have access to a wide range of digital tools, especially through social media and AI-driven technologies. Based on the fieldwork results, Millennials are well acknowledging how these tools can deeply affect their online interactions, social status and relationships. One common strategy is carefully curating digital profiles to fit their desired image, influencing both their own perceptions and how others see them. However, this practice comes with complexities. Digital representations can distort reality and AIRS can further blur the line between authenticity and fabrication, impacting both how individuals are perceived and how they see themselves.

Millennials, being the first primary audience of social media during their adolescence and young adult years, experienced immense impact of holistic approach between immediate physical and digital environments, e.g. "I felt like if I didn't post about something in my life like it has never happened" (14-2734-ee), "I had urge to check my social media constantly, like I would miss some important part of my life if I would not see my Facebook page for a day" (19-2734-it). These experiences can be recognised within self-description process and practices

they express to cope with the effects AIRS and social media have. In comparison to Generation Z, Millennials distinguish two environments and do not perceive it as a continuity.
The integration of AIRS into digital and immediate physical environments offers new ways for self-improvement. By using AI-mediated digital environments to connect with different social groups, individuals can enhance their social status and make new connections. But this integration also brings anxieties from social pressures and comparisons. Some interviews suggest that Millennials cope with the challenges of AIRS effects through adopt a self-victimising mindset, seeing themselves as victims of AIRS overstimulation effects and negative AI categorisations. This shift in self-perception reflects how social media has evolved over the past decade and can impact their users' personal identity.
On one hand the results of digital ethnography suggest that Millennials show critical digital literacy skills towards AIRS, acknowledging how they shape perceptions, relationships and self-identity, offer opportunities for self-improvement and productivity. On the other hand, semi-structured interviews suggest that they feel emotionally enclosed in AIRS loop that presents challenges related to authenticity, social comparison and mental well-being.

Categories (individual and social value) for 34-55 years old	**Affordances (individual and social)**	**Practices (social and cultural)**
Problem of trustworthiness and convergence of opinions to facts: need for trustworthiness	Reading posts in natural language instead of watching other type of texts (e.g. photo, video), accessing grammatically correct text as trustworthy	Trust to textual post as type of content that can be approached more critically, e.g. interpreted in slower pace at different levels (Valsiner et al., 2023) and includes less AI-mediated (over)stimulation cues
Filter bubbles and echo chambers	Recognition of these aspect of AI-mediated environments is not obvious within this category because they use recognition tools applied to new media (like TV and Newspapers).	Double checking through other sources does not always work for digital environments, where opinions and fake news can be duplicated and shared by different sources to impact AIRS effect in creating categories and promoting the pieces of information towards meaningful centre based on their statistical value.
Tools to monitor professional status and keep updated on professional news	Possibility to impact own professional status and keep updated on professional news through use of AI-mediated digital environments	Users select favourable representations to engage with AI-powered networking tools that suggest connections based on shared interests, mutual contacts or potential collaboration opportunities.
Multitasking	Multitasking in AI-mediated environments as a tool to increase productivity or perceive own actions as productive	Productivity is one of the concepts which is highly exploited within todays' cultural narratives and often has signification in relation to positive decisions and actions which lead to results. Social and cultural reception of multitasking through AI-mediated environment perceived more positive in this age category than among users aged 18-26 and 27-34 years old for who it often related to digital burn out, exhaustion, loose of focus, destruction and control (Baumgartner & Sumter, 2017).

Disembodiment through AI-mediated enunciation as a second-hand experience/practice	Perception of disembodiment through AI-mediated enunciation is mainly assigned to others than to themselves.	This effect mainly attributed to other users and can be considered as second-hand experience; on one hand it indicates distancing between self and physical persona online and on the other hand, it can be interpreted as unwanted effects of communication on digital environments like social media.

Table 24 - Possible generalisations of AIRS' impact on social and cultural practices in Early Millennials and Generation X.

When consuming content, such as posts on social media, Early Millennials and Generation X rely on text-based formats over other mediums like photos or videos, associating grammatically correct text with higher trustworthiness. Textual posts are approached with a more critical mindset, allowing for interpretation at various levels and a slower pace, reducing the influence of AI-mediated stimulation cues.

Their tools for recognition of filter bubbles and echo chambers within AI-mediated environments is not immediately apparent, as traditional recognition tools are often applied to older forms of media like television and newspapers. Double-checking information through other sources may not always be effective in digital environments, where opinions and fake news can be duplicated and shared across multiple sources, impacting the categorisation process of AI systems and promoting certain pieces of information based on statistical value.

Early Millennials and Generation X use of AI-mediated digital environments offers opportunities to enhance one's professional status and stay updated on professional news. Users engage with AI-powered networking tools, selecting favourable representations to connect with others based on shared interests, mutual contacts or potential collaboration opportunities.

Multitasking within AI-mediated environments is often perceived as a tool to increase productivity or to perceive one's actions as productive. In today's cultural narratives, productivity holds significant value, often associated with positive decisions and outcomes. The social and cultural reception of multitasking within AI-mediated environments tends to be more positive among certain age groups, contrasting with younger users who may associate it with digital burnout, exhaustion, loss of focus, distraction and loss of control. Early Millennials and Generation X recognise how disembodiment through AI-mediated communication is often attributed to others rather than oneself. This phenomenon is considered a second-hand experience, indicating a distancing between the self and one's physical persona online. It can also be interpreted as an unintended consequence of communication within digital environments, such as social media.

The practices users acquire through their interactions on AI-mediated digital environments consolidate them as the representatives of certain generations. The fieldwork results suggest that users who identify themselves into a certain generation category based on their experiences are more likely to receive recommendations from AIRS that would reflect the practices and narratives within this generational group. That eventually aid to crystallise some of the existing users have online and transform them to their immediate physical environment, as well as adding ned practices that are algorithmically processed and categorised as ones practiced by their peers.

9.4. Similarities between perception, interpretation and practices in communities: Reflection on suggested hypothesis

In Chapter Three, various hypotheses were suggested as possible effects of AIRS used on digital environments that can influence their user's decision-making process through generalisations and practices. How hypotheses are reflected in the common practices enunciated in the semi-structured interviews and on digital environments (Table 25):

Hypothesis	Fieldwork results
AIRS force user to adapt and fit into environment with incomplete knowledge about it	On one hand, it can allow users to impact own moods, mental and physical conditions, access effects of disembodiment when desired through AI-mediated enunciation; on the other hand, it can cause anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection.
AIRS force users to multitask in the multiple environments at the same time	Multitasking due to the presence in different environment at the same time can cause decrease in functionality, not only on the level of physical activity (e.g. driving a car and being on AI-mediated digital environment can cause an accident due to limited possibility to distribute attention), as well as emotional and sentimental levels (after engaging with highly emotional AI-mediated element on digital environments users may appear less sensitive to stimuli from immediate physical environment), as well as loosing cognitive load experiencing fatigue and burn out.
AIRS force categorisation process on users based on its syntactic elements within digital environment	When users intentionally approach mechanism behind AI-recommendations, they identify it as a useful tool to impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation, motivate themselves, achieve desired self-enhancement effect and social status and relationships through AIRS manipulations of digital representations.
AIRS impact perception of self and others	AI-mediated digital environments can be cause of social comparison through self-identity, polarisation and impose on users' enclosure in filter bubbles and echo chambers, not necessarily the ones that they would choose intentionally. This also can impact their emotional and axiological dimensions and cause them to make decisions which they would not do otherwise.
AIRS can simultaneously inflict a feeling of control as well as stress anticipation on users	An element of AI-mediated digital interactions include constant engagement which, on one hand can signify to users a process of action, a possibility to impact the elements with which they are interacting, with a holistic approach to extend this digital interaction to immediate physical environments; on the other hand, these actions often are AI-manipulated and can impose exposure to some elements or interpretations that are unexpected, chaotic and relative only to a small segment of digital environment like social media.

Table 25 - Comparative table of hypotheses and common practices.

9.5. The interpretation of AI recommendations used on social media: Possible AIRS influence on users' interpretations and decision-making process

Based on the theoretical and empirical contributions this research suggest that AI-mediated digital environments can have following influence on their users:

- Filter bubbles and echo chambers
- Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation
- Motivation
- Disembodiment through AI-mediated enunciation
- Use of public domains, e.g. aesthetics, to overcome individual vulnerabilities
- Self-enhancement and social promotion
- Anxiety towards dominant elements suggested by AIRS/AI-mediated social standards and rejection
- Overstimulation and multitasking
- Impact social status and relationships through AIRS manipulations of digital representations
- Self-enhancement
- Anxiety towards social pressure and comparison through AI-mediated categorisation
- Self-identity (including self-victimisation) though AI-mediated categorisations
- Substitution of natural communication through AI-mediated one
- Impact own professional status and keep updated on professional news
- Problem of trustworthiness and convergence of opinions to facts
- Trustworthiness and advise seeking

These effects of AIRS on the users of AI-mediated digital environments like social media can be grouped based on the affordances that these environments provide. However, based on the purposeful involvement of users and the agency they assign to AIRS, these effects can have various scaffolding effects and lead to different practices.

1)Filter bubbles and echo chambers, 2) Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation, 3) Impact social status and relationships through AIRS manipulations of digital representations and 4) Motivation and 5) Problem of trustworthiness and convergence of opinions to facts

The discussion on how AIRS can create and impose filter bubbles and echo chambers on their users is largely discussed in literature (Goldie et al., 2014; Gillani et al., 2018; Kitchens et al., 2020; Cinelli et al., 2021). Filter bubbles and echo chambers describe a process when AIRS lead users to believe that the world is less diverse and mainly fits into their central values.
Going through the research results, the isotopies and themes suggesting that younger users (18-26 years old) employing AI-mediated environments to impact own moods, cognitive and even physical states in Italy, Estonia and the Netherlands are prevailing to over the practice to impact social relations or immediate environment through the tools of digital environments. Younger users are consecrated on engaging with AI-mediated environments focusing on the environment itself as a tool to impact own mental and physical states, in comparison to users aged 27-34 years old who on the contrary use AIRS and digital environments to influence their social relationships. Therefore, the practices that users of these two age categories develop towards AIRS are largely based on their needs and the affordances they find. However, in both

cases, whether the intentionality of engagement with AIRS is directed towards impacting yourself or impacting one's own representations perceived by others, the decision-making process is laying within the central values reinforced through algorithmic processing. Users 18-26 years old create digital environments that make them feel certain way within algorithmic centre of the dominant narratives that are created through texts, digital representations, that have higher value for an algorithm. The same way users 27-34 years old feel urge to share digital representations of themselves based on the texts that selected for them based on algorithmic value.
Users aged 35-55 years old, in comparison to younger users, have two main tendencies in approach to these effects of AIRS: they mainly use it as a tool for work, abstracting from emotional response or they tend not to acknowledge the effects of AIRS, which may lead them to over-engage with some algorithmically centred texts like it is facet of reality.
The common theme in all collected interviews indicate that users, even when acknowledge the AIRS impact and the elements of environment as the texts, tend to tread digital representations as they would be facts of reality. This can be considered as the main reason to how sentimentally involved users on digital environment with what they see. As well as how they interpret what they see through digital representation to their immediate physical environment.

6) Disembodiment through AI-mediated enunciation, 7) Use of public domains, e.g. aesthetics, to overcome individual vulnerabilities, 8) Self-enhancement and social promotion, 9) Substitution of natural communication through AI-mediated one and 10) Impact own professional status and keep updated on professional news

AIRS as a tool should be always considered through the environment it is applied, because it does not function on its own. An environment, like social media in case of this research, as well as data that is used to make it function, are two main factors that define how it operates and what affordances it presents to users. The results highlighted through the semi-structured interviews confirm that all three elements together can impact practices directed to users' self-identity and self-representation. The themes of disembodiment through AI-mediated enunciation through the elements recommended by algorithm, texts that have algorithmically higher value. Disembodiment through AI-mediated enunciation, use of public domains, self-enhancement and social promotion substitution of natural communication and a possibility to impact own professional status and keep updated on professional news are based on the same affordance users find within AI-mediated digital environment.
AIRS can lead users to identify themselves through the selections of texts they see on AI-mediated environments. These texts stand for a limited digital representation of immediate physical environment, as indicated by one of the interviewees "a point of view, but not the fact of reality" (23-35-ee). However, holistic perception of these texts or selection of texts, may influence how users identify themselves through both digital and immediate physical environment. On the other hand, AIRS impose tools on users that allow to share own digital representations that in turn stand for a limited digital representation of immediate physical environment. This way users can experience disembodiment from their self through creating the texts that enunciate themselves as a text, enhanced based on algorithmically processed centre of the digital environment.
In this case, the in fluence of AIRS have on their users may lead to unification of self-identification and self-representation among users. The theme of following certain "standards" of self-representation online appeared in all interviews, when users were describing the way they create and edit their digital representations on AI-mediated environments, from using specific filters, colour grading, writing supplementary text, using hashtags or even photo

editing with or without involvement of other AI tools, to choosing certain locations and poses to achieve a digital representation that would "fit" into chosen digital environment.

11) Overstimulation and multitasking and 12) Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection and 13) Anxiety towards social pressure and comparison through AI-mediated categorisation, 14) Self-identity as self-victimisation to negative AI-mediated categorisations

One of the main functions of AIRS is keeping users engaged can lead to multitasking and overstimulation. Overstimulation, multitasking and anxiety appear to be themes that come together in the interviews creating a connection. Interviewees, especially in the age category 18-26 years old and 27-34 years old, identified that they would use social media when stressed or bored. While using it they anticipate impact their own cognitive states but experience more anxiety than a feeling of control. Both effects are reinforced through AIRS. AIRS aim to provide more personalised selection of texts to users to keep them engaged to digital environments.
Overstimulation, multitasking and anxiety are connected and may lead to algorithm-driven behaviours, that mentioned in some interviews as for example "impulsive shopping online".
Self-identity as self-victimisation to AI-mediated categories that users consider negative is a recurrent isotopy that can be themed with respect to how users identify the agency of AIRS within digital environments like social media. For a deeper exploration of why interviewees would identify it as a negative category, the answers were rather directed to emotional and sentimental dimensions, as anxiety towards a feeling of losing control of one's own time spent online engaging excessively with texts that are attractive for interactions but do not correspond to users intended self-identity. However, there is a possibility that it corresponds to users' enunciated online self-identity or algorithmically-centred identity.

15) Trustworthiness and advice-seeking

The results of the interviews highlighted themes and practices that users of different age categories and cultural backgrounds find on social media using AIRS. Younger users identify a phenomenon of clickbait. Clickbait is a type of element (usually a post) designed to gather clicks on the search engine pages that use AI recommendations. Clickbait elements are created in an attempt to generate traffic by engaging audiences with sensationalist or shocking headlines to attract attention, which statistically convinces AIRS to recommend these posts to even more users. In the interviews users aged 18-26 years old highlighted emotional engagement targeted by these types of posts. Therefore, avoiding posts that may cause emotional responses is a type of practice that impacts their online behaviours and decision process in whether engaging or not sentimentally with what AIRS provide. Especially it relates to advice-seeking online, actively or passively. Actively means creating a request, a form of a post online to receive relevant information and passively stands for the practice of searching information that would lead to problem solution only relying on AIRS suggested relevant information based on previous search requests.
Trustworthiness is identified by younger users through own emotional response and engagement rates, in relation to AIRS as a part of social media. The older users tend to apply criteria used for new media, like grammar and spelling, which can be less effective based on the effectiveness of LLMs that can fulfil the function of text correction. Users in age categories 18-27 years old and 27-34 years old find AIRS as an affordance to passive search in problem-solving, applying a practice of "algorithm training" which can lead to an intentional semi-

controlled discovery. In this, some shared on negative experiences of active process of searching for advice leading to negative consequences in social relationships or mental states.

9.6. Positive and negative connotations within fieldwork results

Positive and negative connotations, as a part of the categorisation and narrativization process, can be highlighted through the texts that aim to engage the emotional response identified by the interviewed.
Some of the themes discovered during fieldwork correspond to positive or negative connotations which relate to the practices. There is a correlation between intentionality and acknowledgement of AIRS role in these practices, which often result in positive connotations. As for example, one of the themes highlighted within all age categories all three case studies "AIRS impact on self-identity perception within environment, perceived as hybrid (merged between online and offline)" suggest that positivity or negativity of connotations and relative practices are related to intentional involvement with AIRS as a tool. This way, users who acknowledge role of AIRS and intentionally seek to "train algorithm" through selection of images that satisfy their tastes and intentions (e.g. "I am trying to create a safe space on my socials", "algorithm suggested me a sofa I was looking for", "I try to unwind from a hard day") can be categorised as positive. Instead, users focusing on passivation towards AIRS as a tool tend to highlight negative connotations and struggle to create individual and social practices around it (e.g. "because through AIRS they are trying to control us", "it is a rabbit hole", "social media are bad for your mental health"). This way AIRS can be used as a tool that has positive connotations, like impacting own moods and mental states, to reach effect of disembodiment from negative events or create practices that bring a feeling of control. And when it is not considered as a tool that can be used to impact of own physical and mental states, it can become a source of anxiety and even helplessness.
The age group 27-34 years old in the interviews and reflections on their past experiences between 2010 up to 2020, highlight that online communication on digital environment as a new element of their daily interactions might have significantly impact their self-identity and how it is enunciated and perceived by themself and others within digital representations. Mainly, this phenomenon can be attributed to the incompleteness of syntaxis of digital environments, such as social media, lack of regulation tools (AIRS) and lack of social rules within an axiological dimension. In the Table 26 shows positive and negative connotations highlighted through interviews and digital ethnography are present and relevant for all three age groups around three countries where fieldwork was conducted. Meaning that all these effects of AIRS to certain extent are experienced by all individuals. However, some of these connotations are more persistent within some age groups and therefore divided accordingly.

Age category	Positive connotations	Negative connotations
18-26 years old	• Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation • Motivation • Use of public domains, e.g. aesthetics, to overcome individual vulnerabilities • Self-enhancement and social promotion	• Anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection • Overstimulation and multitasking

27-34 y.o	• Impact social status and relationships through AIRS manipulations of digital representations • Self-enhancement	• Anxiety towards social pressure and comparison through AI-mediated categorisation • Self-identity through (self-victimisation to negative) AI-mediated categorisations • Substitution of natural communication through digitally mediated one • Multitasking
35-55 years old	• Impact own professional status and keep updated on professional news • Multitasking	• Problem of trustworthiness and convergence of opinions to facts • Filter bubbles and echo chambers • Disembodiment through AI-mediated enunciation

Table 26 - Comparative table between positive and negative connotations assigned to AIRS effects and users' emerging practices.

9.7. Impact of different levels of learning in the decision-making process in AI-mediated communication

Social and cultural reception of AI-mediated communication can be modelled as a loop, once it is in contact between human-user and AI within a digital environment. AIs, including AI recommendations, isolated from constant new data entries, have a quality to collapse as models. However, with human-user input (not bot-users, represented in high numbers on social media today) and adjustments from designers (developers). The loop is not only focused on a user in reference to the term human-in-the-loop, which is used mainly in relation to UX/UI. As demonstrated in Chapter Two, it is a co-creation process, including pre-decision, co-decision and post-decisional processes. Fieldwork results confirm that co-creation process takes place within users' practices online and offline, since their online behaviours and practices adjusted to the AI-mediated digital environments and their offline practices aim to mimic the AI-mediated texts within platfosphere centre.

Interviews together with texts collected during digital ethnography suggest that AIRS can reinforce the perception of digital environments as homogenous within age groups. However, the quality of homogeneity is not based on geographical criteria among age groups 18-26 and 27-34, while for older groups, it can be primarily enclosed based on their geographical area, e.g. users of older age have more region-specific AI recommendations. This can be attributed to AIRS supporting their interests in local events rather than general or global affairs. There is a significant scope of studies investigating age category defined as digital natives (18-16 years old) and the impact of social media and other AI-mediated environments on their mental health, social relationships, habits in connection to time spent online, etc. This age category is often defined as having the highest level of digital skills with respect to previous generations because of a young age of exposure to portable and wearable digital devices and technologies with intuitive User Interfaces (UI), which engage them in prolonged online activities. However,

empirical findings in this research, based on the theoretical and methodological framework, suggest that the age group with the highest digital literacy skills are those who were adolescents during the period from 2000 to 2010-2015 and had experience with various digital devices and platforms, from command line to intuitive UI using graphic elements, which urged them to gain all variety of skills to communicate and operate different types of computer technologies with little to no top-down regulations. The effect is connected to the practices and online behaviours which were developing in HCI with AI-mediated environments, impacting values and social practices and imposing specific interpretations on the most active users, who were adolescents at the time. Therefore, users in age category 27-34 years old, also described as Late Millennials, can be defined as having higher digital skills and experiences. Nevertheless, the data collected during semi-structured interviews and isotopy analysis defined this group as the most vulnerable and exposed to the impact of AI-mediated environments, as well as most affected by it in different periods of time. This confirms that digital literacy as set of knowledge and skills is not as relevant as intentional involvement with AI-agents.

9.8. The role of AI recommendations in human-users communication on social media

AIRS impact on their users can be highlighted through categories users choose in their enunciations in texts, reflecting on their experiences in natural language or texts they share and use to interact on digital environments. The list of AIRS effects on users cannot be divided exclusively to cognitive, emotive, axiological and pragmatic dimensions because these effects are complex and impact several dimensions, based on affordances users find.

Results of the comparative analysis between field work results in Italy, Estonia and the Netherlands show that users in all age categories can experience similar effects of AIRS used on digital environments like social media. Users define as social media the digital platforms that allow them to communicate with other individuals through the texts, including digital representations that stand for facts and events of immediate physical environment and mimic natural communication among individuals and groups. Fieldwork results confirm that AIRS as a part of social media have various effects on their users, intended and unintended. An intentional involvement with AI-mediating tools of social media can fulfil users' needs and present affordances they lack from their immediate physical environments. However, these effects can be also negative from users' point of view when not managed intentionally.

The most common AIRS' effects are directed at users, as impacting their own self-identity and cognitive and emotive states. Users engage with AIRS to find and receive texts and digital representations that help them to impact how they feel and provide categories that support desired interpretations. As for example, users who interpret their body conditions negatively based on social pressure can create digital environment on one of the social media, training AIRS to show them texts and digital representations of the bodies that similar to their own, that impact their self-identity positively. These effects of AIRS can affect users as motivation, tools to monitor professional status and keep updated on professional news, impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation: AIRS on social media emotional contagion as a coping tool, as well as create filter bubbles and echo chambers. However, when not engaged intentionally, AIRS can provide texts and digital representations that result from algorithmic processing, creating central values that can cause a stress reaction on a user. That can bring anxiety towards dominant elements suggested by AIRS/AI/mediated social standards and rejection.

AIRS is an effective tool to impact social status and relationships through AIRS manipulations of digital representations, to transform private to public domain, e.g. use of aesthetics, to overcome individual vulnerabilities (individual values that one considers peripherical to own perception semiosphere) and self-enhancement through creating meanings that can be

augmented through platform syntactic tools and AIRS. This may lead to division between proper and online identity, disembodiment through AI-mediated enunciation and substitution of natural communication through digitally mediated one, that can be approached in a positive way as well as negative. On one hand, one can create a digital persona enhanced through AIRS that later can be meaningfully engaged into an immediate physical environment. An example can be various influencers whose digital persona impacted their social status. On the other hand, AIRS impact cannot be foreseen and it can lead to various negative cognitive, emotive and pragmatic effects on one's life.

One of the core effects of AIRS is engaging users in multitasking and overstimulation, that can have various individual effects. On the social level these effects can lead to various scaffolding outcomes, that can impact users' behaviours, like being less engaged with immediate physical environments or transform the entire practices. As for example, users being less engaged in face-to-face conversations and more operating through the central to AIRS' processing categories.

Age specific AIRS effects depend on group needs and affordances they find in AI-mediated digital environments. On one hand these needs come from their immediate physical environment, but also can be suggested through the algorithmic processing results provided by AIRS. The fieldwork results suggest that there is a division between how AIRS impact different age categories. On the other hand, it rather depends on the user's community than the age of an individual. For instance, a person aged 18-26 may align more closely with the digital practices of a community aged 27-34, adopting behaviours typical of the older group, or vice versa. AIRS can have profound effects on their users. However significant scope of these effects can be controlled and intentionally managed through users' communication practices. Yet, AIRS can pose some unexpected or undesired effects like overstimulation, some users can find these side effects as beneficial, integrating them into their daily routines. The results of fieldwork confirm that AI-mediated digital environment can have similar effects on their users as emersion to immediate physical ones and AIRS can guide how users perceive themselves and others, interpret their experiences and make their decisions.

Chapter ten -
Discussion, conclusions and further research on AI mediated digital environments

10.1. Discussion of the semiotic perspectives in this research

Current landscape of AI development as a tool to aid human decision-making is complex, often ambiguous and poses challenges both from a research perspective and in terms of social reception. Cassie Kozyrkov, who served as Google's first Chief Decision Scientist and has spent over a decade in AI research, recently remarked on LinkedIn (Figure 42), "The truth is, no one knows exactly where we're headed. We are building the plane while it's taking off. (And maybe the plane is starting to build the plane while it's taking off?)". Her insights suggest that AI tools, including AIRS, ML, LLMs and other algorithms used for problem-solving, are evolving so rapidly that it is crucial to focus on the problems we aim to solve, rather than the tools themselves. Semiotics, among other disciplines, is instrumental in addressing how AI-mediated environments – like AIRS on social media in this research – can influence users' decision-making processes.

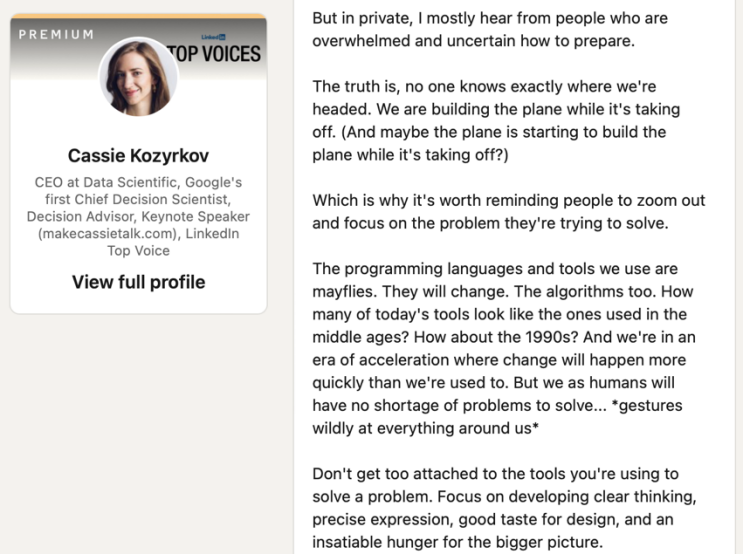


Figure 42 - Cassie Kozyrkov post on "Gold-Medalist Coders Build an AI That Can Do Their Job for Them" [Accessed at: https://www.linkedin.com/feed/update/urn:li:activity:7174035915718152192. Retrieved 07.05.2024].

Over the course of three years, from 2020 to 2023, AI tools have evolved, significantly impacting social relationships and the state of technological art. However, these changes were not so drastic as to alter the findings of this research. Although AI technology is developing at a rapid pace, the adoption, reception and communication practices of users evolve more gradually and are deeply rooted in the fundamentals of human communication. Consequently, semiotics remains a vital approach for exploring the central research question: how AI influences users' decision-making processes.
A pressing issue today is how to integrate a humanistic approach into technology, especially AI. It is vital to assess technological progress through how it is received by individuals and societies and to anticipate its effects on communities and cultures. Addressing these questions

demands a scientific focus on human communication. In this context, semiotic perspectives have facilitated the merging of insights from psychology, decision-making modelling, behavioural studies and cultural studies. This interdisciplinary approach deepens our understanding of HCI from the user's perspective. It also helps close the gap in technology-focused decision-making, which typically focused primarily on developing more sophisticated AI solutions. Adopting a human-centred decision-making strategy, which prioritises understanding and responding to human needs and capabilities, is essential for the optimal integration of these technologies.
This research employed a semiotic approach to investigate the communication mechanisms within AI-mediated environments, exploring how AIRS influence user decisions, actions and behaviours. It aimed to bridge the existing knowledge gap about AI's effects on its users, with a specific focus on the impact of AIRS in digital platforms like social media, which are integral to the daily lives of billions globally. The study examined the effects of regular AI interactions on individuals' cognitive, physiological, emotional, axiological and pragmatic aspects. The primary research question of this work was segmented into a series of objectives, each addressed in separate chapters of this thesis, aiming to integrate theoretical and empirical insights to deepen our understanding of how AI shapes individual, social practices and cultural dynamics.

10.2. The original contributions

Semiotic perspectives in this research aided a possibility to align existing knowledge in psychology, decision-making modelling, behavioural studies, cultural studies, to highlight how HCI can be understood and researched today from a user's perspective. It also helped overcome the gap in technology-oriented decision-making when research is mainly focuses on how to create more advanced solutions and improve current state of art in AI. Instead, human oriented decision-making focuses on human needs and capacities to adopt these technologies in most optimal ways. The question how AI technologies adopted to the social and cultural dynamics highlighted through main research question on how AIRS can influence human decision-making process in Chapter One.
Chapter Two aimed to understand different approaches to decision-making process. Human decision-making works through brain neural mechanisms of signal processing and influenced through genetics and individual organismic bodily states, life-long individual learning, social and cultural shaping of behavioural styles. Among various fields attempting modelling of this complex processes appear research on AI and HCI, where AI aims to aid human decision-making process. Among different tools used today on digital environments, approaches like Big Data that are based on ML algorithms with models like Multi-armed bandits and Reinforcement learning often appear as efficient in their applications. However, exactly as AIRS, that often use approaches like Matrix factorisation, user-based or data element-based approaches, they often lack user-centred results. Even though they can present credible results and solutions.
The main aim of Chapter Two is to analyse how algorithmic modelling process within digital environment can come close to their users' decision-making aiding it. The theory of Juri Lotman (2005 [1984]) on Semiosphere and its Bankov's (2020) application to Platfosphere demonstrated to help in advancing the understanding of how algorithmic approach can impact different elements of digital environments for their users. Revising dominant algorithmic approaches used in AIRS through this perspective it becomes clear that there is inevitable division between centre and periphery based on syntactic features of the digital environments. This way digital representations can represent semantic and pragmatic dimension for their users through relations to other elements within digital environments operated through an algorithm

AIRS and not through their relation to the objects and events of immediate physical environment they represent. In other words, the meaning and signification of the elements shared within digital environments is more likely to be influenced by the algorithm. Further exploration of this phenomena of algorithmic meaning-making behind digital representations suggest that users may tend to accept it, holistically introducing algorithmic values behind digital representations to their immediate physical environment. This can stand for the introduction of algorithmic biases of AIRS into cognitive biases of users.
Chapter Two goes on analysing how AI-augmented digital representations can be processed through AIRS. It highlights that AIRS can process more effectively images that were previously AI-augmented or modified through AI tools. This can lead to algorithmic clustering of texts, including digital representations, towards centre of Platfosphere. Therefore, the Platfosphere, as a part of semiosphere, can impact how users perceive, recognise and interpret their hybrid environment, digital and immediate physical as one. This also may lead to change in users' practices, acting on texts reinforces through AIRS and sorted to meaningful centre as they would be facts or events of immediate physical environment. To this extend the personalisation qualities of AIRS for each user can be biased through the datasets that have been AI-augmented or mediated. Therefore, they are function not as a unique digital environment for each user but as a highly influential tool leading users to accept statistically dominant categories mediated through selected AIRS' algorithm. This can impact users' cognitive, axiological, emotive and pragmatic dimensions, influence their identity, behaviours and practices. One of the highlighted effects of AIRS' impact can be seen in users' behaviours online when they aim to create digital representations of themselves that would look like AI-augmented images. Users seek to create digital representations of themselves that they post on social media aiming to look like AI-beatifying tools applied, first to fit into categories of algorithmically processed centre of platfosphere and only later to communicate with other users through these texts. Therefore, the decision-making process become co-decision-making process between a user, AIRS, based on the input from designers and datasets. The decision-making process aided through AIRS can be described through interconnected stages of pre-decision, co-decision and post-decision between AI and social actors. Pre-decision process describes how AI models, created by groups of IT professionals and data sets, resulting from reception of post-decision process and how they impact users' input. Co-decision process describes the decision-making between user and AI output based on the inputs. And post-decision process, where the AI-mediated text is used to generate new texts as a model or deconstructed to understand the underlying algorithmic process and technical, social and cultural potential of these texts.

10.2.1. Theoretical contributions

The focus of this research is to understand how users cognitive, axiological, emotive and pragmatic dimensions can change within AI-mediated digital environments. After revising through the lens of semiotics how AI-mediated tools, like AIRS, operate within semiotic space, this research proceeds to explore how users operate within AI-mediated environments. Focusing on cognitive, axiological, emotive and pragmatic dimensions of communication process Chapter Three revises decision-making process from a user's perspective. In doing so it employs Pierce (1992) and Lotman (2005) communication models in relation to texts, as main operational element for AI-mediated digital environments. A proposed model sets user in relation to different social and non-human actors that can impact users' experiences of their digital and immediate physical environments. Social actors are designers and other users that interact within digital environments like social media and non-human actors are AIRS, that operate based on the input of social actors and chosen datasets. Adopting ecosemiotic approach,

this research suggests that AI-mediated texts can be perceived as stimuli and impact users' Umwelten, their perception, recognition and interpretations. The hypotheses based on these theoretical findings suggest that this can influence users' unconscious reaction, online and offline behaviours and lead to changes in individual, social and cultural practices.
The hypothesis raised in Chapter Three suggest that AIRS as a part of communication process of digital environments can influence users in following:

1. AIRS can coerce users to conform and navigate environments despite limited knowledge
2. AIRS can compel users to multitask across multiple environments simultaneously
3. AIRS can induce categorisation processes in users through syntactic elements in digital environments
4. AIRS can influence perceptions of self and others
5. AIRS can elicit feelings of control and anticipation of stress concurrently

The findings of this research underscore the significant impact of users' active engagement in assigning or recognising agency to AI recommendations within digital environments, consequently influencing the decision-making process. The theoretical insights presented in Chapters Two and Three, along with the proposed hypotheses, not only enrich the theoretical framework of this research but also offer valuable methodological guidance for conducting comparative case study analyses. Semiotics offers a promising avenue for enriching research in Human-Computer Interaction, particularly concerning the communication process facilitated by AI-based recommendation systems. By employing semiotic principles, researchers can delve deeper into the symbolic meanings embedded within user interactions with these systems, unveiling nuances in communication dynamics and user perceptions. Adopting a semiotic approach has the potential to reshape the AI-mediated decision-making process by providing a deeper understanding of the symbolic representations and sign systems involved. This deeper understanding can lead to more nuanced algorithms and interfaces that better align with users' cognitive processes and preferences, ultimately enhancing the practical applications of AI research in decision support systems and beyond.

10.2.2. The connection between theoretical and empirical contributions

This research analysed a case study to verify the hypotheses elaborated based on theoretical investigation. The case study research strategy was appropriate to show how a connection between analytical frames developed in the field of HCI and semiotics could contribute to a better understanding of the multiple interpretations of how AI tools like AIRS can impact human decision-making on digital environments and whether this impact extends to immediate physical ones.
Chapters Four and Five develop theoretical framework on accessing how users may experience AI-mediated digital environments and how the collected data can be analysed using qualitative approach based on semiotics. Chapters Four focuses on theoretical framework elaborated for the case studies of this research based on the act of enunciation. Users enunciate their experiences through the languages and texts, on digital environments and in natural language as a reflection on their interactions with AI-mediated digital environments. The focus of exploring users' experience as a text is to highlight isotopies that emerge within interpretations and categorisation process used in describing their interactions and role of AIRS in it.
Chapters Five introduces a multi-method approach chosen to collect, analyse and compare data produced through interviews and digital ethnography. Semi-structured interviews explored the users' opinions, beliefs and emotional reactions. Semi-structured interviews focused on the enunciation through the natural language when volunteers of three age categories were invited

to reflect on their experiences with AI-mediated digital environments like social media. Digital ethnography concentrated on the enunciation though actions and interactions of users online on AI-mediated digital environments through categorisation tools offered there. A specific set of questions was developed to create a bottom-up approach to how AI-mediated digital environments can influence users' self-perception and self-identity, their self-monitoring, self-representation and self-enhancement. Based on these questions the highlighted common isotopies in semi-structured interviews conducted in Italy, Estonia and the Netherlands contribute to empirical novelty of this research.

10.2.3. Empirical contributions

This research aimed to introduce semiotics as a tool for analysing AIRS used on digital environments like social media, which can influence their users' decision-making process. Chapters Six, Seven and Eight focus on the analysis of common isotopies in semi-structured interviews conducted in Italy, Estonia and the Netherlands and how they can be themed to represent the influence AIRS on their users. Chapter Nine provides a comparative analysis between 90 interviews concluded in these three countries and highlights how bottom-up approach based on semiotics and qualitative analysis can bring closer understanding to individual, social and cultural effects of AI-tools like AIRS used on digital environments like social media. The themes based on highlighted isotopies from interviews and supported through results of digital ethnography, form the following list of possible effects AIRS can have on their users:

- Filter bubbles and echo chambers.
- Impact own moods, mental and physical conditions.
- Motivation.
- Disembodiment through AI-mediated enunciation.
- Use of public domains, e.g. aesthetics, to overcome individual vulnerabilities.
- Self-enhancement and social promotion.
- Anxiety towards dominant elements suggested by AIRS/AI-mediated social standards and rejection.
- Overstimulation and multitasking.
- Impact social status and relationships through AIRS manipulations of digital representations.
- Self-enhancement.
- Anxiety towards social pressure and comparison through AI-mediated categorisation.
- Self-identity (including self-victimisation) though AI-mediated categorisations.
- Substitution of natural communication through AI-mediated one.
- Impact own professional status and keep updated on professional news.
- Problem of trustworthiness and convergence of opinions to facts.
- Trustworthiness and advise seeking.

The empirical findings that are closely connected to theoretical framework based on semiotics tools not only prove this methodology for qualitative approach in studying AI-human interactions and HCI in general but also give highlights on the current situation within the field. Empirical findings show that users learn AI-mediated categories to interpret daily experiences (1). Moreover, different social groups find different affordances (2) reinforcing AI tools to receive stimuli that impact desired states at all levels, from body reactions to individual and social behaviours (3). The development and regulations of AI lead to managing the

trustworthiness of AI engaging users to trust and accept AI-mediated values and practices (4) and adapting to AI-mediated environments and digital representations of immediate physical environment (5).

The Table 27 "List of Empirical contributions" highlights how AIRS influence of different categories of users, drawing parallels between the syntaxis of AI and digital environments and possible effects. One of these effects is stress reaction to the overstimulation. These stimuli, in turn, might cause various stress-related reactions that eventually might influence users' decision-making process, behaviours and practices and even have an effect at social and cultural levels. In this thesis, a stress reaction is considered a response to stimuli that cause biological changes and conditions at the lower level of semiosis, which, subsequently, can impact and be expressed in users' emotional, cognitive and axiological states. It is important to note that stress in this discussion is considered as a condition of overstimulation that may lead to change in users' behaviour and not in common sense when one refers to "stress" as a harmful emotional condition. The discussion in the theoretical Chapters Two and Three and findings of the chapters concerning fieldwork (Six, Seven, Eight and Nine) also underline that stress conditions can lead to various changes in users' behaviour, having adverse effects – when a user is unable to utilise this condition in owns favour (e.g. "I feel exhausted and don't want to do anything, just spending all time on TikTok", from 10-1826-it) or positive ones, when overstimulation through AI and digital environment can serve in educational purposes ("I am not aiming to create a safe space on my social media, I need a stimulating environment that would encourage me to develop", from 1-1826-it). However, in both cases, the research findings suggest that prolonged use of AI-mediated digital environments, like social media that use AI recommendations, requires significant cognitive effort as the interpretation process is at the higher levels of semiosis, even when a user does not acknowledge it. The factors that impact it are incompleteness of environment, exposure to excessive number of elements in a short period of time and repetitive form of elements, which all can cause fatigue. Fatigue and high cognitive load together can impact users' decision-making process. It can lead them to poor decisions online and offline, as well as change in behaviours and practices.

Main contributions based on empirical part of the research	Individual level: biological, cognitive, axiological, pragmatic	Level of Social and Cultural generalisations
Learning of AI-mediated 1) categories to interpret daily experiences	-Disembodiment through AI-mediated enunciation, Division between proper and online identity -Self-identity through AI-mediated categorisations -Anxiety towards social pressure and comparison through AI-mediated categorisation -Anxiety towards dominant elements suggested by AIRS/AI-mediated social standards and rejection	AIRS' role in shaping cultural and social norms through the content it promotes can lead to a homogenisation of culture, where diverse voices and less mainstream ideas might be overshadowed by what is algorithmically favoured. AIRS categorise people based on data (such as preferences, behaviours and social interactions), leading individuals to see themselves more through the lens of these algorithmically assigned categories. This can shape one's identity according to external data-driven norms rather than personal interpretations and decisions.

2) Different age categories find different affordances reinforcing AI tools to 3) receive stimuli that impact desired states at all levels (from body reactions to individual and social behaviours)	-Overstimulation of users -Motivation -Impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation -Substitution of natural communication through AI-mediated one -Impact social status and relationships through AIRS manipulations of digital representations	AIRS ability to manipulate digital representations and selective information filtering can impact social status and relationships, as well as communication dynamics, potentially leading to a decrease in empathy, emotional depth and the nuanced understanding that comes from in-person interactions. This manipulation can shape how individuals are perceive themselves and others, influencing social hierarchies and personal interactions based on AI-curated profiles rather than authentic expressions.
Development and regulations of AI lead to managing the trustworthiness of AI, meaning that users rely on AI through the bond of trust 4) accepting values and practices and 5) adapting to AI-mediated environments and digital representations of immediate physical environment	-Transform private to public domains, e.g. aesthetics, to overcome individual vulnerabilities -Impact users' professional status and keep updated on professional news -Self-enhancement and social promotion -Filter bubbles and echo chambers -Problem of trustworthiness and convergence of opinions to facts	AIRS can influence social and professional realms by emphasising statistically dominant digital representations, often prioritising superficial traits over deeper qualities. They can blur the distinction between facts and opinions, leading users to accept widespread opinions as truths, which undermines trust in accurate reporting and expert analysis.

Table 27 - List of empirical contributions.

Empirical contributions highlight that different age groups of users can be affected in different ways by AIRS, independently on their digital literacy. Findings show that similar age groups rely on similar practices reinforced by AI as a mediating agent in a digital environment and their own needs are reflected on the affordances, they find on platforms identified as social media. AI-mediated communication platforms can lead to a disembodiment where individuals might feel a separation between their physical selves and their online personas. This disjunction can create dual identities where one's "real" self and online self can differ significantly, potentially leading to conflicts in self-perception and social behaviour and communication. This also can be due to categories provided through AIRS. As AI processing categorises based on data users provide, the algorithmically assigned categories might impose on individuals to see themselves more through its lens. This can shape one's identity according to external data-driven norms rather than personal introspection to own personal experiences. This also may lead to anxiety and social comparison with other individuals on AI-mediated environments. Users may experience pressure from AI-mediated social norms due to the pressure to conform to standards and identities suggested by AIRS or popular content, which are often prioritised based on engagement metrics rather than users' well-being. These effects can escalate to a fear of rejection and non-conformity. Anxiety may also stem from AI-reinforced social standards, where failure to align with what's popular or recommended digital representations can lead to feelings of rejection or being outcast. This can affect personal and social decisions, pushing individuals towards conformity at the expense of self-expression.

Moreover, AIRS can have influence on social dynamics and cultural norms. Purposeful division between an individual's online and offline identities can lead to the categorisation of behaviours and interactions. This division may also influence societal norms on authenticity and representation, as people manage multiple "selves". AIRS role in shaping cultural and social norms through the content it promotes can lead to a homogenisation and standardisation of behaviours and practices within society and culture, where diverse voices and less mainstream ideas might be overshadowed by what is algorithmically favoured.
On the individual level AIRS can be cause of users' overstimulation and cause fatigue due to sensory and cognitive overload. AI-driven platforms, with their continuous streams of notifications and recommendations, can lead to overstimulation. This constant engagement demands sustained attention and can contribute to mental fatigue and decreased ability to focus on tasks without digital interruption.
They also can provide motivation and behavioural influence when approached as a social agent. AIRS can influence user motivation by providing selections of digital representations that stimulate one's personalised goals, serve as a feedback and incentives. While this can enhance productivity and learning, it might also lead to dependency on external validation rather than intrinsic motivation. This can raise a question whether AIRS can impact their users' mental and physical health. Interaction with AI, particularly through social media and personal devices, can significantly impact users' moods and mental health, potentially amplifying conditions like anxiety and depression. The impact AIRS have on mental health and self-perception may also lead to sense of disembodiment and identity dissociation to digital identity or physical self. Consequently, it can lead to changes in communication practices.
The shift from face-to-face communication to AI-mediated communication (e.g. various texting practices, use of virtual assistants) can alter traditional communication dynamics, potentially leading to a decrease in empathy, emotional depth and the nuanced understanding that comes from in-person interactions. Relatively these communication changes led by AIRS can impact social dynamics and social status. AIRS ability to manipulate digital representations through selective information filtering can impact social status and relationships. This manipulation can shape how individuals are perceived by others, influencing social hierarchies and personal interactions based on AI-curated profiles rather than authentic expressions. Social media and digital platforms often encourage the sharing of personal experiences and aesthetics that were traditionally private. AIRS can serve to normalise and destigmatise certain vulnerabilities, but also exposes individuals to broader scrutiny and potential misinterpretation.
AIRS as categorisation and sorting tool can be used by individuals to enhance own social and professional visibility and reputation through optimisation of social media profiles, personalised content creation and strategic networking suggestions. This promotion can lead to enhanced opportunities but also create a gap between digital representations and tangible facts. Moreover, AI-mediated digital environments facilitate real-time updates on professional news and trends, helping individuals maintain their professional status by staying informed. This can be crucial in rapidly evolving fields, but also pressures individuals to constantly engage with new information, potentially leading to information overload and overstimulation.
One of the most discussed effects of AIRS, filter bubbles and echo chambers. AIRS tend to show users content that aligns with their previous interactions, creating a feedback loop that reinforces existing beliefs and filters out dissenting views. This phenomenon limits exposure to diverse perspectives and can deepen cultural and political divisions. Like filter bubbles, echo chambers occur when individuals are predominantly exposed to opinions that reinforce their own, leading to a situation where alternative viewpoints are seldom encountered or considered. This brings to the question of trust and information integrity.
AIRS used on digital environments like social media may lead to convergence of opinions and facts for their users. The difficulty in distinguishing between fact-based information and

opinion-driven content is reinforced by AI-driven content distribution on digital environments. Users may begin to treat popular opinions as facts due to their widespread acceptance and repeated exposure, undermining trust in factual reporting and expert analyses.

10.3. Limitations of the thesis

The objective of this research was to contribute to better comprehension of how AI-mediated environments employing AIRS can shape their users' behaviours and experiences. While the introduction of semiotics sheds light on the effects of AIRS, it is important to acknowledge certain limitations. These limitations pertain to both theoretical and empirical inquiries as well as potential applications. Despite the growing recognition of AI's broad impacts on society, it's crucial to acknowledge the existing limitations in AI research. This acknowledgment is essential for gaining a deeper understanding of the subject matter and for effectively addressing and mitigating any potential issues arising from generalisations of research findings.

One of the main limitations of this research relate to the fact that AI technology continues to evolve rapidly and research findings may quickly become outdated, making it difficult to keep pace with the latest developments and understand their immediate impacts. However, stressing on the users' perspective, recognising the limitations in current approaches to AI is crucial for developing more accurate, reliable and comprehensive research methodologies. This research took place in during 2020-2023, during which various changes happened on the level of technological development as well as individual and societal needs.

The empirical inquiry of this research suggests various effects of AI and AI-mediated technologies (like AIRS) on identity, mental health and social interactions. The degree of AI integration and its effects can vary significantly between different regions, cultures and socioeconomic groups. Research often does not account for these variances, which can lead to incomplete or biased interpretations of how AI impacts society globally. This research aimed to provide diverse scope of social groups in EU based on the case studies in Italy, Estonia and the Netherlands interviewing 90 individuals and supporting this data with digital ethnography data. However, there is a risk of overgeneralising findings from this limited data sets, which may not account for the varied experiences and responses across different populations. Moreover, the present research focuses on short-term effects without being able to suggest the long-term impacts of AI interactions. The prolonged effects of digital disembodiment, overstimulation and changes in social dynamics are still not fully understood in AI's implications.

Another limitation of this thesis relates to identification of correlations and causations between detecting and quantifying subtle changes in behaviour, self-perception and social relationships in different age categories. This research rather proposes generational approach that stands for the unique practices that are relevant to a specific group within a given period of time. These limitations are important to consider in the applications of the findings and can be addressed in the future directions for research on AI tools use and their impact on individual, social and cultural levels.

10.4. Future directions

As AI technologies continue to advance and integrate further into everyday life, they wield a profound influence on core human experiences, from communication patterns and self-perception to social dynamics and motivation. While this fusion of AI presents potential opportunities, it also introduces complexities that underscore the need for a nuanced evaluation of its impact across individual, social and cultural domains. These shifts significantly reshape

the processes of identity formation, perception and societal values, emphasising the critical necessity of engaging thoughtfully with technological advancements.
This research can be continued within the framework of UX/UI discipline because in this thesis the field was touched only partly. The findings can be analysed through the practical applications together with existing approaches. Another practical applications of the future directions of research can focus on ethics and regulations regarding digital literacy and cultural reception of AI tools largely in use today. Ensuring transparency in how AIRS categorise and shape user experiences is paramount, using bottom-up approaches establishing primary focus on a user. This researched aimed to introduce semiotics as an umbrella science to focus on user and suggesting how adopting a balanced approach to the integration of AI tools, including AIRS, important for both mental well-being and cultural diversity. Furthermore, as AIRS have capacity to redefine cultural norms and behavioural patterns, the urgency for innovative strategies in digital literacy becomes increasingly apparent.
The future lines of research should be grounded in a deep understanding of the intrinsic mechanisms of communication and the semantic and pragmatic aspects, when designing for prospective users. Given the multifaceted nature of human behaviour and the various external influences beyond AI, establishing causation poses significant challenges. Therefore, further research into the use of AI-mediated environments and their potential impact on individual and societal behaviours is imperative. Further research should also apply the semiotic perspectives presented in this thesis to explore specific individual and social behaviours that may precipitate changes in practices and cultural outcomes, providing insights crucial for navigating the evolving landscape of AI integration.

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The images and small portions of a copyrighted work (photos) used in this research are protected by copyright and are used under the United States concept of fair use **Copyright Act 1968* (Cth)) for research or study. According to Instagram copyright regulations (https://help.instagram.com/116455299019699) "using a fashion photograph to discuss the amount of photo editing used in the photograph is more likely to be fair use", as intended in this research.

Appendix I

Ethics committee approval

Direzione Ricerca

UNIVERSITÀ DI TORINO

Prot. n. 0242950 del 09/05/2023 - [UOR: SI000045 - Classif. III/14]

Prot. n.*
n. e data della registrazione di protocollo riportati nei metadati del sistema di protocollo informatico Titulus

Dott.ssa Daria Arkhipova
Dipartimento di Filosofia e Scienze dell'educazione
Via S. Ottavio, 20
10124 Torino

Oggetto: Approvazione Progetto

Si comunica che in data 18 aprile 2023 il Comitato di Bioetica d'Ateneo ha approvato il progetto dal titolo "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale".

Cordiali saluti

(Segreteria Comitato di Bioetica d'Ateneo)

Cesarina Marretta

Università degli Studi di Torino
Direzione Ricerca - Comitato di Bioetica di Ateneo
Via Bogino, 9 – 10123 Torino
Tel (011) 670 4394 – 670 4377 | Mail staff.cba@unito.it

Personal data protection documents

Dipartimento
Filosofia e Scienze
dell'Educazione

UNIVERSITÀ
DI TORINO

UNIVERSITÀ DEGLI STUDI DI TORINO SCHEDA DI RICOGNIZIONE DEI TRATTAMENTI STRUTTURA SCUOLA DI DOTTORATO

	DENOMINAZIONE	DATI DI CONTATTO
TITOLARE:	Università degli Studi di Torino, nella persona del Legale rappresentante il Magnifico Rettore	Via Verdi, 8 - 10124 Torino | Centralino +39 011 6706111 | email: rettore@unito.it
CONTITOLARE:		-
RESPONSABILE INTERNO DEL TRATTAMENTO:	*Dipartimento di Filosofia e Scienze dell'Educazione Graziano Lingua riferimento nominativo*	direzione.dfe@unito.it
RESPONSABILE ESTERNO DEL TRATTAMENTO:		-

ATTIVITÀ DI TRATTAMENTO:	*Interviste semi-strutturate ai utenti del Social Media su "Come Raccomandazioni dell'Intelligenza Artificiale possono influenzare processo decisionale"*
BASE GIURIDICA DEL TRATTAMENTO:	*Esecuzione di un compito di interesse pubblico o connesso all'esercizio di pubblici poteri ai sensi dell'art.6 par. 1 lett. e) del Regolamento UE n.2016/679. Legge n. 168/1989 e s.m.i.*

Università degli Studi di Torino
Dipartimento di Filosofia e Scienze dell'educazione
Via Sant'Ottavio 20 - 10124 – Torino (TO)
Tel (011) 670 3608 – 670 3689 – 670 Interno | Mail direzione.dfe@unito.it

UNIVERSITÀ
DI TORINO

FINALITÀ:	*Ricerca*	
CATEGORIE DI INTERESSATI CUI SI RIFERISCONO I DATI:	STUDENTI	**NO**
	LAUREATI	**NO**
	PERSONALE DOCENTE	**NO**
	PERSONALE TECNICO AMMINISTRATIVO	**NO**
	FAMIGLIARI (ISEE, ASSEGNI)	**NO**
	MINORI DI ETÀ	**NO**
	DIVERSAMENTE ABILI	**NO**
	DECEDUTI	**NO**
	ALTRO	**SI'**
	DATI ANAGRAFICI	**SI'**
	DATI DI ACCESSO (USERNAME, LOGS, ETC.)	**NO**
	DATI IDENTIFICATIVI TERMINALE/ POSTAZIONE (IP, BROWSER, HOST, ETC.)	**NO**

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CATEGORIE DI DATI:	ORIGINE ETNICA	**NO**
	CONVINZIONI RELIGIOSE	**NO**
	CONVINZIONI FILOSOFICHE	**NO**
	ADESIONE A PARTITI, SINDACATI, ASSOCIAZIONI OD ORGANIZZAZIONI RELIGIOSE	**NO**
	ABITUDINI SESSUALI	**NO**
	DATI RELATIVI ALLA SALUTE	**NO**
	DATI GIUDIZIARI	**NO**
	DATI GENETICI	**NO**
	DATI BIOMETRICI	**NO**
	ALTRO	audio
CATEGORIE DI DESTINATARI DELLA COMUNICAZIONE DEI DATI:	*I dati personali identificativi e di contatto (nome cognome, e-mail), le registrazione della voce sono disponibili esclusivamente al responsabile del progetto la dottoranda Daria Arkhipova. I dati raccolti durante le intervista, trattati tramite le trascrizioni, anonimizati e pseudonimizati saranno conservati su cloud di Università degli studi di Torino. Le interviste trascritte e anonimizzate saranno utilizzate nella ricerca e condivise con le tutor del progetto. I dati raccolti durante le interviste saranno condivise con le supervisor esclusivamente in modo come informazioni anonimizzate.*	
TRASFERIMENTI DI DATI ALL'ESTERO:	UNIONE EUROPEA	**SI'**
	PAESI TERZI	*SI'*
	ORGANIZZAZIONI INTERNAZIONALI	*NO*
	CARTACEO	**NO**

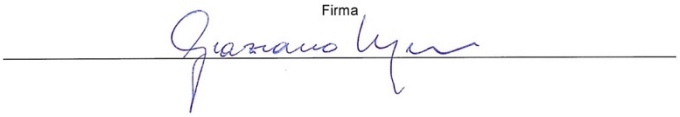
UNIVERSITÀ
DI TORINO

MODALITÀ DI TRATTAMENTO:	INFORMATIZZATO	*Se sì, specificare se trattasi di applicativo/banca dati, telemedicina, ecc…*
	SUPPORTO DI ALTRO TIPO	*audioregistrazioni delle interviste con registratore audio digitale*
TIPOLOGIA DELLE OPERAZIONI ESEGUITE:	RACCOLTA	**SI'**
	REGISTRAZIONE	**SI'**
	INTERCONNESSIONE con altri trattamenti/archivi	*NO*
	CONSERVAZIONE	*Cloud Unito*
	ALTRO	*Pubblicazione del dati anonimizati nella tesi del dottorato e pubblicazioni nel reviste scientifiche*
TERMINI PREVISTI PER LA CANCELLAZIONE DEI DATI:	I dati personali identificativi e di contatto (e-mail) sono conservati per il tempo strettamente necessario al perseguimento delle finalità del trattamento (nel rispetto del principio di necessità e finalità del trattamento) legati all'elaborazione della tesi di Dottorato e pubblicazioni previste, e pertanto saranno cancellati al termine del progetto. Le audio delle interviste registrati saranno eliminate al completamento delle operazioni di trascrizione dei contenuti relative per i obiettivi della ricerca. I dati raccolti e trattati tramite le trascrizioni delle interviste effettuate possono essere conservati per 18 mesi in forma pseudonimizzata per finalità di ricerca scientifica e/o per finalità statistiche anche oltre il periodo necessario per il raggiungimento degli scopi per i quali sono stati raccolti o successivamente trattati, in conformità all'art.5, §1 lett. e) e dell'art.89 del Regolamento. UE in materia di trattamento dei dati personali 2016/679 (GDPR).	

UNIVERSITÀ
DI TORINO

MISURE DI SICUREZZA TECNICHE:	*Procedure operative di sicurezza informatica indicate e addottate da SIPE e consultabili nella Sezione Intranet ad oggetto "sicurezza Informatica", pseudonimizzazione, anonimizzazione e eliminazione dei tutti dati sensibili*
MISURE DI SICUREZZA ORGANIZZATIVE:	*Designazione autorizzati, istruzioni, informazione e formazione, accesso controllato, procedura modifica credenziali.*

Firma



	intervistata saranno eliminati. Le interviste trascritte e anonimizzate saranno utilizzate nella ricerca e condivise con le tutor del progetto. I dati raccolti durante le interviste saranno condivise con le supervisor esclusivamente in modo come informazioni anonimizzate. I dati personali identificativi e di contatto (e-mail) sono conservati per il tempo strettamente necessario al perseguimento delle finalità del trattamento (nel rispetto del principio di necessità e finalità del trattamento) legati all'elaborazione della tesi di Dottorato e pubblicazioni previste, e pertanto saranno cancellati al termine del progetto. Le audio delle interviste registrate saranno eliminate al completamento delle operazioni di trascrizione dei contenuti relative per gli obiettivi della ricerca. I dati raccolti e trattati tramite le trascrizioni delle interviste effettuate possono essere conservati in forma pseudonimizzata per finalità di ricerca scientifica e/o per finalità statistiche anche oltre il periodo necessario per il raggiungimento degli scopi per i quali sono stati raccolti o successivamente trattati, in conformità all'art.5, §1 lett. e) e dell'art.89 del Regolamento UE in materia di trattamento dei dati personali 2016/679 (GDPR). La tesi di Dottorato verrà conservata nell'archivio dell'Università di Torino per tempo illimitato.
	- dati anagrafici età (nome cognome, range di età: 18-26; 27-34, 35-55); - paese dove si svolge l'intervista; - registrazione della voce; - dati di contatto (e-mail);

Il soggetto autorizzato (ex incaricato ai sensi del D. Lgs. 196/2003) agisce sotto la diretta autorità del Responsabile interno ed è tenuto a eseguire i trattamenti nel rispetto:

1. dei principi di liceità, correttezza, trasparenza, limitazione delle finalità, minimizzazione dei dati, esattezza, limitazione della conservazione, integrità e riservatezza, sicurezza, come previsto dall'art. 5 del GDPR;
2. del codice Etico della Comunità universitaria;
3. del Codice di Comportamento dei dipendenti pubblici;

UNIVERSITÀ DEGLI STUDI DI TORINO

Dipartimento di Filosofia e Scienze dell'Educazione

Al Direttore del Dipartimento, prof. Graziano Lingua

Prot. N.

Oggetto: Autorizzazione ed istruzione per lo svolgimento di attività connesse alla redazione della tesi dottorale dal titolo provvisorio "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale" nel rispetto della normativa di protezione dei dati personali

Il Direttore del Dipartimento di Filosofia e Scienze dell'Educazione, in qualità di responsabile interno al trattamento di dati personali, ai sensi del "*Regolamento in materia di protezione dei dati personali in attuazione del Regolamento UE 2016/679 del Parlamento Europeo e del Consiglio*", Università degli studi di Torino, emanato con Decreto Rettorale n. 870 del 04/03/2019, su richiesta della tutor del progetto, Prof. Massimo Leone, ai sensi del "*Regolamento in materia di protezione dei dati personali in attuazione del Regolamento UE 2016/679 del Parlamento Europeo e del Consiglio*", (emanato con Decreto Rettorale n. 870 del 04/03/2019)

autorizza

la dottoranda Daria Arkhipova, al **trattamento di dati** personali, sotto la propria responsabilità e nell'ambito del proprio assetto organizzativo, secondo quanto previsto dall'**art. 4, p.10, dall'art 29 del Regolamento Europeo Generale sulla protezione dei dati personali (Regolamento (UE) 2016/679 (di seguito GDPR),** dal Codice in materia di protezione dei dati personali(D. Lgs. 196 del 2003) come novellato dal D. Lgs. 10 agosto 2018, n. 101(di seguito Codice) e dall'art. 13 del Regolamento interno in materia di protezione dei dati personali in attuazione del Regolamento UE 2016/679 del Parlamento Europeo e del Consiglio, D.R. 870 del 04.03.2019.

La dottoranda autorizzata opera sotto la supervisione e il coordinamento del tutor assegnato, che ha compiti didattici, in collaborazione con i co-tutor, il prof. Talis Bachmann (University of Tartu) e il prof. Kalevi Kull (University of Tartu), nonché sotto la vigilanza del responsabile interno del trattamento (ai sensi dell'art. 11 del D.R. 870 del 2019) che sovrintende alla protezione dei dati personali in relazione alle attività di trattamento afferenti alla struttura da lui diretta. I soggetti autorizzati sono tenuti a seguire le istruzioni organizzative e tecniche concordate con la tutor per lo svolgimento delle attività che possono avere un impatto rispetto al trattamento di dati personali. A tal fine, il Dipartimento mette a disposizione della dottoranda autorizzata gli strumenti tecnici ed i locali per svolgere le attività finanziate all'elaborazione della tesi, connesse alle operazioni di trattamento di dati personali e a tal fine dà indicazione sulle misure tecniche ed organizzative adeguate a garantire la sicurezza dei dati raccolti.

La nomina è effettuata in relazione a tutte le operazioni di trattamento dei dati, connesse alle attività di ricerca, nell'ambito dei compiti assegnati all'interno della struttura di appartenenza.

Progetto del Dottorato con il titolo "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale", approvato dal Comitato Bioetico dell'ateneo, Prot. n. 0242950 del 09/05/2023 - [UOR: SI000045 - Classif. III/14]	Le interviste con i soggetti nell'ambito dell'uso di social media, attivo o passivo, saranno svolte in presenza oppure attraverso la piattaforma Webex account istituzionale della dottoranda). Tutti i dati raccolti durante la ricerca, durante le interviste semi-strutturate (registrazione dell'audio) saranno preservati sul cloud di unito (account istituzionale della dottoranda) pseudonimizzate sotto il codice univoco e solo fino transizione nella forma del testo. Durante la trascrizione tutti i dati che possono indicare la persona

4. delle "Regole deontologiche per trattamenti a fini statistici o di ricerca scientifica" (G.U. del 14 gennaio 2019, n. 11) e Provvedimento recante le prescrizioni relative al trattamento di categorie particolari di dati, ai sensi dell'art. 21, comma 1 del D. Lgs. 10 agosto 2018, n. 101 *(Pubblicato sulla Gazzetta Ufficiale Serie Generale n. 176 del 29 luglio 2019)*
5. delle policy in materia di sicurezza informatica e di organizzazione e in generale in materia di trattamento e protezione dei dati personali adottate dall'Università degli Studi di Torino;
6. dei Provvedimenti generali dell'Autorità Garante nazionale in materia di trattamento dati.

In qualità di autorizzato al trattamento, Lei è tenuto ad attenersi scrupolosamente alle istruzioni di seguito fornite, che costituiscono parte integrante della presente lettera di nomina, alle istruzioni, anche in materia di sicurezza informatica, contenute nei documenti riferiti all'organizzazione dell'Università degli Studi di Torino (ad es. regolamenti e manuali operativi), nonché alle istruzioni che Le saranno eventualmente impartite in seguito dal Titolare e/o dal responsabile interno del trattamento. Le ricordiamo, infine, che il mancato rispetto di tali istruzioni potrà comportare la violazione degli obblighi previsti dal disposto normativo sul trattamento dati personali ed esporre l'ente a rischi sul piano delle responsabilità e delle sanzioni a livello civile, amministrativo, penale.

Definizioni (art. 4 del Codice e art. 4 del GDPR)
"Dato Personale": qualsiasi informazione riguardante una persona fisica identificata o identificabile («Interessato»); si considera identificabile la persona fisica che può essere identificata, direttamente o indirettamente, con particolare riferimento a un identificativo come il nome, un numero di identificazione, dati relativi all'ubicazione, un identificativo online o a uno o più elementi caratteristici della sua identità fisica, fisiologica, genetica, psichica, economica, culturale o sociale;

"Dati Particolari (ex cd. sensibili secondo la precedente normativa in materia)": i dati personali idonei a rivelare l'origine razziale ed etnica, le convinzioni religiose, filosofiche o di altro genere, le opinioni politiche, l'adesione a partiti, sindacati, associazioni od organizzazioni a carattere religioso, filosofico, politico o sindacale, nonché i dati personali idonei a rivelare lo stato di salute e la vita sessuale e i dati genetici e biometrici utilizzati al fine di identificare in modo univoco una persona fisica;

"Dati giudiziari": dati personali idonei a rivelare provvedimenti in materia di casellario giudiziale, di anagrafe delle sanzioni amministrative dipendenti da reato e dei relativi carichi pendenti o la qualità di imputato o di indagato;

"Trattamento": qualsiasi operazione o insieme di operazioni, compiute con o senza l'ausilio di processi automatizzati e applicate a dati personali o insiemi di dati personali, come la raccolta, la registrazione, l'organizzazione, la strutturazione, la conservazione, l'adattamento o la modifica, l'estrazione, la consultazione ,l'uso, la comunicazione mediante trasmissione, diffusione o qualsiasi altra forma di messa a disposizione, il raffronto o l'interconnessione, la limitazione, la cancellazione o la distruzione;

"Violazione dei dati personali": la violazione di sicurezza che comporta accidentalmente o in modo illecito la distruzione, la perdita, la modifica, la divulgazione non autorizzata o l'accesso ai dati personali trasmessi, conservati o comunque trattati.

Istruzioni

In ottemperanza a quanto previsto dal c.d. Codice Privacy, dal GDPR e dal Regolamento interno di Ateneo in materia di protezione dei dati personali, dovrà attenersi alle regole relative alla tutela dei dati e delle informazioni, sia in termini di sicurezza, sia in materia di riservatezza.

In particolare, in qualità di soggetto autorizzato al trattamento dei dati di cui viene a conoscenza Lei è tenuto a:

1. Presupposti

- operare in modo lecito e secondo correttezza;
- trattare i dati personali, in formato sia elettronico che cartaceo, ai quali Lei ha legittimo accesso, ai fini della realizzazione del progetto di ricerca, nel corretto svolgimento del rapporto di lavoro e dell'attività di studio, in ogni caso, per scopi determinati, espliciti, compatibili con gli obblighi di riservatezza, utilizzando gli strumenti indicati o messi a disposizione dall'Università;
- trattare i dati personali, di categorie particolari ex art. 9 del GDPR e i dati giudiziari ex art. 10 del GDPR, contenuti in elenchi, registri o banche dati e utilizzati con l'ausilio di mezzi elettronici o comunque automatizzati, ove possibile attraverso tecniche di cifratura e di pseudonimizzazione o mediante l'applicazione di codici identificativi e di altri sistemi di sicurezza;
- nel trattamento di dati relativi alla salute, osservare le regole di riservatezza e di sicurezza cui sono tenuti gli esercenti le professioni sanitarie ovvero le regole di riservatezza e sicurezza comparabili;
- svolgere l'attività di ricerca sulla base di un progetto redatto conformemente agli standard metodologici del pertinente settore disciplinare, anche al fine di documentare che il trattamento sia effettuato per idonei ed effettivi scopi statistici e/o scientifici;
- verificare, ove possibile, che i dati siano esatti e se necessario aggiornarli;
- raccogliere e trattare i dati unicamente per gli scopi inerenti l'attività svolta.

2. Informazioni agli interessati

- consegnare agli interessati, eventualmente al momento della raccolta dei dati, se rientra negli impegni assunti (in base alla posizione soggettiva), dal Titolare – Università degli Studi di Torino, il modulo contenente l'informativa di cui all'art. 13 del GDPR, dal Titolare o dal Responsabile del trattamento;
- aggiornare le informative privacy ai sensi degli artt. 13 e 14 del GDPR relative a ciascun trattamento dati connesso al progetto di ricerca. A titolo esemplificativo e non esaustivo, informativa di: bandi e concorsi, eventi/progetti tematici, videosorveglianza (informativa semplificata), somministrazioni questionari, etc.

3. Misure di sicurezza tecniche

- trattare, custodire e controllare i dati personali, i dati a categoria particolare, mediante l'adozione delle misure di sicurezza disposte dal Titolare e/o dal Responsabile del trattamento, al fine di evitare la distruzione, la perdita o l'accesso non autorizzato da parte di terzi, in relazione alle diverse classifiche operative;
- osservare scrupolosamente gli obblighi relativi alla riservatezza sia in ordine al trattamento di dati personali, sia in ordine alla custodia delle credenziali di autenticazione a Lei attribuite per lo svolgimento dell'attività di ricerca;
- non comunicare a terzi e non diffondere, con o senza strumenti elettronici, le notizie, le password, le informazioni o i dati appresi in relazione a fatti e circostanze di cui sia venuto a conoscenza in qualità di soggetto autorizzato;
- osservare scrupolosamente il divieto di pubblicare su piattaforme web non autorizzate o in altro luogo accessibile da un pubblico definito o indefinito – foto, video e/o ogni altro dato in cui siano riconoscibili i soggetti interessati al trattamento;
- osservare le misure adottate dal Titolare e dal Responsabile interno al trattamento dati, al fine di garantire il rispetto delle citate regole deontologiche, nonché della normativa in materia di protezione dei dati personali;
- custodire con diligenza la/le propria/e credenziale/i di autenticazione e altre eventuali credenziali di accesso a sistemi informatici, software, banche dati e astenersi dal comunicare a terzi (anche se colleghi o comunque appartenenti alla struttura non coinvolti nel progetto di ricerca) in qualsiasi forma, le stesse, necessarie per effettuare il trattamento dei Dati Personali relativi all'attività di ricerca;
- modificare, con scadenza periodica le proprie password relative alle credenziali assegnate, secondo le policy di sicurezza informatica di Ateneo.

4. Misure di sicurezza organizzative

- supportare, nei limiti delle rispettive competenze funzionali, il responsabile gerarchico, il responsabile scientifico del progetto di ricerca e nei limiti dello svolgimento delle attività di studio e di ricerca, i Referenti privacy della Struttura di Riferimento, per quanto riguarda le attività concernenti il censimento di nuovi trattamenti o di trattamenti già in essere e l'aggiornamento del registro dei trattamenti, in attuazione delle istruzioni ivi contenute connesse all'attività di ricerca;
- comunicare preventivamente, ossia prima dell'avvio, al responsabile scientifico del progetto di ricerca, al Referente privacy e/o al Responsabile interno, l'attivazione di un nuovo trattamento, dandone notizia al Responsabile della protezione dati (RPD) nei casi di trattamenti più complessi;
- segnalare al proprio responsabile gerarchico, al responsabile scientifico del progetto di ricerca e eventualmente al Referente Privacy della Struttura di assegnazione, situazioni di rischio per la sicurezza dei dati di cui sia venuto a conoscenza (es. la violazione della password, il tentativo di accesso non autorizzato ai sistemi), anche quando riguardino le attività di soggetti autorizzati all'accesso, da partners esterni: la Sua collaborazione potrebbe essere fondamentale al fine di colmare eventuali lacune nei sistemi di sicurezza e nelle procedure relative alla tutela dei dati personali;
- passare le consegne relative alle attività di studio e di ricerca ad altro soggetto, in modo preciso, dettagliato e documentato nel caso di trasferimento dell'attività svolta;
- seguire corsi di formazione in materia di protezione dei dati personali, obbligatori alla luce delle nuove disposizioni del GDPR e sostenere i relativi test di valutazione finalizzati alla verifica dell'apprendimento;
- consultare la Sezione Privacy presente sulla Rete Intranet di Ateneo;
- in caso di ispezioni da parte dell'Autorità Garante, della polizia Postale e della Guardia di Finanza, qualora si verifichi un intervento immediato a sorpresa o si abbia conoscenza della notizia di ispezione, avvisare tempestivamente il proprio responsabile gerarchico e il Referente Privacy della Struttura di assegnazione, al fine di informare ed attivare la filiera dei soggetti responsabili e offrire la massima collaborazione nelle attività ispettive, fornendo la documentazione richiesta e ogni altra informazione utile di cui si abbia legittimamente cognizione.
- collaborare con l'Amministratore di Sistema se nominato e se coinvolto nell'attività di ricerca.

5. Data Breach e registro delle attività di trattamento

- informare in modo tempestivo secondo la procedura Data breach di Ateneo, consultabile nella sezione privacy e sicurezza informatica, il proprio Responsabile di Sezione / Responsabile di Staff / Responsabile di Area / Direttore di Direzione, Dipartimento o Centro, in base all'ufficio/struttura di afferenza e il Referente Privacy della Struttura di assegnazione, qualora si verifichi una violazione dei dati trattati (anomalie, furti, distruzione, divulgazione/accessi non autorizzati, perdite accidentali di dati) al fine di attivare la procedura del Data Breach che prevede la notifica all'Autorità Garante entro 72 ore nei casi in cui la violazione comporti gravi rischi per i diritti e le libertà delle persone fisiche (artt. 33 e 34 del GDPR);.

Gli obblighi relativi alla riservatezza, alla comunicazione e alla diffusione dovranno essere da Lei scrupolosamente osservati anche in seguito all'eventuale cessazione del rapporto di lavoro attualmente in essere con l'Università.

Si precisa che gli obblighi sopra descritti rientrano nell'ambito della prestazione lavorativa e non comportano alcuna modifica della qualifica professionale o delle mansioni assegnate; sono dovuti in ottemperanza alle predette istruzioni senza determinare alcuna remunerazione aggiuntiva e la loro violazione può comportare l'applicazione di sanzioni.

L'accettazione della presente nomina costituisce altresì una dichiarazione di impegno a conformarsi alle recenti Regole deontologiche per trattamenti a fini statistici o di ricerca scientifica del 19 dicembre 2018, pubblicate ai sensi dell'art. 20, comma 4, del d.lgs. 10 agosto 2018, n. 101 (doc. web n. 9069637).

Il soggetto autorizzato è informato ed è consapevole che l'accesso, la permanenza nei sistemi informatici universitari per ragioni estranee e comunque diverse rispetto a quelle per le quali sono stati abilitati, configura il reato di accesso abusivo ai sistemi informatici, esponendo l'amministrazione a danni reputazionali, e il soggetto responsabile a sanzioni di carattere penale, amministrativo.

UNIVERSITÀ DEGLI STUDI DI TORINO
Dipartimento di Filosofia e Scienze dell'Educazione

Data e luogo: Torino, 30.05.2023

Il Responsabile interno del trattamento dei dati, prof. Graziano Lingua

Firma per accettazione

Il Responsabile scientifico del progetto di ricerca, prof. Massimo Leone

Firma per accettazione

UNIVERSITÀ
DI TORINO

Dipartimento di Filosofia e Scienze dell'Educazione

Informativa sul trattamento dei dati personali ai sensi degli artt. 13 e 14 del Regolamento 2016/679/UE

30.05.2023

a) Titolare del trattamento e dati di contatto

Il Titolare del Trattamento dei dati è l'Università di Torino, in persona del legale rappresentante pro-tempore il Magnifico Rettore) con sede legale in Via Verdi 8 – 10124 Torino (dati di contatto: indirizzo pec: ateneo@pec.unito.it - indirizzo mail: rettore@unito.it: telefono 011 6706111).

b) Dati di contatto del Responsabile della protezione dei dati personali

Il Responsabile della protezione dei dati personali – RPD, nella versione anglosassone Data Protection Officer – DPO, può essere contattato al seguente indirizzo mail rpd@unito.it.

c) Finalità del trattamento e base giuridica

L'Università di Torino è un'istituzione pubblica di alta cultura insignita di compiti aventi **finalità istituzionali di istruzione superiore e di ricerca** (art. 1 dello Statuto dell'Università di Torino), in attuazione dell'art. 33 della Costituzione.
L'Università di Torino tratterà i dati personali per la finalità istituzionale di ricerca nell'ambito del Progetto di dottorato "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale"

L'Università di Torino effettua il trattamento dei dati personali per l'esecuzione di un compito di interesse pubblico o connesso all'esercizio di pubblici poteri ai sensi dell'art. 6 par. 1 lett. e) del Regolamento UE n. 2016/679. La base giuridica, ai sensi dell'art. 2 ter del D. Lgs. n. 101 del 2018, è costituita dalla Legge n. 168/1989 e s.m.i., dalla Legge 240/2010 e s.m.i

Il progetto di ricerca si pone l'obiettivo di comprendere come l'utilizzo dell'intelligenza artificiale influenzi l'esperienza dell'utente su piattaforme digitali come i Social media. L'obiettivo di questa ricerca è identificare i modelli di comunicazione mediata da piattaforme ad intelligenza artificiale e le raccomandazioni dell'Intelligenza Artificiale attraverso esperienze personali dei suoi utenti.
Il progetto rispetta le disposizioni di cui all'art. 6 delle Regole deontologiche per trattamenti a fini statistici o di ricerca scientifica.
La ricerca è effettuata sulla base di un progetto redatto conformemente agli standard metodologici del pertinente settore disciplinare, anche al fine di documentare che il trattamento di dati personali sia effettuato per idonei ed effettivi scopi statistici o scientifici.

d) Tipi di dati trattati

I dati personali raccolti e trattati dal Titolare per le finalità sopra indicate sono i seguenti:
- dati anagrafici di età (nome cognome, range di età: 18-26; 27-34, 35-55);
- paese dove si svolge l'intervista;
- registrazione della voce;
- dati di contatto (e-mail);

e) **Conferimento dei dati**

L'adesione alla ricerca è libera e volontaria, la mancata partecipazione non comporta alcuna conseguenza per l'interessato.

La partecipazione al progetto da parte dell'interessato implica il conferimento dei dati personali richiesti come descritto nel paragrafo d) della presente informativa. Il mancato conferimento dei dati e la mancata adesione al progetto di ricerca, non consentirà la realizzazione del progetto stesso e gli adempimenti conseguenti.

f) **Modalità del Trattamento**

Il trattamento dei dati personali avverrà mediante strumenti telematici comunque idonei a garantire la sicurezza e la riservatezza dei dati stessi.

Per il raggiungimento delle finalità sopra riportate, i dati sono trattati all'interno dell'Università di Torino da soggetti autorizzati al trattamento dei dati sotto la responsabilità del Titolare, i quali sono a tal fine adeguatamente istruiti e formati.

Responsabili esterni al trattamento
I dati potrebbero essere comunicati e trattati altresì all'esterno da parte di soggetti terzi fornitori di alcuni servizi necessari all'esecuzione del trattamento, che agiscono per conto del Titolare ai soli fini della prestazione richiesta e che saranno debitamente nominati "Responsabili del trattamento" a norma dell'art. 28 del Regolamento UE 2016/679.

g) **Categorie di destinatari dei dati personali**
Il Titolare del trattamento dati pone specifica attenzione nella definizione dell'organizzazione, nell'individuazione del personale preposto alla raccolta dei dati fornendo adeguate istruzioni in merito alle modalità di svolgimento delle attività di trattamento, in modo da garantire il rispetto delle regole deontologiche e la tutela dei diritti degli interessati.
I dati personali raccolti non saranno condivisi, saranno preservati sul cloud di Università degli studi di Torino, e cancellati al termine della ricerca.
I dati raccolti durante le interviste verranno trascritti e anonimizzati, prima di essere comunicati e condivisi con i tutor.

h) **Trasferimento dati a paese terzo**

I dati personali possono essere trasferiti verso Paesi terzi rispetto all'Unione Europea, in quanto il Titolare utilizza i servizi di Google per il settore Educational. Google si avvale di infrastrutture informatiche, di apparecchiature necessarie all'interconnessione di reti ed utenti e logging centers ubicati in Stati extra UE e per tali servizi rispetta la normativa europea sul trasferimento dei dati come indicato nell'Emendamento sul trattamento dei dati, sottoscritto dall'Ateneo, in cui sono contenute le clausole contrattuali tipo (vedi https://cloud.google.com/terms/sccs/eu-c2p). Con Decisione di esecuzione (UE) 2021/914 del 4 giugno 2021 la Commissione Europea ha emanato le clausole contrattuali tipo per il trasferimento di dati personali verso paesi terzi a norma del regolamento (UE) 2016/679 del Parlamento europeo e del Consiglio.

i) **Periodo di conservazione dei dati**

I dati personali identificativi e di contatto sono conservati per il tempo strettamente necessario al perseguimento delle finalità del trattamento (nel rispetto del principio di necessità e finalità del trattamento) legati all'elaborazione della tesi di Dottorato, e pertanto saranno cancellati al termine del progetto, entro e non oltre 18 mesi dalla conclusione del progetto, fermo restando che la tesi sarà conservata nell'Archivio dell'Università di Torino per tempo illimitato.

Le audioregistrazioni delle interviste effettuate saranno eliminate al completamento delle operazioni di trascrizione dei contenuti.

I dati personali possono essere conservati per finalità di ricerca scientifica e/o per finalità statistiche anche oltre il periodo necessario per il raggiungimento degli scopi per i quali sono stati raccolti o successivamente trattati, in conformità all'art. 5, § 1 lett. e) e dell'art. 89 del Regolamento UE in materia di trattamento dei dati personali 2016/679 (GDPR)

j) **Diritti sui dati**

L'interessato può esercitare gratuitamente i diritti sui dati personali previsti dagli artt. art. 15 e ss del Regolamento UE in materia di trattamento dei dati personali 2016/679 (GDPR) ove applicabili, attraverso l'invio di una specifica istanza avente ad oggetto: "*Diritti privacy"* all'indirizzo e-mail: direzione.scuoladottorato@unito.it e per conoscenza al Responsabile scientifico del progetto.

k) **Reclamo**

L'interessato ha diritto di proporre reclamo all'autorità di controllo e può rivolgersi all'Autorità Garante per la protezione dei dati personali: https://www.garanteprivacy.it/.

l) **Profilazione**

Il Titolare del trattamento dei dati personali non utilizza processi automatizzati finalizzati alla profilazione.

Daria Arkhipova
Department of Philosophy and Educational Sciences,
Università degli Studi di Torino, Italia
Department of Semiotics,
University of Tartu, Estonia
mail:daria.arkhipova@unito.it
mob: 0039 348 3120757

Dear Interviewee,

My name is Daria Arkhipova, a PhD student at University of Turin (Italy) and University of Tartu (Estonia). My research aims to prepare an analysis of how Artificial Intelligence (later AI) recommendations can influence the decision-making process.
Today, we are having a meeting about your personal experience of interactions on Social Media which uses an AI recommendations algorithm to optimise users' experience. I am looking for your personal experiences on the Social Media you use and other connected interactions. All your opinions and practices related to Social Media use are important for this research. I will ask you a few questions, and it should not take more than 30-40 min of your time. I am kindly asking for your consent to record our conversation in order not to lose anything from our conversation. All the registered and transcribed data will be stored separately from your identity with respect to your privacy according to national and international regulations. Therefore your name would not be associated with the data collected during this research. You can always ask me to stop recording whenever you feel like you prefer something that remains private. The data collected during our interview would be used only for research purposes. I can provide you with a draft copy of our interview so that you may review the contents. You have the right to withdraw even after receiving the transcript. Your personal experiences in Social Media use based on AI recommendations would help to improve the research. Do I have your permission to record our interview?

Sincerely,
Daria Arkhipova

- ☐ I have read this document and understand what is required of me. I give permission to record this interview and store the password-protected file. I agree that an anonymised transcript of my interview can be stored in the Open Access database and used for this research. I freely consent to participate.
- ☐ I give permission to process my data according to General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR'))
- ☐ Please, tick here if you agree that anonymous quotes from your interview can be used
- ☐ Please, tick here if you wish to see a transcript of the interview
- ☐ Please, tick here if you wish to be contacted once the work is done and if you wish to receive the final report of my findings

Date, _____

Name of Interviewee signed

Name of Interviewer signed

Consent form (Version for interviewees in Estonia)

Kuidas mõjutavad tehisintellektipõhised soovitussüsteemid inimese otsuseid: semiootiline käsitlus

Daria Arkhipova
Department of Philosophy and Educational Sciences,
Università degli Studi di Torino, Italia
Department of Semiotics,
University of Tartu,
Estonia mail:
daria.arkhipova@unito.it
mob: 0039 348 3120757

Dear Interviewee,
My name is Daria Arkhipova, a research student at University of Turin (Italy)* and University of Tartu (Estonia). The purpose of my research is to prepare an analysis of how Artificial Intelligence (later AI) recommendations can influence the decision-making process.
Today, we are having a meeting about your personal experience of interactions on social media which uses an AIRS algorithm to optimise users' experience. I am looking for your personal experiences on the social media you use and other interactions connected to it. All your opinions and practices related to social media use are important for this research.
I will ask you a few questions and it would not take more than 30-40 min of your time. I am kindly asking for your consent to record our conversation in order not to lose anything from our conversation. All the recorded and transcribed data will be stored separately from your identity with respect to your privacy according to national and international regulations. Therefore your name would not be associated with the data collected during this research. You can always ask me to stop recording whenever you feel like you prefer something that remains private.
The data collected during our interview would be used only for research purposes. I can provide you with a draft copy of our interview so that you may review the contents. You have the right to withdraw even after receiving the transcript.
Your personal experiences in social media use based on AIRS would help to improve the research. Do I have your permission to record our interview?

Sincerely,
Daria Arkhipova

☐ I have read this document and understand what is required of me. I give permission to record this interview and store the password-protected file. I agree that an anonymised transcript of my interview can be stored in the Open Access database and used for this research. I freely consent to participate.

- ☐ I give permission to process my data according to the General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR'))
- ☐ Please, tick here if you agree that anonymous quotes from your interview can be used
- ☐ Please, tick here if you wish to see a transcript of the interview
- ☐ Please, tick here if you wish to be contacted once the work is done and if you wish to receive the final report of my findings

*All procedures developed and performed in the study are following the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards to the ethical code of the Italian Psychology Association (https://www.dsu.univr.it/documenti/Avviso/all/all636315.pdf) and the General Data Protection Regulation (Regulation (EU) 2016/679) ('GDPR')).

The research project was approved by the University of Turin (Turin, Italy) Prot. n. 0242950 del 09/05/2023 - [UOR: SI000045 - Classif. III/14].

Date, _____

Name of Interviewee signed
Name of interviewer signed

Appendix II

Example of an interview, translation and analysis, link to database of fieldwork

The process of data collection, data transcription and data analysis step by step.

0. Recruitment process is described in Chapter Five.

1. First steps. Meeting with a volunteer interviewee participant is a comfortable and private space, preferably chosen by a respondent. After the presentation of the Consent form and verbal description of all the parts of it, it is signed and a copy is immediately granted to a volunteer interviewee participant. In case the meeting takes place in a cafè or at the researcher's home, a volunteer interviewee participant is offered drinks and food to break the ice and make them feel more comfortable.

2. Interview and recording. Only after a volunteer interviewee participant verbally consent that their voice and interview can be recorded the recording begins. During the interview, the researcher follows the developed methodology for semi-structured interviews.

3. Interview recording is safely stored under a code name and password protected on University of Turin cloud until the transcription process.

4. Transcription process.
First, All interviews are transcribed word-to-word accurately
[the copy is available only to the researcher to protect privacy of volunteers]

Second, All sensitive or potentially identity-revealing information is removed
[Example of an interview and translation with a volunteer interviewee participant 3-1826-it in the original language, see Figure 1]

Third, Interview transcription is translated to English language, if needed
[Example of an interview and translation with a volunteer interviewee participant 3-1826-it translated to English, see Figure 2]

5. Data organisation. From an interview selected the relevant data to be placed in the comparative table that later is used as data set for this research.
[See Figure 2 and Data repository entry for research "How AIRS influence decision-making process"]

Figure 1.
Example of an interview and translation with a volunteer interviewee participant 3-1826-it in the original language (mother tongue) to an interviewee
**** - stars replace the information that was removed as sensitive or possibly identity revealing.

00:00:02 Daria
Preferisci fare in italiano o in inglese?
00:00:12 Interviewee 3-1826-it
Come preferisci? Se vuoi chiedermi le cose in inglese.
00:00:23 Interviewee 3-1826-it
Io sto bene l'inglese, ma potrebbe darsi che ci siano dei filtri

00:00:32 Interviewee 3-1826-it
Ma se vuoi farmi le domande in inglese
00:00:35 Interviewee 3-1826-it
Fammele pure in inglese
00:00:37 Daria
Ma provo a fare in italiano allora?
00:00:38 Interviewee 3-1826-it
In italiano che facciamo tutto in italiano?
00:00:42 Daria
Puoi raccontarmi un po
00:00:43 Daria
quando hai avuto primo computer, primo cellulare, cosa facevi con questi device?
00:00:55 Interviewee 3-1826-it
Innanzitutto la cosa che mio ****** fa ********** per lavoro, quindi ha sempre avuto le tecnologie dell'ultimo modello in giro per casa, che è stata una delle prime persone in Italia ad avere un cellulare
00:01:11 Interviewee 3-1826-it
Ehm. E quindi praticamente da quando ho memoria io ho un pc portatile o comunque un pc, quindi non ricordo nemmeno quando ho iniziato ad andare su Internet, ma è una cosa che risale praticamente ai miei primi anni di vita, non cioè da quando Internet esiste in Italia
00:01:31 Interviewee 3-1826-it
Io ci sono, ci sono stato sopra. Ecco come dire
00:01:36 Interviewee 3-1826-it
Per quanto riguarda
00:01:37 Interviewee 3-1826-it
Il telefono invece ho avuto uno smartphone 12 anni, più o meno a 12 anni
00:01:44 Interviewee 3-1826-it
Che è relativamente tardi per la mia generazione, nel senso che
00:01:49 Interviewee 3-1826-it
Molti miei coetanei c'erano avuto l'anno prima e io ho passato un anno da isolata sociale perché non avevo il Cellulare
00:01:56 Interviewee 3-1826-it
e non avevo modo per contattare i miei amici che invece si chattava tutti su Whatsapp
00:02:03 Interviewee 3-1826-it
E quindi ho avuto una fase intorno agli 11 anni in cui ho avuto un telefono di quelli coi tasti grossi che non è
00:02:09 Interviewee 3-1826-it
Uno smartphone, ma soltanto quelli
00:02:11 Interviewee 3-1826-it
la tastiera e poi l'anno dopo ho avuto veramente uno smartphone dare proprio piccolino, grosso così
00:02:20 Interviewee 3-1826-it
Che aveva pochissima memoria, usavo per Whatsapp, Facebook e qualunque altro tipo di social non c'è l'ho avuto fino a credo due anni fa, perché si più o meno poi tre anni fa
00:02:36 Interviewee 3-1826-it
Un po i miei mi hanno impedito di non registrarmi su qualunque social, praticamente finché non sono stata adolescente e poi al liceo avrei potuto farlo, ma non mi piaceva, cioè non mi piaceva l'ambiente. Instagram tutt'ora
00:02:52 Interviewee 3-1826-it
Non c'è l'ho
00:02:53 Interviewee 3-1826-it
Però non come dire guardavo i miei coetanei sprecare tipo metà della giornata cazzeggiando sui social. Non lo so, credo non mi ispirasse, non mi ispirasse l'idea di fare la stessa cosa. Ho sempre usato molto Youtube invece
00:03:13 Interviewee 3-1826-it
Questo più o meno da quando, anche prima di avere un telefono, in realtà praticamente da da, quando cioè da quando ho iniziato le scuole medie
00:03:21 Interviewee 3-1826-it
Quindi più o meno 11 anni?
00:03:23 Interviewee 3-1826-it
E più o meno finisce qui
00:03:30 Interviewee 3-1826-it
Nel senso ho Twitter adesso e ho Facebook
00:03:34 Interviewee 3-1826-it
E ho Twitter da più tempo di quanto io abbia Facebook ed è anche più interessante. Ci passo più tempo o Facebook, soprattutto per tenermi in contatto con persone o dell'età dei miei genitori
00:03:48 Interviewee 3-1826-it
Oppure contatti di lavoro per la ricerca, insomma, lo uso come come qualcuno userebbe linkedin, ecco
00:03:59 Daria
Tu hai linkedin o Pinterest?
00:04:04 Interviewee 3-1826-it
Ho LinkedIn che non uso mai perché non ho un curriculum che vale la pena di vedere
00:04:09 Interviewee 3-1826-it

Ehm ho Pinterest, ma anche lì lo uso per ispirazioni fotografiche. Sono un utente dei social molto passivo, cioè posto molto poco e guardo molta roba degli altri
00:04:25 Interviewee 3-1826-it
Addirittura metto pochi mi piace metto pochi, cioè non è una cosa che non mi piace lasciare troppe tracce online, però noto che è una cosa che mi si è
00:04:34 Interviewee 3-1826-it
Ritorta contro, perché non avendo Instagram, le persone cercano di ricostruire chi
00:04:40 Interviewee 3-1826-it
Sono quando gli dico, cioè quando ci conosciamo e quindi mi cercano su Google e se mi cerchi su Google trovi molte più informazioni di quante ne troveresti
00:04:49 Interviewee 3-1826-it
Avendo il mio profilo Instagram per dire perché ci sono tante cose che ho fatto, che hanno lasciato una traccia online, diciamo indipendentemente dalla mia volontà
00:04:58 Interviewee 3-1826-it
C'è un mio video di *** ****, non so se hai presente cos'è su Youtube
00:05:04 Interviewee 3-1826-it
Eh? E poi ci sono articoli e cose varie che mi nominano, quindi finisce che alla fine ci sono più tracce di me sparse per la rete che non sui social
00:05:16 Interviewee 3-1826-it
C'è stato guardia, i miei profili social non scopri niente di me
00:05:20 Daria
Fantastico, su cosa hai fatto ******* su YouTube?
00:05:22 Interviewee 3-1826-it
Sui diritti LGBT.
00:05:26 Interviewee 3-1826-it
E, Eh, ma è in realtà l'ho fatto per praticamente. C'è stato un corso **********, un corso di public speaking che finiva con la possibilità di
00:05:43 Interviewee 3-1826-it
Dare questo ******* davanti a tutti che poi sarebbe stato registrato e postato su Youtube, infatti, cioè su Youtube
00:05:52 Interviewee 3-1826-it
E no, è stata una bellissima esperienza, avevo 17 anni, quindi già un po di tempo fa però
00:05:59 Interviewee 3-1826-it
Una cosa molto interessante mi è piaciuto molto
00:06:04 Interviewee 3-1826-it
E questo è praticamente l'unica cosa che le persone
00:06:07 Interviewee 3-1826-it
Trovano di me quando
00:06:07 Interviewee 3-1826-it
Mi cercano online
00:06:09 Interviewee 3-1826-it
Quindi si fanno sempre un'idea stranissima
00:06:12 Interviewee 3-1826-it
Quello che so
00:06:15 Daria
Perché è stranissimo?
00:06:19 Interviewee 3-1826-it
Imagina di non sapere niente di qualcuno e non sapere neanche che puoi fare un ******** anche senza
00:06:25 Interviewee 3-1826-it
qualcuno importante, cioè?
00:06:29 Interviewee 3-1826-it
Però, cioè cerchi cerchi questa persona che hai appena conosciuto su Internet e scopri che ha questo video che presenta in inglese mi è capitato di avere un'interazione con ragazzi che avevo appena conosciuto, che
00:06:46 Interviewee 3-1826-it
Che fondamentalmente mi avevano già cercata su Internet perché avremmo condiviso il dormitorio
00:06:55 Interviewee 3-1826-it
E erano praticamente terrorizzate all'idea di conoscermi, perché si aspettavano che fossi chissà quale genio, celebrità incredibile perché avevo fatto questa cosa
00:07:05 Interviewee 3-1826-it
Quindi un biglietto da visita, un
00:07:06 Interviewee 3-1826-it
Po strano in qualche modo
00:07:08 Daria
Ma tu come ti senti rispetto a queste rappresentazioni di te online?
00:07:12 Interviewee 3-1826-it
Ma mi mette molto a disagio l'idea che le persone possano ricostruire aspetti importanti della mia vita da cose che io lascio in giro
00:07:24 Interviewee 3-1826-it

Però in qualche misura è inevitabile, quindi lo lascio succedere. Diciamo che non.... preferisco cercare di mantenere la mia privacy il più possibile. Una cosa a cui do molto valore. E quindi uso pseudonimi online, spesso e oppure
00:07:49 Interviewee 3-1826-it
Interagisco molto poco se esprimo le mie idee sono ah, ecco un social che ho che che è un social ma è una cosa un po strana che si chiama, si chiama Quora
00:08:00 Interviewee 3-1826-it
E questo questa specie di Yahoo Answers, ma fatto in teoria in maniera più seria si
00:08:10 Interviewee 3-1826-it
E per un periodo su Quora ho avuto una cosa, cioè praticamente quelli di di cuore per per assicurare che ci siano domande e risposte di qualità sul loro
00:08:26 Interviewee 3-1826-it
Loro social, quello che fanno e pagare della gente, ma pagare una miseria, pagare tipo 5 centesimi a domanda per chi scriva e risponda
00:08:43 Interviewee 3-1826-it
E per un periodo io ho avuto l'abilitazione a fare questa cosa, quindi postavo tantissime domande e risposte e se cerchi tuttora, probabilmente se cerchi il mio profilo di cuore è il posto in cui ci sono più cose che ho scritto. La cosa paradossale che non ho neanche scritte io per la maggior parte è che mio ****** ha deciso che era molto intelligente da scrivere queste cose
00:09:09 Interviewee 3-1826-it
E quindi se ne sa farlo lui quindi non sono veramente mie opinioni, sono le sue
00:09:16 Interviewee 3-1826-it
Però, cosa che mi ha creato dei problemi, perché avere cose che pensano altri scritti a tuo nome non è il massimo, soprattutto se appunto non apprezzo chi sappiano cosa di me sul internet
00:09:33 Interviewee 3-1826-it
Eh, ma la cosa surreale di di di cuore e che guadagni tanto tanto quanto riesci a rendere una domanda popolare, cioè tante quante persone ti rispondono? Quello è in proporzione quanto quanto guadagni e questo significa che
00:09:53 Interviewee 3-1826-it
Devi passare molto tempo della tua giornata a pensare a delle domande che all'algoritmo piaceranno
00:10:00 Interviewee 3-1826-it
E spesso sono delle domande incredibilmente stupide, quindi in qualche modo pilota anche la presentazione che tu hai di te stesso di sopra, perché se ci guadagni qualcosa che ripeto è veramente una miseria, non guadagno davvero. Cioè se raggiungi 50 € al mese è gia tanto
00:10:20 Interviewee 3-1826-it
E però questo significa che fondamentalmente la tua presenza sul social è molto pilotata, perché è decisa da quello che funziona e quindi anche lì in realtà non so veramente io, cioè?
00:10:31 Interviewee 3-1826-it
In pratica io sono molto poco sui social, però ci passo in realtà moltissimo tempo, cioè non scrivendo, ma appunto
00:10:40 Interviewee 3-1826-it
Passivamente in qualche modo
00:10:42 Daria
Tu hai mai
00:10:45 Daria
Cercato qualcuno su social e oppure qualcosa che hai visto
00:10:50 Daria
di rappresentazione di uno su social influenzato da qualche parte come tu vedi queste persone in vita reale?
00:11:08 Interviewee 3-1826-it
Sicuramente si! Però il modo in cui io conosco le persone online, di solito le persone... cioè se incontro le persone online che restano conoscenze online
00:11:19 Interviewee 3-1826-it
Quindi non li incontro mai nella vita reale, oppure
00:11:24 Interviewee 3-1826-it
Se... se sono persone che conosco nella vita reale sono persone con cui ho parlato prima di vedere il loro profilo, non so cosa e quindi ho già un'idea di loro precedente. C'è un'eccezione a questa cosa?
00:11:38 Interviewee 3-1826-it
Quando durante la pandemia io ho iniziato l'università in pieno lockdown, praticamente è quello che quello che è successo in pieno lockdown, e che il primo anno di università nessuno si conosceva
00:11:53 Interviewee 3-1826-it
E dovremmo trovare un modo per tenerci in contatto, quindi quello che abbiamo fatto è stato creare gruppi Whatsapp
00:11:59 Interviewee 3-1826-it
A go proprio
00:12:01 Interviewee 3-1826-it
Non solo, ma abbiamo creato un discorso, un server su Discord, che anche lì c'era la fiera del cazzeggio. Litigavamo sempre su questi gruppi, cioè tra l'altro sulle cose più ridicole, nel senso ci scannavano per ogni minimo. Io zia è quello, cioè l'immagine
00:12:19 Interviewee 3-1826-it

Che che mi sono fatta delle persone che ho conosciuto, così è rimasta nel senso che tutt'ora, cioè alcune persone che alcuni miei colleghi di università che conosco, ci scriviamo su Whatsapp ci scriviamo più di quanto ci parliamo nella vita reale è l'idea che loro hanno di me, è molto costruita sulla base di quello che
00:12:41 Interviewee 3-1826-it
Io manifestavo su questi gruppi. Non solo, ma la loro, cioè la loro immagine, l'immagine che io di loro è molto legata a quello che loro fanno trasparire online
00:12:44 Interviewee 3-1826-it
No, no, no…
00:12:50 Interviewee 3-1826-it
Se sono dei ******* online sì, cioè nella mia testa loro sono dei canzoni e no. E la cosa piu divertente che su Whatsapp la gente spesso non si chiama con nome e cognome. Si chiama con nomignoli strani
00:13:04 Interviewee 3-1826-it
Di queste persone, cioè, sono state salvate nella mia testa con i loro nome di Whatsapp. Ho dei colleghi che chiamo con il loro nome di Whatsapp anziché con nome e cognome e tutti sappiamo cosa ci riferiamo, perché eravamo tutti insieme su questo gruppo surreale
00:13:21 Interviewee 3-1826-it
Però, è l'unica volta che effettivamente mi è capitato di
00:13:24 Interviewee 3-1826-it
Di avere questa disconnessione tra le persone nella vita reale e le persone
00:13:31 Interviewee 3-1826-it
Fissa conosciute online
00:13:37 Interviewee 3-1826-it
C'è ancora una realtà...
00:13:43 Interviewee 3-1826-it
****
00:13:44 Interviewee 3-1826-it
Mi sono iscritt* ********** un forum
00:13:56 Interviewee 3-1826-it
A tema **********, ma sono iscritt* con uno pseudonimo. Non non c'è il
00:14:01 Interviewee 3-1826-it
Mio nome è lì, anche lì ci si conosce tutti con lo pseudonimo perché è un forum, una cosa molto anni 90 nel senso, non come dire, è una dinamica molto diversa da quella dei social attuali
00:14:16 Interviewee 3-1826-it
E quindi ci si conosce tutti per pseudonimo, nessuno è veramente interessato a sapere il tuo vero nome. Ci si quando ci si incontra di persona ci si riferisce agli uni agli altri con
00:14:25 Interviewee 3-1826-it
Il nome del Forum
00:14:27 Interviewee 3-1826-it
E quelle persone le ho conosciute di persona e devo dire che
00:14:33 Interviewee 3-1826-it
Cioè, è stato abbastanza uno shock rendersi conto che quello che succede online e che si esasperano molto le antipatie, cioè un messaggio scritto in maniera bonaria, viene distorto in qualcosa su, cioè per cui vale la pena rispondere con tono arrabbiato, mentre nelle conversazioni uno a uno non è affatto così
00:14:53 Interviewee 3-1826-it
Cioè si riesce a parlare in maniera molto più calma e spesso rendersi conto che si è d'accordo quando in realtà sia cioè si è passato il mese precedente, magari a insultarsi online
00:15:04 Daria
E pensi che questo, magari connesso da qualche parte, che quando le persone comunicano ideali abbiamo più possibilità di comunicare qualcosa perché online manca qualcosa?
00:15:08 Daria
Perché ci sono diversi tipi di personalità che si esporranno nei diversi ambienti?
00:15:26 Interviewee 3-1826-it
È un'ottima domanda
00:15:29 Interviewee 3-1826-it
Non lo so.
00:15:33 Interviewee 3-1826-it
La vulgata vuole che lo schermo filtrano, no, quindi?
00:15:39 Interviewee 3-1826-it
In qualche modo
00:15:41 Interviewee 3-1826-it
Che faccia fatica a empatizzare con persone che sono distanti e
00:15:46 Interviewee 3-1826-it
Che conosci solo la tua verso uno schermo secondo me è interessante anche l'altra cosa che hai detto?
00:15:52 Interviewee 3-1826-it
Penso effettivamente che la mia personalità cambi quando quando scrivo, quando scrivo online, sono molto, cioè una cosa che ho notato su di me, ad esempio, è che sono molto più confrontationla
00:16:03 Interviewee 3-1826-it

mi viene molto di più da dare torto alle persone, mi viene molto di più da trollare in gergon, cioè?
00:16:15 Interviewee 3-1826-it
Prendermi poco sul serio
00:16:17 Daria
Ma come lo Senti questo? Senti, Senti come un'emozione
00:16:21 Daria
oppure questo qualcosa
00:16:26 Daria
Più conscio per costruire la tua identità online?
00:16:32 Interviewee 3-1826-it
Ma penso che dipenda dalle situazioni
00:16:36 Interviewee 3-1826-it
Quello che succede
00:16:38 Interviewee 3-1826-it
Allora a volte, tipo quando scrivo sotto pseudonimo e non c'è la mia faccia, per esempio sul forum su cui sono
00:16:48 Interviewee 3-1826-it
C'è una dimensione di costruzione della mia identità, c'è sicuramente una dimensione in cui sto creando un personaggio, cioè non voglio essere io, voglio essere qualcun altro, quindi costruisco questa persona che voglio essere teso molto. Le mie parole perché il vantaggio di avere un social che è molto prescritto
00:17:05 Interviewee 3-1826-it
E che ti permette di di riflettere molto su quello che che posti no. Quindi c'è ovviamente una dimensione molto costruita. Quel mi rendo conto che una mia scelta non è universale, perché molte persone ad esempio, scrivono online possano senza neanche rileggere i messaggi, mentre io, se devo postare qualcosa, leggo e rileggo, rileggo, e peso ogni parola in modo
00:17:28 Interviewee 3-1826-it
Non sia male interpretabile
00:17:30 Daria
cosi ha molta autocensura?
00:17:32 Interviewee 3-1826-it
Si, penso di si...
00:17:50 Daria
E come funziona la autocensura? C'è qualche regole che cerchi a seguire?
00:17:55 Daria
Particolare rappresentazioni?
00:17:59 Daria
Da dove viene questa sensazione che
00:18:02 Daria
Tutto deve essere in un certo modo? Cosa sono queste l'aspettative?
00:18:05 Interviewee 3-1826-it
È un'ottima domanda
00:18:09 Interviewee 3-1826-it
Secondo me allora dirò un'opinione poco popolare, ma credo che sperare tanto tempo online, cioè entrare a contatto con il mondo dell'Internet quando si è piccoli o comunque, direi, presto
00:18:25 Interviewee 3-1826-it
Abbiamo come effetto che ti rendi conto molto prima che il mondo online è come il mondo nella vita reale e certe cose non le puoi dire su un forum come non le diresti
00:18:35 Interviewee 3-1826-it
In piazza non non le puoi dire sul tuo profilo come non dire non le urlerei davanti a tutte
00:18:41 Interviewee 3-1826-it
In realtà è paradossale che
00:18:45 Interviewee 3-1826-it
Quando leggo i messaggi ho la presentazione online di persone che hanno più o meno l'età dei miei genitori. Cinquant'anni. I bomber diciamo, hanno lo stesso comportamento che io avevo quando avevo 13 anni. Online, cioè
00:19:00 Interviewee 3-1826-it
C'è una dimensione di di filtro che non hanno del tutto acquisito, cioè non si rendono del tutto conto secondo me che alcune cose sono imbarazzanti ed è senz'altro vero che che cosa è imbarazzante online è una cosa acquisita. Cioè non c'è nessun motivo per cui può stare
00:19:18 Interviewee 3-1826-it
Non so, la foto di famiglia?
00:19:20 Interviewee 3-1826-it
Ah, nelle storie di Whatsapp dovrebbe essere più imbarazzante che fare qualcos'altro
00:19:29 Interviewee 3-1826-it
Siccome la nostra generazione ha assorbito l'idea che mostrarsi troppo e soprattutto mostrarsi vulnerabili, cioè mostrarsi troppo umani online, sia un male o comunque sia, sia cringe no... e credo che
00:19:45 Interviewee 3-1826-it
Anche qui cringe è un termine che di solito si si usa per riferirsi all'imbarazzo di seconda mano, second-hand embarrassment, non so come bene tradurlo
00:19:55 Daria

Magari mi puoi spiegare un pò
00:19:57 Interviewee 3-1826-it
L'idea è che diciamo quando vedi una persona a fare qualcosa di che per lei dovrebbe essere imbarazzante, ti imbarazza anche più no. Può essere più o meno la sensazione
00:20:08 Interviewee 3-1826-it
E online ti capita continuamente, tu guardi, magari i video di persone che si umiliano in pubblico e senti quel quel senso di.
00:20:16 Interviewee 3-1826-it
Cioè quasi dolore a vedere le persone umiliarsi e è più o meno credo che sia la volontà di evitare di suscitare questa questa emozione negli altri. Quello che ti porta ad autocensurarsi c'è
00:20:32 Interviewee 3-1826-it
Questo questo continuo senso di essere troppo vicini, di di aver visto troppo di qualcun altro, fa sì che in qualche modo vogliamo distanziarci
00:20:42 Interviewee 3-1826-it
Non vogliamo mostrare emozioni troppo intense, non vogliamo mostrare momenti troppo intimi, anche troppo entusiasmo. È vero che secondo me c'è una dimensione di in qualche modo ideologia di classe, di disfunzione in questo
00:20:59 Interviewee 3-1826-it
In questo meccanismo, perché?
00:21:04 Interviewee 3-1826-it
E cioè non posso fare a meno di notare l'analogia tra
00:21:10 Interviewee 3-1826-it
Quello che prova, cioè ad esempio una persona della mia generazione a guardare un boomer che costa un buongiornissimo e quello che prova una persona tipo aristocratica che avrebbe provato cent'anni fa a vedere non so, un parvenu borghese, essere inappropriato da una festa
00:21:30 Interviewee 3-1826-it
E c'è una dimensione secondo me, secondo me
00:21:34 Interviewee 3-1826-it
Molte persone della mia generazione hanno la percezione che i Boomer siano i parvenu dell'Internet, che siano gente che si è ritrovata un telefono in mano a cinquant'anni e si è lasciata prendere dall'entusiasmo e adesso non riesce più a stare senza e a contravvenuto le sue stesse regole, perché in maniera paradossale
00:21:55 Interviewee 3-1826-it
Mia madre e mio padre mi hanno sempre impedito di avere telefoni o social mentre crescevo, ma adesso che sono cresciuta e che loro hanno scoperto i social è impossibile scolarli, cioè mia madre adesso su Instagram c'è questo paradosso per cui mia madre su Instagram io no
00:22:15 Interviewee 3-1826-it
E mia madre su Instagram passa più tempo di quanto passi io a guardare lo schermo del mio cellulare?
00:22:21 Interviewee 3-1826-it
E come se non aver avuto quell'educazione in qualche modo, cioè quel brusco, quel brusco impatto da piccoli
00:22:29 Interviewee 3-1826-it
Porta semplicemente essere più incauti, non so come dire
00:22:33 Interviewee 3-1826-it
E ed è sicuramente vero che, come dire?
00:22:39 Interviewee 3-1826-it
Cioè ci sono stati episodi quando ero alle scuole medie in cui abbiamo abusato del del cellulare. Abbiamo fatto, ad esempio c'era stato un episodio di bullismo nei confronti di miei compagni di classe che si era consumato sul gruppo Whatsapp della classe
00:22:55 Interviewee 3-1826-it
E quel tipo di esperienze, come dire, avute un'età?
00:22:58 Interviewee 3-1826-it
Cioè in giovane età, secondo me ti hanno che certe cose
00:23:02 Interviewee 3-1826-it
Parla e basta.
00:23:05 Interviewee 3-1826-it
Non è detto che questo sia altrettanto chiaro a qualcuno che non ha, quel non ha quell'educazione, appunto, cioè non ha quel quell'idea di inaccettabilità che
00:23:17 Interviewee 3-1826-it
Ma c'è qualcuno che è uscito con un telefono in manuale?
00:23:23 Interviewee 3-1826-it
C'è ancora dimensione di consapevolezza che quello che scrivi online resta lì, cioè?
00:23:31 Interviewee 3-1826-it
A questo punto è come dire?
00:23:35 Interviewee 3-1826-it
È difficile ignorare a proposito l'autocensura, il fatto che
00:23:40 Interviewee 3-1826-it
Se io scrivo qualcosa da qualche parte, cancellarlo da lì sarà molto complicato, nel senso che magari io lo cancello, ma qualcun altro ha preso uno screenshot, magari con lo screenshot, verrà ripostato da qualche parte
00:23:53 Interviewee 3-1826-it

Non avevo più neanche il controllo di che fine ha fatto? E questo fa sì che io sia molto più attenta a questa dimensione, cioè anche aver sentito nei negli ultimi, cioè nell'ultimo decennio
00:24:03 Interviewee 3-1826-it
Storie su storie di persone la cui carriera è stata rovinata
00:24:07 Interviewee 3-1826-it
Da una cosa che
00:24:08 Interviewee 3-1826-it
Hanno fatto vent'anni prima e inavvertitamente postato online
00:24:12 Interviewee 3-1826-it
Per esempio, una dimensione che a me personalmente preoccupa è il fatto che per trovare lavoro ormai quasi tutti i controlli il tuo profilo social
00:24:23 Interviewee 3-1826-it
E questo significa che, ad esempio, se vuoi insegnare al liceo, vuoi insegnare con minorenni, non puoi avere tracce di te, che fai cose, anche solo un minimo scopertamente sessuale online
00:24:36 Interviewee 3-1826-it
Nostro paese e questa cosa è sanzionatissima, c'è stato il caso di una maestra di Torino che ha perso il lavoro perché il suo compagno ha postato dal Revenge porno
00:24:45 Interviewee 3-1826-it
sul gruppo di Calcetto, e poi è arrivato ai genitori dei figli, e insomma, la preside ha licenziato la maestra
00:24:56 Interviewee 3-1826-it
E questo tipo di cose ti fanno pensare nel senso che ti rendi conto che se non sei
00:25:01 Interviewee 3-1826-it
Attento adesso questa cosa tra 10 anni potrebbe ritorcersi contro, in maniera anche impattante sulla tua vita. Cioè, non puoi permetterti di postare qualunque cosa ti venga in mente online. Penso anche che tipo?
00:25:18 Interviewee 3-1826-it
Ai cinquant'anni il posto fisso da 30 e
00:25:23 Interviewee 3-1826-it
Non fondamentalmente nessuno ti schioda più da li, puoi permetterti di essere molto più rilassato su questo. È questo. Cioè è una forma di ingiustizia in qualche modo, nel senso che penso che il modo in cui noi, noi della nostra generazione, curiamo la nostra immagine online dipenda dal fatto che vogliamo proteggerci dai giudizi che altri daranno di noi, perché siamo fragili. Alla fine c'è, dal mio punto di vista
00:25:49 Interviewee 3-1826-it
L'online è uno dei pochi posti in cui ci è dato di esprimerci, ma è anche uno dei posti in
00:25:54 Interviewee 3-1826-it
Cui stiamo più visti
00:25:56 Interviewee 3-1826-it
In qualche modo
00:25:59 Daria
E allora sì
00:26:01 Daria
E quindi con la dimensione di autocensura, ci deve essere in qualche a qualche livello, cioè?
00:26:08 Daria
E quando tu vai online, ovviamente hai detto che non hai instagram
00:26:14 Daria
o anche Facebook, dove è più facile, magari creare gruppi
00:26:20 Daria
A gestire cosa l'algoritmo ti mostra. Però hai avuto qualche sensazione che tu vai su Youtube, per esempio, perché cerchi un certo tipo di sensazione o vuoi gestire come ti senti al momento?
00:26:38 Interviewee 3-1826-it
Si...
00:26:42 Interviewee 3-1826-it
La cosa che ho notato ultimamente
00:26:49 Interviewee 3-1826-it
C'è un tempo, era molto più facile controllare anche su Youtube, ma anche su Twitter, adesso che l'ha comprato Elon Musk
00:26:57 Interviewee 3-1826-it
È cambiato qualcosa, proma era molto più facile controllare esattamente cosa volevi guardare, cioè si, l'algoritmo su Youtube c'è sempre stato però
00:27:05 Interviewee 3-1826-it
Adesso ci sono gli short, ad esempio, che sono tipo l'equivalente di tik tok, ma per Youtube e Tik tok questa cosa che praticamente è impossibile orientare il flusso di quello che fai, perché se inizia a crollare vai avanti, vai avanti, vai avanti e
00:27:21 Interviewee 3-1826-it
Cioè l'algoritmo di propina qualunque cosa decida che tu vuoi voglia guardare
00:27:27 Interviewee 3-1826-it
Ed effettivamente molto più difficile andare online cercando una cosa è trovare quella cosa là più la sensazione di quando entri in un supermercato dicendo faccio la spesa ma non hai in mente una lista della spesa e quindi ti ritrovi a comprare tipo i cachi, cioè delle robe che non avresti mai neanche pensato
00:27:47 Interviewee 3-1826-it

E ma personalmente questa cosa delle conseguenze negative trovo sulla mia salute mentale, perché?
00:27:57 Interviewee 3-1826-it
YouTube tende a propinarmi ultimamente
00:28:00 Interviewee 3-1826-it
Contenuti che sono a volte copertamente di odio, cioè nel senso che vanno fondamentalmente da punti di vista con cui politicamente non mi ritrovo a cose esplicitamente hateful
00:28:18 Interviewee 3-1826-it
Volersi rilassare, invece, essere costretti a
00:28:24 Interviewee 3-1826-it
Come dire, interagire con questo tipo di contenuti
00:28:28 Interviewee 3-1826-it
Fa sì che sia un'esperienza molto faticosa secondo me, cioè diventato più faticoso nella mia sensazione, è questo
00:28:40 Interviewee 3-1826-it
È diventato più faticoso
00:28:44 Interviewee 3-1826-it
Non so se sto rispondendo alla tua domanda nel merito

…

01:03:30 Daria
In realtà c'è solo un'ultima domanda, che
01:03:35 Daria
Se tu pensi o senti, se algoritmi che sono gli usati su social influiscono in qualsiasi
01:03:43 Daria
Modo la tua vita
01:03:54 Interviewee 3-1826-it
ah sicuramente
01:04:01 Interviewee 3-1826-it
C'è una dimensione di chi
01:04:07 Interviewee 3-1826-it
Influiscono benessere anche a livello di salute mentale di
01:04:11 Interviewee 3-1826-it
Percezione del mondo
01:04:14 Interviewee 3-1826-it
Perché credo sia esperienza di tutti che
01:04:20 Interviewee 3-1826-it
Come dire, vabbè
01:04:22 Interviewee 3-1826-it
Per una questione di aumentare l'engagement, spesso gli algoritmi tendono a proporti cose che
01:04:30 Interviewee 3-1826-it
Suscitato una reazione, è spesso queste cose sono sono anche abbastanza al limite della disinformazione, cioè non è detto che siano notizie affidabili
01:04:41 Interviewee 3-1826-it
Ehm. Fortunatamente. A volte però capita appunto la mia esperienza con Twitter che
01:04:48 Interviewee 3-1826-it
Se Apri Twitter al mattino, scorrere per questa eterna collezione di fatti tragici e terribili successi nel mondo
01:04:58 Interviewee 3-1826-it
Arrivederci notizie italiane
01:05:02 Interviewee 3-1826-it
Sì, esatto, cioè uno si sveglia e poi si rende conto che si ricorda che l'umanità è una merda e poi può finalmente proseguire il resto della sua giornata
01:05:15 Interviewee 3-1826-it
Da quel punto di vista sicuramente vero, cioè nel senso è molto più probabile che se io sono sono online che mi faccio i fatti miei, mi venga, cioè mi io mi imbatta e sia più propensa a cliccare su post che
01:05:32 Interviewee 3-1826-it
Discutono di cose come dire negative o da quel punto di vista sicuramente tipo i nostri bias cognitivi giocano un ruolo, cioè nel senso. Sicuramente è vero che
01:05:43 Interviewee 3-1826-it
Come dire di 10 cose positive e una negativa. Io andrò a guardare quella negativa, perché quelle positive alla fine impattano la mia vita solo fino a un certo punto
01:05:52 Interviewee 3-1826-it
Eh, non lo so, e credo che effettivamente ci sia una dimensione un po predatoria
01:06:01 Interviewee 3-1826-it
Del modo in cui funzionano gli algoritmi, cioè
01:06:04 Interviewee 3-1826-it
O cioè, a volte ho il vissuto di

01:06:06 Interviewee 3-1826-it
Cioè rendermi conto che sto venendo manipolat* praticamente
01:06:15 Interviewee 3-1826-it
Però dovrei rifletterci meglio
01:06:18 Interviewee 3-1826-it
Perché non è una cosa a cui io faccia spesso caso
01:06:22 Interviewee 3-1826-it
La mia vita è impattata dal punto di vista, diciamo di quello che faccio attivamente, magari, cioè sì, magari parlo per due giorni di una cosa che ho letto, ma difficilmente faccio qualcosa perché l'ho visto fare online o perché l'ho visto discutere
01:06:38 Interviewee 3-1826-it
Ehm, a volte può succedere, ma spesso è invece una cosa positiva, cioè di solito se se a un certo punto
01:06:48 Interviewee 3-1826-it
Cioè se scopro online cose che che vorrei fare di solito quello è il tipo di contesto in cui mi viene da dire che i social, insomma, cosa buona nel senso. Saluto con abbastanza entusiasmo
01:07:04 Interviewee 3-1826-it
Il tipo di informazioni che puoi trovare sugli eventi, ad esempio a ******. E trovo abbastanza frustrante il fatto che senza Instagram, ora come ora ti perdi degli eventi inevitabilmente perché vengono pubblicizzati solo su Instagram
01:07:18 Interviewee 3-1826-it
E quindi sì, ed è vero, che tipo
01:07:21 Interviewee 3-1826-it
Ad esempio, tutt*
01:07:21 Interviewee 3-1826-it
Cioè tutti i miei coetanei fanno quasi tutti le stesse cose, perché
01:07:26 Interviewee 3-1826-it
Ma sono tutti al corrente degli stessi eventi, sono tutti e spesso io sono cose che mi perdo. Ad esempio però quella la vedo, cioè una cosa in è sicuramente un modo in cui gli algoritmi influenzano
01:07:36 Interviewee 3-1826-it
Il mondo, cioè
01:07:37 Interviewee 3-1826-it
La tua esperienza di vita credo sia meno
01:07:41 Interviewee 3-1826-it
Cioè una cosa
01:07:42 Interviewee 3-1826-it
Più positiva, in qualche modo non so e credo anche sia una dimensione in cui c'è un aspetto in cui
01:07:50 Interviewee 3-1826-it
i algoritmi hanno un peso minore, cioè spesso i contenuti che alla fine influenzano le sue azioni sono meno determinati dall'algoritmo, è più da
01:08:02 Interviewee 3-1826-it
fattori in qualche modo esterni, o cioè, ad esempio, banalmente, dove vivi
01:08:10 Interviewee 3-1826-it
Le cose che già ti interessano, però sto probabilmente sparando cose a caso nel senso… non lo so, ma è interessante punto di vista.
01:08:19 Daria
Ma tu non ti arrendi, non vuoi registrarti su Instagram per sapere più di eventi?
01:08:26 Interviewee 3-1826-it
Eh probabilmente non lo so questo
01:08:29 Interviewee 3-1826-it
E un calcolo costi benefici, alla fine cioè la mia valutazione che se mi perdo un evento ogni tanto
01:08:35 Interviewee 3-1826-it
Sono più contenta con passare tre ore del mio tempo a guardare
01:08:42 Interviewee 3-1826-it
Non lo so
01:08:46 Interviewee 3-1826-it
Ci confesso che la mia avversione per Instagram, cioè la riconosco come, come in buona parte irrazionale nel senso, non non credo
01:08:55 Interviewee 3-1826-it
Cioè per quanto era argomentazioni io posso proporre, non credo abbia veramente delle motivazioni fondate, nel senso Instagram non è peggio di Twitter
01:09:11 Interviewee 3-1826-it
Come dire, fossi coerente starei lontana anche da Twitter, ad esempio.
01:09:16 Interviewee 3-1826-it
Credo che ci sia qualcosa che mi turba profondamente di un'immagine, cioè credo di essere più vulnerabile a un'immagine troppo negativa del mondo rispetto a una troppo positiva, cioè quello che mi infastidisce di Instagram, del mondo in cui tutto sembra perfetto e
01:09:31 Interviewee 3-1826-it
Su come di non riuscirci
01:09:32 Interviewee 3-1826-it

Crederci…. Cioè preferisco credere. Preferisco nel senso di sono più propensa a credere che il mondo sia un posto peggiore di quello che e
01:09:40 Interviewee 3-1826-it
Come ti ti suggerisce Twitter rispetto a pensare che il mondo sia un posto migliore di quello che come fa Instagram
01:09:48 Interviewee 3-1826-it
Non lo so
01:09:49 Interviewee 3-1826-it
Questo probabilmente è una cosa mia, cioè non penso sia condivisibile da
01:09:55 Interviewee 3-1826-it
Molte persone però….
01:10:05 Daria
Mille grazie. Per la intervista

Figure 2.
Example of an extract (15 min out of 1 hour 10 min) from an interview and translation with a volunteer interviewee participant 3-1826-it translated to English with assigned questions and data coding. The transcription of conversation in Italian language is translated to English, every response is assigned to the question from the research methodology that was answered to be transferred accordingly to the dataset sorted by country (Italy, Estonia and the Netherlands) and age category (18-26; 27-34; 35-55 years old). The last column represents highlighted isotopies identified in the context of a sample interview to be compared with other samples. During translation the speech is edited to become a text that can be analysed.

Original (Italian)	Translation of Interview (From Italian to English)	Assigned question from the research methodology	Interview Data for the comparative table	First level of analysis / 1st tier of codes and identified isotopies (Concepts or types of social actions)
00:00:02 Daria Preferisci fare in italiano o in inglese? 00:00:12 Interviewee 3-1826-it Come preferisci? Se vuoi chiedermi le cose in inglese. 00:00:23 Interviewee 3-1826-it Io sto bene l'inglese, ma potrebbe darsi che ci siano dei filtri 00:00:32 Interviewee 3-1826-it Ma se vuoi farmi le domande in inglese 00:00:35 Interviewee 3-1826-it Fammele pure in inglese	00:00:02 Daria Do you prefer to do it in Italian or in English? 00:00:12 Interviewee 3-1826-it As you prefer? If you want to ask me things in English. 00:00:23 Interviewee 3-1826-it I'm good at English, but there may be some filters. 00:00:32 Interviewee 3-1826-it But if you want to ask me the questions in English. 00:00:35 Interviewee 3-1826-it Do it in English as well.	Ice breaking question		
… 00:00:42 Daria Puoi raccontarmi un po 00:00:43 Daria quando hai avuto primo computer, primo cellulare, cosa facevi con questi device?	… 00:00:42 Daria Can you tell me a little 00:00:43 Daria when you had your first computer, first mobile phone, what did you do with these devices?	When did you have first computer? What your first experience with digital devices was? What were you doing with	First of all, the latest model technologies (always have been) around the house, including one of the first people in Italy to have a cell phone. And so practically,	-Introduction to digital devices in early adolescence -Controlled/ regulated access by older users -Early introduction to digital environments

00:00:55 Interviewee 3-1826-it Innanzitutto la cosa che mio ****** fa ********** per lavoro, quindi ha sempre avuto le tecnologie dell'ultimo modello in giro per casa, che è stata una delle prime persone in Italia ad avere un cellulare 00:01:11 Interviewee 3-1826-it Ehm. E quindi praticamente da quando ho memoria io ho un pc portatile o comunque un pc, quindi non ricordo nemmeno quando ho iniziato ad andare su Internet, ma è una cosa che risale praticamente ai miei primi anni di vita, non cioè da quando Internet esiste in Italia 00:01:31 Interviewee 3-1826-it Io ci sono, ci sono stato sopra. Ecco come dire 00:01:36 Interviewee 3-1826-it Per quanto riguarda 00:01:37 Interviewee 3-1826-it Il telefono invece ho avuto uno smartphone 12 anni, più o meno a 12 anni 00:01:44 Interviewee 3-1826-it Che è relativamente tardi per la mia generazione, nel senso che 00:01:49 Interviewee 3-1826-it Molti miei coetanei c'erano avuto l'anno prima e io ho passato un anno da isolata sociale perché non avevo il Cellulare 00:01:56 Interviewee 3-1826-it e non avevo modo per contattare i miei amici che invece si chattava tutti su Whatsapp 00:02:03 Interviewee 3-1826-it E quindi ho avuto una fase intorno agli 11 anni in cui ho avuto un telefono di quelli coi tasti grossi che non è 00:02:09 Interviewee 3-1826-it Uno smartphone, ma soltanto quelli	00:00:55 Interviewee 3-1826-it First of all, my ****** is ********** for work, so ** always had the latest model technologies around the house and he was one of the first people in Italy to have a cell phone. 00:01:11 Interviewee 3-1826-it Erm…And so practically, since I can remember, I've had a laptop or at least a pc, so I don't even remember when I started using the Internet. Still, it's something that practically dates back to my first years of life, but not since the Internet existed in Italy. 00:01:31 Interviewee 3-1826-it I'm here, I've been there. Here's how to tell. 00:01:36 Interviewee 3-1826-it With regard to. 00:01:37 Interviewee 3-1826-it The phone, on the other hand, I had a smartphone for 12 years, more or less when I was 12. 00:01:44 Interviewee 3-1826-it Which is relatively late for my generation in the sense that. 00:01:49 Interviewee 3-1826-it Many of my peers had had it the year before and I spent a year in social isolation because I didn't have a cell phone 00:01:56 Interviewee 3-1826-it and I had no way to contact my friends who were all chatting on Whatsapp instead. 00:02:03 Interviewee 3-1826-it And so I had a phase around age 11 where I had a big button phone that's not. 00:02:09 Interviewee 3-1826-it A smartphone, but only those. 00:02:11 Interviewee 3-1826-it the keyboard and then the following year I really had a	it? When did you have your first wearable device?	since I can remember, I've had a laptop or at least a PC, so I don't even remember when I started using the Internet. Still, it's something that practically dates back to my first years of life. With regard to the phone, on the other hand, I had a smartphone more or less **when I was 12. Which is relatively late for my generation** in the sense that many of my peers have had it the year before and I spent a year in social isolation because I didn't have a cell phone and I had no way to contact my friends who **were all chatting on Whatsapp instead.** And so I had a phase around age 11 where I had a big button phone that's not a smartphone, then the following year I had a smartphone that was really small.	
		When did you start to use social media consistently, what platforms do you use and what are the favourable? How would you describe the role of social media in your life?	The phone I used had very little memory, I used for **WhatsApp**, **Facebook** and any other type of social network, I didn't have Facebook until I think two years ago, because yes more or less then three years ago. My parents prevented me from registering on any social network, basically until I was a teenager and then in high school I could have done it, but I didn't like it, that is, I didn't like the environment. Instagram still I do not have it. But not how to say I watched my peers wasting	-Definition of social media as communication-based content sharing platforms, and range from WhatsApp (private messenger tool), to forums and social media like Facebook, Instagram, to mediated content sharing environments like YouTube. Platforms are used and divided mainly based on primary functionality.

00:02:11 Interviewee 3-1826-it la tastiera e poi l'anno dopo ho avuto veramente uno smartphone dare proprio piccolino, grosso così 00:02:20 Interviewee 3-1826-it Che aveva pochissima memoria, usavo per Whatsapp, Facebook e qualunque altro tipo di social non c'è l'ho avuto fino a credo due anni fa, perché si più o meno poi tre anni fa 00:02:36 Interviewee 3-1826-it Un po i miei mi hanno impedito di non registrarmi su qualunque social, praticamente finché non sono stata adolescente e poi al liceo avrei potuto farlo, ma non mi piaceva, cioè non mi piaceva l'ambiente. Instagram tutt'ora 00:02:52 Interviewee 3-1826-it Non c'è l'ho 00:02:53 Interviewee 3-1826-it Però non come dire guardavo i miei coetanei sprecare tipo metà della giornata cazzeggiando sui social. Non lo so, credo non mi ispirasse, non mi ispirasse l'idea di fare la stessa cosa. Ho sempre usato molto Youtube invece 00:03:13 Interviewee 3-1826-it Questo più o meno da quando, anche prima di avere un telefono, in realtà praticamente da da, quando cioè da quando ho iniziato le scuole medie 00:03:21 Interviewee 3-1826-it Quindi più o meno 11 anni? 00:03:23 Interviewee 3-1826-it E più o meno finisce qui 00:03:30 Interviewee 3-1826-it Nel senso ho Twitter adesso e ho Facebook 00:03:34 Interviewee 3-1826-it E ho Twitter da più tempo di quanto io abbia Facebook ed è anche più	smartphone that was really small, this big 00:02:20 Interviewee 3-1826-it which had very little memory, I used for Whatsapp, Facebook and any other type of social network, I didn't have it until I think two years ago, because yes more or less than three years ago. 00:02:36 Interviewee 3-1826-it My parents prevented me from registering on any social network, basically until I was a teenager and then in high school, I could have done it, but I didn't like it, that is, I didn't like the environment. Instagram still. 00:02:52 Interviewee 3-1826-it I do not have it. 00:02:53 Interviewee 3-1826-it But not how to say I watched my peers wasting like half of the day messing around on social media. I don't know, I think it didn't inspire me, I wasn't inspired by the idea of doing the same thing. I've always used Youtube a lot instead 00:03:13 Interviewee 3-1826-it This has been around since, even before I had a phone, actually pretty much since, which is when I started middle school. 00:03:21 Interviewee 3-1826-it So more or less 11 years? 00:03:23 Interviewee 3-1826-it And that's more or less the end of it 00:03:30 Interviewee 3-1826-it I mean I have Twitter now and I have Facebook. 00:03:34 Interviewee 3-1826-it And I've had Twitter longer than I've had Facebook and it's even more interesting. I spend more time on it or Facebook, mostly to keep in touch with people or my parents' age 00:03:48 Interviewee 3-1826-it		like half of the day messing around on social media. I don't know, I think it didn't inspire me, I wasn't inspired by the idea of doing the same thing. I've always used **Youtube** a lot instead. This has been around since, even before I had a phone, actually pretty much since, which is when I started middle school. So more or less 11 years? And that's more or less the end of it. I mean I have Twitter now and I have Facebook. And I've had **Twitter** longer than I've had Facebook and it's even more interesting. I spend more time on it. Facebook is mostly to keep in touch with people of my parents' age or work contacts for research, in short, I use it as someone would use **LinkedIn**, that's it.	

interessante. Ci passo più tempo o Facebook, soprattutto per tenermi in contatto con persone o dell'età dei miei genitori 00:03:48 Interviewee 3-1826-it Oppure contatti di lavoro per la ricerca, insomma, lo uso come come qualcuno userebbe linkedin, ecco	Or work contacts for research, in short, I use it as someone would use linkedin, that's it.			
00:03:59 Daria Tu hai linkedin o Pinterest? 00:04:04 Interviewee 3-1826-it Ho LinkedIn che non uso mai perché non ho un curriculum che vale la pena di vedere 00:04:09 Interviewee 3-1826-it Ehm ho Pinterest, ma anche lì lo uso per ispirazioni fotografiche. Sono un utente dei social molto passivo, cioè posto molto poco e guardo molta roba degli altri 00:04:25 Interviewee 3-1826-it Addirittura metto pochi mi piace metto pochi, cioè non è una cosa che non mi piace lasciare troppe tracce online, però noto che è una cosa che mi si è 00:04:34 Interviewee 3-1826-it Ritorta contro, perché non avendo Instagram, le persone cercano di ricostruire chi 00:04:40 Interviewee 3-1826-it Sono quando gli dico, cioè quando ci conosciamo e quindi mi cercano su Google e se mi cerchi su Google trovi molte più informazioni di quante ne troveresti 00:04:49 Interviewee 3-1826-it Avendo il mio profilo Instagram per dire perché ci sono tante cose che ho fatto, che hanno lasciato una traccia online, diciamo indipendentemente dalla mia volontà 00:04:58 Interviewee 3-1826-it	00:03:59 Daria Do you have LinkedIn or Pinterest? 00:04:04 Interviewee 3-1826-it I have LinkedIn which I never use because I don't have a resume worth looking at. 00:04:09 Interviewee 3-1826-it Erm I have Pinterest, but even there I use it for photographic inspiration. I'm a very passive social media user, meaning I post very little and watch a lot of other people's stuff. 00:04:25 Interviewee 3-1826-it I even put a few likes I put a few, that is, it's not something I don't like leaving too many traces online, but I notice that it is something that has occurred to me 00:04:34 Interviewee 3-1826-it Backfires, because by not having Instagram, people are trying to piece together who 00:04:40 Interviewee 3-1826-it I am when I tell them, that is when we get to know each other and therefore they search me on Google and if you search for me on Google you will find much more information than you would. 00:04:49 Interviewee 3-1826-it Having my Instagram profile to tell why there are so many things I've done that have left a trace online, let's say regardless of my will. 00:04:58 Interviewee 3-1826-it There is my *** ****, I don't know if you know what it is on Youtube.	When did you start to use social media consistently, what platforms do you use and what are the favourable? How would you describe the role of social media in your life?	I have LinkedIn which I never use because I don't have a resume worth looking at. **I have Pinterest, but even there I use it for photographic inspiration**. I'm a very passive social media user, meaning I post very little and watch a lot of other people's stuff. I even put a few likes. I put a few, that's it. I don't like leaving too many traces online, but **I notice that it is something that can backfire,** because by not having Instagram, people are trying to put together who I am when we get to know each other and therefore they search me on Google. And if you search for me on Google you will find much more information than you would if I would have Instagram profile. **There are so many things I've done that have left a trace online**, let's say regardless of my will. There is my *** ****, I don't know if you know what it is on YouTube. And then there are articles and various things that name me, so in the end there are more traces of me scattered across the net than on social media. If you would	Consistent use of social media mainly include two-directional approach: -create representations of oneself online to impact own social status (social connections, work connections, considering impact digital world has on social dynamics); -create impact on own cognitive or physical state (e.g. search for inspiration).

C'è un mio video di ********, non so se hai presente cos'è su Youtube 00:05:04 Interviewee 3-1826-it Eh? E poi ci sono articoli e cose varie che mi nominano, quindi finisce che alla fine ci sono più tracce di me sparse per la rete che non sui social 00:05:16 Interviewee 3-1826-it C'è stato guardia, i miei profili social non scopri niente di me	00:05:04 Interviewee 3-1826-it Huh? And then there are articles and various things that name me, so in the end there are more traces of me scattered across the net than on social media. 00:05:16 Interviewee 3-1826-it If you would watch, my social profiles wouldn't find out anything about me		watch, my social profiles wouldn't find out anything about me.	
00:05:20 Daria Fantastico, su cosa hai fatto ******* su YouTube? 00:05:22 Interviewee 3-1826-it Sui diritti LGBT. 00:05:26 Interviewee 3-1826-it E, Eh, ma è in realtà l'ho fatto per praticamente. C'è stato un corso **********, un corso di public speaking che finiva con la possibilità di 00:05:43 Interviewee 3-1826-it Dare questo ******* davanti a tutti che poi sarebbe stato registrato e postato su Youtube, infatti, cioè su Youtube 00:05:52 Interviewee 3-1826-it E no, è stata una bellissima esperienza, avevo 17 anni, quindi già un po di tempo fa però 00:05:59 Interviewee 3-1826-it Una cosa molto interessante mi è piaciuto molto 00:06:04 Interviewee 3-1826-it E questo è praticamente l'unica cosa che le persone 00:06:07 Interviewee 3-1826-it Trovano di me quando 00:06:07 Interviewee 3-1826-it Mi cercano online 00:06:09 Interviewee 3-1826-it Quindi si fanno sempre un'idea stranissima	00:05:20 Daria Great, what have you done ******* on YouTube? 00:05:22 Interviewee 3-1826-it On LGBT rights. 00:05:26 Interviewee 3-1826-it And, heh, but it's actually I've done it for pretty much. There was a ********** course, a public speaking course that ended with the possibility of 00:05:43 Interviewee 3-1826-it Giving this ******* in front of everyone which would then be recorded and posted on Youtube, in fact, that is, on Youtube 00:05:52 Interviewee 3-1826-it And no, it was a wonderful experience, I was 17, so it was already a while ago though 00:05:59 Interviewee 3-1826-it One very interesting thing I really liked 00:06:04 Interviewee 3-1826-it And that's pretty much the only thing people do 00:06:07 Interviewee 3-1826-it They find me when 00:06:07 Interviewee 3-1826-it They look for me online 00:06:09 Interviewee 3-1826-it So they always get the weirdest idea 00:06:12 Interviewee 3-1826-it	When did you start to use social media consistently, what platforms do you use and what are the favourable? How would you describe the role of social media in your life?	There was a public speaking course that ended with the possibility of make this ******* in front of everyone which would then be recorded and posted on YouTube, in fact, it is still on YouTube. I was 17, so it was already a while ago. And **that's pretty much the only thing people do when they find me online. So they always get the weirdest idea of who I am.**	-Consistent use of social media or individual races left online can impact how individuals perceive each other and act later on. -Digital environment predefines first impression, e.g. Priming effect?

00:06:12 Interviewee 3-1826-it Quello che so	Of who I am			
00:06:15 Daria Perché è stranissimo? 00:06:19 Interviewee 3-1826-it Imagina di non sapere niente di qualcuno e non sapere neanche che puoi fare un ******** anche senza 00:06:25 Interviewee 3-1826-it qualcuno importante, cioè? 00:06:29 Interviewee 3-1826-it Però, cioè cerchi cerchi questa persona che hai appena conosciuto su Internet e scopri che ha questo video che presenta in inglese mi è capitato di avere un'interazione con ragazzi che avevo appena conosciuto, che 00:06:46 Interviewee 3-1826-it Che fondamentalmente mi avevano già cercata su Internet perché avremmo condiviso il ******** 00:06:55 Interviewee 3-1826-it E erano praticamente terrorizzate all'idea di conoscermi, perché si aspettavano che fossi chissà quale genio, celebrità incredibile perché avevo fatto questa cosa 00:07:05 Interviewee 3-1826-it Quindi un biglietto da visita, un 00:07:06 Interviewee 3-1826-it Po strano in qualche modo	00:06:15 Daria Why is it weird? 00:06:19 Interviewee 3-1826-it Imagine not knowing anything about someone and not even knowing that you can do a ******** without it 00:06:25 Interviewee 3-1826-it someone important, that is? 00:06:29 Interviewee 3-1826-it However, that is, you search for this person you just met on the Internet and you find that she has this video that she presents in English I happened to have an interaction with guys I had just met, who 00:06:46 Interviewee 3-1826-it That they basically already looked me up on the internet because we were sharing a ***** 00:06:55 Interviewee 3-1826-it And they were practically terrified to know me, because they expected me to be some genius, incredible celebrity because I did this thing 00:07:05 Interviewee 3-1826-it So a business card, a 00:07:06 Interviewee 3-1826-it Kind of weird somehow	How do you think AI recommendations on social media influence you?	Imagine not knowing anything about someone and not even knowing that you can do a ******** without being someone important. However, imagine you search for this person you just met on the Internet and you find that there is a video of that person in English. **I happened to have an interaction with guys I had just met, who basically already looked me up on the Internet because we were sharing a living space and they were practically terrified to meet me because they expected me to be some genius, incredible celebrity** because I did this thing. So it is like a business card somehow. And it feels weird.	Search engine on majority of social media based on similar algorithm as AI recommendations, that allows users to trace others online behaviours. These behaviours can be interpreted not just as representations but more broadly in the context of digital environment or immediate physical environment and community, society. Sometimes can be unintentional to a user who is behind the shared texts.
00:07:08 Daria Ma come ti senti rispetto a queste rappresentazioni di te online? 00:07:12 Interviewee 3-1826-it Ma mi mette molto a disagio l'idea che le persone possano ricostruire aspetti importanti della mia vita da cose che io lascio in giro 00:07:24 Interviewee 3-1826-it	00:07:08 Daria But how do you feel about these representations of yourself online? 00:07:12 Interviewee 3-1826-it But I'm very uncomfortable with the idea that people can reconstruct important aspects of my life from things that I leave around 00:07:24 Interviewee 3-1826-it But to some extent it's unavoidable, so I let it	How often do you use social media? What kind of social media do you use? For what purposes? / How do you think AI recommendations on social media influence you?	The social network that I have which is a social network, it's called **Quora**. And this kind of **Yahoo Answers**, but done in theory in a more serious way. And for a while on Quora, I was one to ensure that there are quality questions and answers on their social media. They paid like 5 cents per	User's presence and behaviours online is driven by the results of AI analysis of statistically more engaging topics.

Però in qualche misura è inevitabile, quindi lo lascio succedere. Diciamo che non.... preferisco cercare di mantenere la mia privacy il più possibile. Una cosa a cui do molto valore. E quindi uso pseudonimi online, spesso e oppure 00:07:49 Interviewee 3-1826-it Interagisco molto poco se esprimo le mie idee sono ah, ecco un social che ho che che è un social ma è una cosa un po strana che si chiama, si chiama Quora 00:08:00 Interviewee 3-1826-it E questo questa specie di Yahoo Answers, ma fatto in teoria in maniera più seria si 00:08:10 Interviewee 3-1826-it E per un periodo su Quora ho avuto una cosa, cioè praticamente quelli di di cuore per per assicurare che ci siano domande e risposte di qualità sul loro 00:08:26 Interviewee 3-1826-it Loro social, quello che fanno e pagare della gente, ma pagare una miseria, pagare tipo 5 centesimi a domanda per chi scriva e risponda 00:08:43 Interviewee 3-1826-it E per un periodo io ho avuto l'abilitazione a fare questa cosa, quindi postavo tantissime domande e risposte e se cerchi tuttora, probabilmente se cerchi il mio profilo di cuore è il posto in cui ci sono più cose che ho scritto. La cosa paradossale che non ho neanche scritte io per la maggior parte è che mio ****** ha deciso che era molto intelligente da scrivere queste cose 00:09:09 Interviewee 3-1826-it E quindi se ne sa farlo lui quindi non sono veramente mie opinioni, sono le sue 00:09:16 Interviewee 3-1826-it Però, cosa che mi ha creato dei problemi, perché avere cose che pensano altri	happen. Let's say no.... I prefer to try to maintain my privacy as much as possible. Something I value a lot. And so I use pseudonyms online, often and or 00:07:49 Interviewee 3-1826-it I interact very little if I express my ideas I'm ah, here's a social network that I have which is a social network but it's a somewhat strange thing it's called, it's called Quora 00:08:00 Interviewee 3-1826-it And this kind of Yahoo Answers, but done in theory in a more serious way 00:08:10 Interviewee 3-1826-it And for a while on Quora I had one thing, which is basically those of the heart to ensure that there are quality questions and answers on their 00:08:26 Interviewee 3-1826-it Their social media, what they do and pay people, but pay a pittance, pay like 5 cents per question for whoever writes and answers 00:08:43 Interviewee 3-1826-it And for a while I had the authorization to do this thing, so I posted a lot of questions and answers and if you're still looking, probably if you're looking for my heart profile, it's the place where there are more things I've written. The paradoxical thing that I haven't even written for the most part is that my ****** decided he was very smart to write this stuff 00:09:09 Interviewee 3-1826-it And so he knows how to do it so they're not really my opinions, they're his 00:09:16 Interviewee 3-1826-it However, which created problems for me, because having things that other people think written in your name is not the best, especially if I don't appreciate those who know		question for whoever writes and answers. And for a while I had the authorization to do this thing, so I posted a lot of questions and answers and if you're still looking for my profile, it's the place where there are more things I've written. The paradoxical thing that I haven't even written for the most part, it is that my ****** decided he was very smart to write this stuff. And so they're not really my opinions, they're his. **However, it created problems for me, because having things that other people think written in my name is not the best, especially if I don't appreciate people to know much about me on the Internet.** The surreal thing is that you earn only as much as you can make a popular question, i.e. as many people answer you. That is in proportion to how much you earn and that means that you have to spend a lot of your day thinking about questions that the algorithm will like. And often they are incredibly stupid questions, so somehow it also pilots the presentation that you have of yourself. And yet this means that **basically, your presence on social media is very driven because it's decided by what works** and therefore, even there, I don't really know.	

scritti a tuo nome non è il massimo, soprattutto se appunto non apprezzo chi sappiano cosa di me sul Internet 00:09:33 Interviewee 3-1826-it Eh, ma la cosa surreale di di di cuore e che guadagni tanto tanto quanto riesci a rendere una domanda popolare, cioè tante quante persone ti rispondono? Quello è in proporzione quanto quanto guadagni e questo significa che 00:09:53 Interviewee 3-1826-it Devi passare molto tempo della tua giornata a pensare a delle domande che all'algoritmo piaceranno 00:10:00 Interviewee 3-1826-it E spesso sono delle domande incredibilmente stupide, quindi in qualche modo pilota anche la presentazione che tu hai di te stesso di sopra, perché se ci guadagni qualcosa che ripeto è veramente una miseria, non guadagno davvero. Cioè se raggiungi 50 € al mese è gia tanto 00:10:20 Interviewee 3-1826-it E però questo significa che fondamentalmente la tua presenza sul social è molto pilotata, perché è decisa da quello che funziona e quindi anche lì in realtà non so veramente io, cioè?	what about me on the Internet 00:09:33 Interviewee 3-1826-it Eh, but the surreal thing about heartily is that you earn as much as you can make a popular question, i.e. as many as people answer you? That is in proportion to how much you earn and that means that 00:09:53 Interviewee 3-1826-it You have to spend a lot of your day thinking about questions that the algorithm will like 00:10:00 Interviewee 3-1826-it And often they are incredibly stupid questions, so somehow it also pilots the presentation that you have of yourself above, because if you earn something from it, which I repeat is really a pittance, I really don't earn. That is, if you reach €50 a month, that's already a lot 00:10:20 Interviewee 3-1826-it And yet this means that basically your presence on social media is very driven, because it's decided by what works and therefore even there I don't really know, that is?			
00:10:31 Interviewee 3-1826-it In pratica io sono molto poco sui social, però ci passo in realtà moltissimo tempo, cioè non scrivendo, ma appunto 00:10:40 Interviewee 3-1826-it Passivamente in qualche modo	00:10:31 Interviewee 3-1826-it In practice, I am very little on social media, but I actually spend a lot of time there, that is, not writing, but precisely 00:10:40 Interviewee 3-1826-it Passively somehow	What kind of feelings do you experience when you are on Instagram/ TikTok/ YouTube, etc? What kind of feelings are you looking for?	But **I'm very uncomfortable with the idea that people can reconstruct important aspects of my life** from things I leave around. But to some extent, **it's unavoidable**, so I let it happen. Let's say no.... I prefer to try to maintain my privacy as much as possible. Something I value a lot. And so I use pseudonyms online often and or interact very little if I express my ideas.	-Feeling of discomfort from inability to control own experience online and predict how others will encounter their experience online related to proper identity and personality -Expressing more passive behaviours online to minimise others' experiences with proper identity and personality -Emphasising communication process as an addressee

			In fact, I am very little on social media, but **I actually spend a lot of time there, that is, not writing, but precisely passively somehow.**	
00:10:42 Daria Tu hai mai 00:10:45 Daria Cercato qualcuno su social e oppure qualcosa che hai visto 00:10:50 Daria di rappresentazione di uno su social influenzato da qualche parte come tu vedi queste persone in vita reale? 00:11:08 Interviewee 3-1826-it Sicuramente si! Però il modo in cui io conosco le persone online, di solito le persone... cioè se incontro le persone online che restano conoscenze online 00:11:19 Interviewee 3-1826-it Quindi non li incontro mai nella vita reale, oppure 00:11:24 Interviewee 3-1826-it Se... se sono persone che conosco nella vita reale sono persone con cui ho parlato prima di vedere il loro profilo, non so cosa e quindi ho già un'idea di loro precedente. C'è un'eccezione a questa cosa? 00:11:38 Interviewee 3-1826-it Quando durante la pandemia io ho iniziato l'università in pieno lockdown, praticamente è quello che quello che è successo in pieno lockdown, e che il primo anno di università nessuno si conosceva 00:11:53 Interviewee 3-1826-it E dovremmo trovare un modo per tenerci in contatto, quindi quello che abbiamo fatto è stato creare gruppi Whatsapp 00:11:59 Interviewee 3-1826-it A go proprio	00:10:45 Daria Did you ever searched for someone on social media or something you saw 00:10:50 Daria on Socials did influenced how do you see these people in real life? 00:11:08 Interviewee 3-1826-it Surely! But the way I get to know people online, usually people... that is if I meet people online who remain acquaintances online 00:11:19 Interviewee 3-1826-it So I never meet them in real life or 00:11:24 Interviewee 3-1826-it If… if they are people I know in real life they are people I have talked to before seeing their profile, I don't know what and so I already have an idea about them before. Is there an exception to this thing? 00:11:38 Interviewee 3-1826-it When during the pandemic I started university in full lockdown, that's basically what happened in full lockdown and that in the first year of university no one knew each other 00:11:53 Interviewee 3-1826-it And we should find a way to keep in touch, so what we did was create Whatsapp groups 00:11:59 Interviewee 3-1826-it Just go 00:12:01 Interviewee 3-1826-it Not only that, but we created a discourse, a server on Discord, which was also the bullshit fair there. We always quarreled about these groups, that is, among other things,	With how many people do you communicate online on a daily basis in respect to face-to-face communication? What are your preferences and why?	Usually, I meet people online who remain acquaintances online. So, I never meet them in real life or if they are people I know in real life, they are people I have talked to before. Seeing their profile, I already have an idea about them. The exception to this was when **during the pandemic, I started university in full lockdown and that was the first year of university, no one knew each other.** And we had to find a way to keep in touch, so what we did several WhatsApp groups. Not only that, but we created a discourse, a server on Discord, which was also the "weird communication" there. We always quarrelled about these groups. Among other things, about the most ridiculous things, in the sense that we slaughtered each other for every little thing.	18-26 years old users might be highly affected that some of the important milestones in their personality development connected to core experiences have happened fully online through digital environments like Social meida.

00:12:01 Interviewee 3-1826-it Non solo, ma abbiamo creato un discorso, un server su Discord, che anche lì c'era la fiera del cazzeggio. Litigavamo sempre su questi gruppi, cioè tra l'altro sulle cose più ridicole, nel senso ci scannavano per ogni minimo. Pazzia è quello, cioè l'immagine	about the most ridiculous things, in the sense that we slaughtered each other for every little thing.			
00:12:19 Interviewee 3-1826-it Che che mi sono fatta delle persone che ho conosciuto, così è rimasta nel senso che tutt'ora, cioè alcune persone che alcuni miei colleghi di università che conosco, ci scriviamo su Whatsapp ci scriviamo più di quanto ci parliamo nella vita reale è l'idea che loro hanno di me, è molto costruita sulla base di quello che 00:12:41 Interviewee 3-1826-it Io manifestavo su questi gruppi. Non solo, ma la loro, cioè la loro immagine, l'immagine che io di loro è molto legata a quello che loro fanno trasparire online 00:12:44 Interviewee 3-1826-it No, no, no… 00:12:50 Interviewee 3-1826-it Se sono dei ******* online sì, cioè nella mia testa loro sono dei canzoni e no. E la cosa piu divertente che su Whatsapp la gente spesso non si chiama con nome e cognome. Si chiama con nomignoli strani 00:13:04 Interviewee 3-1826-it Di queste persone, cioè, sono state salvate nella mia testa con i loro nome di Whatsapp. Ho dei colleghi che chiamo con il loro nome di Whatsapp anziché con nome e cognome e tutti sappiamo cosa ci riferiamo, perché eravamo tutti insieme su questo gruppo surreale 00:13:21 Interviewee 3-1826-it	00:12:19 Interviewee 3-1826-it What I've made of the people I've known, so it's remained in the sense that even now, that is, some people that some of my university colleagues I know, we write to each other on Whatsapp we write to each other more than we talk to each other in real life is the idea that they have of me, is very built on the basis of what 00:12:41 Interviewee 3-1826-it I was demonstrating on these groups. Not only that, but theirs, i.e. their image, the image that I have of them is closely linked to what they reveal online 00:12:44 Interviewee 3-1826-it No, no, no… 00:12:50 Interviewee 3-1826-it If they are ******* online, yes, that is in my head they are songs and no. And the funniest thing that on Whatsapp people often don't call each other by first and last name. He goes by strange nicknames 00:13:04 Interviewee 3-1826-it Of these people, that is, have been saved in my head with their Whatsapp name. I have colleagues that I call by their Whatsapp name instead of their first and last name and we all know what we mean, because we were all together on this surreal group 00:13:21 Interviewee 3-1826-it Though, it's the only time I actually happened to	How many people do you follow on social media, how would you describe these people? Did online communication with someone or observing their social media behaviours impact how you think about them?	On WhatsApp we write to each other more than we talk to each other in real life is **the idea that they have of me, is very built on the basis of what I was demonstrating on these groups.** Not only that but theirs, i.e. their image, the image that I have of them is closely linked to what they reveal online. And the funniest thing is that on WhatsApp, people often don't call each other by first and last name but go under strange nicknames. So these people have been saved in my head with their WhatsApp names**. I have colleagues that I call by their WhatsApp name instead of their first and last name.** And we all know what we mean because we were all together on this surreal group. Though it's the only time I actually happened to have this disconnection between people in real life and people Who first became my online acquaintances. There is still a reality…	Proper representation online can have more impact on the perception of communication process with other individuals than face-to-face physical interactions.

Però, è l'unica volta che effettivamente mi è capitato di 00:13:24 Interviewee 3-1826-it Di avere questa disconnessione tra le persone nella vita reale e le persone 00:13:31 Interviewee 3-1826-it Fissa conosciute online 00:13:37 Interviewee 3-1826-it C'è ancora una realtà...	00:13:24 Interviewee 3-1826-it To have this disconnect between people in real life and people 00:13:31 Interviewee 3-1826-it Make online acquaintances 00:13:37 Interviewee 3-1826-it There is still a reality…			
00:13:43 Interviewee 3-1826-it ********** 00:13:44 Interviewee 3-1826-it Mi sono iscritt* ********** 00:13:56 Interviewee 3-1826-it A tema **********, ma sono iscritt* con uno pseudonimo. Non non c'è il 00:14:01 Interviewee 3-1826-it Mio nome è lì, anche lì ci si conosce tutti con lo pseudonimo perché è un forum, una cosa molto anni 90 nel senso, non come dire, è una dinamica molto diversa da quella dei social attuali 00:14:16 Interviewee 3-1826-it E quindi ci si conosce tutti per pseudonimo, nessuno è veramente interessato a sapere il tuo vero nome. Ci si quando ci si incontra di persona ci si riferisce agli uni agli altri con 00:14:25 Interviewee 3-1826-it Il nome del Forum 00:14:27 Interviewee 3-1826-it E quelle persone le ho conosciute di persona e devo dire che 00:14:33 Interviewee 3-1826-it Cioè, è stato abbastanza uno shock rendersi conto che quello che succede online e che si esasperano molto le antipatie, cioè un messaggio scritto in maniera bonaria, viene distorto in qualcosa su, cioè	00:13:43 Interviewee 3-1826-it ********** 00:13:44 Interviewee 3-1826-it I joined * ********** forum 00:13:56 Interviewee 3-1826-it ********** themed, but I'm signed up * under a pseudonym. There is no 00:14:01 Interviewee 3-1826-it My name is there and even there, we all know each other by a pseudonym because it is a forum, something very 90s in a sense, not how to say, it is a very different dynamic from that of current social networks 00:14:16 Interviewee 3-1826-it And so we all know each other by aliases; nobody is really interested in knowing your real name. When we meet in person, we refer to each other with 00:14:25 Interviewee 3-1826-it The name of the Forum 00:14:27 Interviewee 3-1826-it And I met those people in person and I must say that 00:14:33 Interviewee 3-1826-it That is, it was quite a shock to realise that what happens online and that dislikes are greatly exacerbated, that is, a message written in a good-natured way, is distorted into something about, that is, worth responding to in an angry tone, while in conversations one by one it is not like that at all	Did you ever have a conflict because of the social media? What kind of conflict: communication online or face-to-face?	That was quite a shock to realise that what happens online and that dislikes are **greatly exaggerated,** that is, a message written in a good-natured way is distorted into something about, that is, worth responding to in an angry tone, while in conversations one-to-one, it is not like that at all. It is possible to speak in a much calmer way and often realise that you both agree, after spending the previous month perhaps insulting each other online.	-Conflict online can be exaggerated based on limits of environment and its elements, for the perception, recognition and interpretation process

per cui vale la pena rispondere con tono arrabbiato, mentre nelle conversazioni uno a uno non è affatto così 00:14:53 Interviewee 3-1826-it Cioè si riesce a parlare in maniera molto più calma e spesso rendersi conto che si è d'accordo quando in realtà sia cioè si è passato il mese precedente, magari a insultarsi online	00:14:53 Interviewee 3-1826-it That is, it is possible to speak in a much calmer way and often realise that one agrees when in reality it is that is, one spent the previous month, perhaps insulting each other online			
00:15:04 Daria E pensi che questo, magari connesso da qualche parte, che quando le persone comunicano ideali abbiamo più possibilità di comunicare qualcosa perché online manca qualcosa? 00:15:08 Daria Perché ci sono diversi tipi di personalità che si esporranno nei diversi ambienti? 00:15:26 Interviewee 3-1826-it È un'ottima domanda 00:15:29 Interviewee 3-1826-it Non lo so. 00:15:33 Interviewee 3-1826-it La vulgata vuole che lo schermo filtrano, no, quindi? 00:15:39 Interviewee 3-1826-it In qualche modo 00:15:41 Interviewee 3-1826-it Che faccia fatica a empatizzare con persone che sono distanti e 00:15:46 Interviewee 3-1826-it Che conosci solo la tua verso uno schermo secondo me è interessante anche l'altra cosa che hai detto? 00:15:52 Interviewee 3-1826-it Penso effettivamente che la mia personalità cambi quando quando scrivo, quando scrivo online, sono molto, cioè una cosa che ho notato su di me, ad esempio, è che sono molto più confrontationla 00:16:03 Interviewee 3-1826-it	00:15:04 Daria And do you think this, maybe connected somehow, that when people communicate ideals we have more chances to communicate something because something is missing online? 00:15:08 Daria Why are there different types of personalities that will exhibit themselves in different environments? 00:15:26 Interviewee 3-1826-it It's a great question 00:15:29 Interviewee 3-1826-it I do not know. 00:15:33 Interviewee 3-1826-it The vulgate wants the screen to filter, right? 00:15:39 Interviewee 3-1826-it Somehow 00:15:41 Interviewee 3-1826-it That it is a struggle to empathise with people who are distant and 00:15:46 Interviewee 3-1826-it That they only know your personality through a screen. In my opinion the other thing you said is also interesting 00:15:52 Interviewee 3-1826-it I actually think my personality changes when I'm writing, when I'm writing online, I'm a lot, that is, one thing I've noticed about me, for example, is that I'm a lot more confrontational 00:16:03 Interviewee 3-1826-it	Did you ever do something just because you wanted to share a representation of this experience of social media? Or because others from your social media did this?	Somehow, **it is a struggle to empathise with people who are distant** and that only know you through the screen. **I think my personality changes when I'm writing,** I've noticed about me, for example, is that when I'm writing online I'm a lot more confrontational. I feel much more like blaming people, I feel like trolling in slang.	-limited conditions for empathy in communication -adaptation in decision-making process based on environment

mi viene molto di più da dare torto alle persone, mi viene molto di più da trollare in gergon, cioè?	I feel much more like blaming people, I feel like trolling in slang, that is? .			

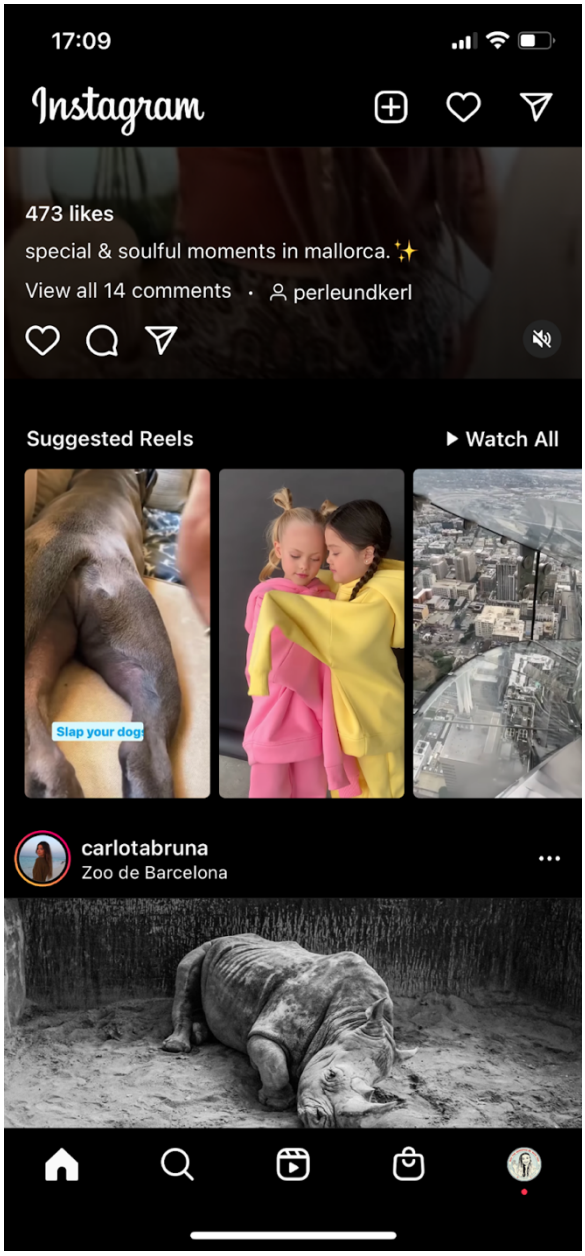
Appendix III

Example of an entry from the diary for observations based on digital ethnography

[…]

11.10.2021

Instagram changed their feed and reels just popping up to you together with video advertisements and not in the form of posts, but something a little different, and also as a line in the vertical feed.



It seems that they are going towards TikTok's UX, because video draws more visual time from users than the photos. Couple weeks ago, I saw a teenager who was scrolling through the feed incredibly fast, probably searching for something, but not even looking at every pic, just surfing on it.

8.10.2021

This video of the parent getting horse face is amazing, because girl gets shocked from what she sees on screen, then check on parent, ensure that he is normal; but still starts/keeps crying of

the horror of parent face transformation? Is it a concept of scary things? Or it is about change? Rapid change? Cannot recognise the parent anymore?
https://www.instagram.com/reel/CTr0C2CJIRV/?utm_medium=copy_link
Accessed on 08.10.2021

[…]

22.11.2021
About a year ago YouTube introduced "shorts", as short videos with 15 nd 60 seconds length respectively. So I decided to try it, as I have several videos on TikTok and I see others successfully uploading their ones.
So, TikTok allows you to use different sounds or the sounds of other users and later your content and content of others which have something in common (sound effect/ sound/ music/ filter) can be found like in the way they are searched with hashtags. There is no major issue with using other sounds (considered as citation) as it can be contributing to the original video/sound and through copying make it introduced to the culture faster (everything like Torop suggests). However, in YouTube one can get even banned for using something what was on someone else channel originally. And especially you have a problem if the rights for a music record belongs to some company. Seems that YouTube algorithm is more concerned in finding content rights strikes than dealing with engagement.
So, what was my problem. I created 11 seconds video on TikTok and it went well on YouTube. Views were going up (reached 1200) until YouTube recognised it using a song of Avicii and video was immediately out from the recommendation algorithm. Since then I got only 5 views. And a copyright claim from Sony and others. So just because one can have monetisation directly from views YT is blocking them first when it thinks that you did something wrong with your content. Ridiculous and very upsetting for me. Even though I even don't have monetisation on the channel. I would say that YT recommendations algorithm is not friendly for new users at all, I would even call it monopolisation algorithm or greedy for search algorithm (the last one I need to check).
Algorithm which is looking only for winning strategies which does not provide diversity and plurality. Well, in general very little of them do, but this is very not sustainable model which teach user to have certain picture of the world and not really allowing "fresh" water into the stream.

12.02.2022
YouTube removed dislike from website version. This would impact their recommendation algorithm, and especially their users' experience.

[…]

27.10.2022
Today in the public transport I observed a young adult who was looking through their Instagram feed scrolling it with the speed of light. It seemed like they would not be even able to grasp an image that was there, not even to mention to read the captions. What kind of attention one should have to receive any information from the pictures that change every second? And it is not the first time I see young people do it. Can it be that the practice of young adults is to perceive a contextual message rather than each image on their own? Then it is definitely AIRS that choose what they see in these fast-changing scrolling of their feed.
[…]

Appendix IV

Markov Decision Process

Markov Decision Process (MDP) is a mathematical framework for reinforcement learning and decision-making under uncertainty. The MDP formula, along with references and a Python example of an algorithm, are provided below.
Markov Decision Processes (MDPs) are used in various calculations and decision-making scenarios, primarily in the field of reinforcement learning and stochastic optimisation. Some of the key calculations and applications of MDPs include:

1. **Value Iteration:** MDPs are used to find the optimal value function, representing the expected cumulative reward for following a particular policy. Value iteration is an iterative algorithm used to calculate the value function.
2. **Policy Iteration:** MDPs are used to find the optimal policy, which defines the best action to take in each state to maximise expected cumulative rewards. Policy iteration is an iterative algorithm alternating between policy evaluation and policy improvement.
3. **Q-Learning:** Q-learning is a popular off-policy reinforcement learning algorithm that uses MDPs to learn the Q-values (action-state values). Q-learning is used to find the optimal policy and action selection in an MDP.
4. **Monte Carlo Methods:** MDPs are used in Monte Carlo methods to estimate the value function and optimal policies through sampling. Monte Carlo methods are particularly useful when the MDP model is unknown or too complex.
5. **Dynamic Programming:** MDPs form the foundation for dynamic programming techniques, including the Bellman equation, which is used to express the value function in terms of optimal future values.
6. **Markov Chain Analysis:** MDPs are a type of Markov chain and they are used in Markov chain analysis to calculate various properties, such as steady-state probabilities and expected time to reach certain states.
7. **Stochastic Optimization:** MDPs solve stochastic optimisation problems where decisions are made sequentially under uncertainty. Examples include inventory management, resource allocation and portfolio optimisation.
8. **Game Theory:** In multi-agent environments, MDPs are used in game theory to model strategic interactions and find optimal strategies for players in a game.
9. **Robotics and Control:** MDPs are applied in robotics and control systems to plan robot movements, control autonomous vehicles and optimise the behaviour of intelligent agents in dynamic environments.
10. **Healthcare and Finance:** MDPs are used in healthcare for treatment planning and patient management and in finance for portfolio optimisation and risk management.

In essence, MDPs are a fundamental framework for modelling decision-making under uncertainty in a wide range of fields and they provide a mathematical foundation for various algorithms and techniques used to solve complex problems. The specific calculations and methods employed depend on the problem domain and the objectives of the decision-making process.

Markov Decision Process (MDP) Formula:

A Markov Decision Process can be formally defined as a tuple (S, A, P, R), where:

- S: The set of states.
- A: The set of actions.
- P: The state transition probability function, representing the probability of transitioning from one state to another given an action.
- R: The reward function, representing the immediate reward received when an action is taken in a particular state.

The goal of an MDP is to find a policy (π) that maximises the expected cumulative reward over time.

Here's the formula for the expected cumulative reward (also known as the value function) for a policy π:

$$V_\pi(s) = \Sigma_{t=0}^{\infty}(\gamma t \cdot E[R_{t+1} \mid S_t = s])$$

Where:

- *Vπ(s)* is the expected cumulative reward starting from state s and following policy π
- γ is the discount factor, which represents the importance of future rewards
- E[Rt+1|St=s] is the expected immediate reward when taking action π(s) in state s

Python Example using Q-learning:

Q-learning is a popular algorithm for solving MDPs. Here's a simplified Python example using Q-learning:

```
import numpy as np

# Define the MDP
num_states = 3
num_actions = 2
gamma = 0.9 # Discount factor

# Initialize the Q-table
Q = np.zeros((num_states, num_actions))

# Define the state transition probabilities (P) and rewards (R)
# This is a simplified example; in practice, these values are problem-specific.
P = np.array([[0.8, 0.2, 0.0], [0.1, 0.7, 0.2], [0.0, 0.0, 1.0]])
R = np.array([[1.0, -1.0], [2.0, 0.0], [0.0, 0.0]])

# Q-learning algorithm
num_episodes = 1000
learning_rate = 0.1
epsilon = 0.1

for episode in range(num_episodes):
    state = 0  # Starting state
    done = False
    while not done:
        # Choose an action using epsilon-greedy policy
        if np.random.rand() < epsilon:
            action = np.random.choice(num_actions)
        else:
            action = np.argmax(Q[state, :])

        # Take the action and observe the next state and reward
        next_state = np.random.choice(num_states, p=P[state, action])
        reward = R[state, action]
```

```
        # Update the Q-value using the Q-learning update rule
        Q[state, action] += learning_rate * (reward + gamma * np.max(Q[next_state, :])
- Q[state, action])

        state = next_state

        # Check for episode termination
        if state == num_states - 1:
            done = True

# Print the learned Q-values
print("Learned Q-values:")
print(Q)
```

This example demonstrates a basic Q-learning implementation for a simple MDP with three states and two actions. In practice, the state transition probabilities and rewards would be defined based on the specific problem to solve. Nevertheless, this approach is not currently used in the AI recommendations, it can be possibly employed in future.

In case of Q-learning approach to an algorithmic processing, a model-free reinforcement learning algorithm to learn the value of an action in a particular state that is user's input based. In this case the state of environment represents a user, and algorithm is considered as an agent. This can aid to minimise a designer's input to the model or datasets.

Hypothetically, implementation of Markov's Decision Process as a part of AI recommendations can benefit users with two major problems in assisted decision-making: 1) when the algorithm can aid into broader discovery based on different states/scenarios and 2) overcoming model collapse when algorithmic processing engaged mainly in previously algorithmically processed data elements/datasets, as described in Chapter Two.

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Author's CV (English)

Name: Daria Arkhipova
Address: Via San Vittore 1, Bologna 40136, Italy
E-mail: daria.d.arkhipova@gmail.com

Education:
2020-now | Ph.D. student | University of Turin, Italy
2022-now | Ph.D. student | University of Tartu, Estonia (joint co-tutelle degree)
2014 - 2016 | MA in Humanities in Semiotics | University of Tartu, Estonia
2011 | Inter-university Exchange program | University of Tartu, Estonia
2008 - 2013 | Specialist Degree (MA equal) in Journalism | Voronezh State University, Voronezh, Russia

Study visits at other universities:
October 2022 - November 2022 | Delft University of Technology, the Netherlands, visiting PhD student, invited by Prof. M. Janssen

Research-related work:
2017 - 2020 | Specialist in Applied Semiotics, branding and creative strategies | Space Doctors, Office Ideologies, Ruth Somerfield Ltd. | London, UK
2016 - 2017 | Study in Estonia representative in Russia and Ukraine | Archimedes Foundation | Tallinn, Estonia

Academic career:
2024 | Assistant to lecturer, course Semiotics 2024, IULM, Milan, Italy
2024 | EUFACETS, FBK, Trento, Italy

Ethics committee applications:
University of Turin Bioethics Committee approved application for research "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale" - Prot. n. 0242950 del 09/05/2023 - [UOR: SI000045 - Classif. III/14]

Peer-review contribution:
Assistant reviewer. 2020. PUNCTUM. Volume 5, Issue 2 (2019)
Assistant reviewer. 2022. Hortus Semioticus Special Issue (2022)
Assistant reviewer. 2023. Semiotica: Journal of the International Association for Semiotic Studies / Revue de l Association Internationale de Sémiotique (SEMI)
Assistant reviewer. 2023. De Arquitectura.Volume 44 (2023)
Assistant reviewer. 2024. Romance Notes, The University Of North Carolina At Chapel Hill.

Science communication:
Project Un pò d'aria show, a YouTube popular science channel since 2019, available at https://www.youtube.com/c/UNPODARIAshow

Author's CV (Estonian)

Nimi: Daria Arkhipova
Aadress: Via San Vittore 1, Bologna 40136, Itaalia
E-post: daria.d.arkhipova@gmail.com

Haridus:
2020-now | doktoriõpe| University of Turin, Itaalia
2022-now | doktoriõpe| University of Tartu, Eesti (joint co-tutelle degree)
2014 - 2016 | magistriõpe | Humanities in Semiotics | University of Tartu, Eesti
2011 | Inter-university Exchange program | University of Tartu, Eesti
2008 - 2013 | Specialist Degree (magistriõpe) | Voronezh State University, Voronezh, Venemaa
Õppetöö teistes ülikoolides:
2022 - Delft University of Technology, Madalmaad

Eetikakomitee taotlused:
University of Turin Bioeetikakomitee kiitis heaks uuringutaotluse "Come le raccomandazioni dell'Intelligenza Artificiale possono influenzare il processo decisionale" - Prot. n. 0242950 del 09/05/2023 - [UOR: SI000045 - Classif. III/14]

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Abstract in Estonian

Kuidas tehisintellekti soovitussüsteemid mõjutavad inimeste otsuste tegemist

Uurimistöö kasutas semiootilist lähenemist, et käsitleda tehisaru poolt vahendatud keskkondade kasutajate suhtlusmehhanisme. Uuriti, kuidas tehisaru soovitussüsteemid (AIRS) tööriistana võivad aidata ja mõjutada kasutajate otsuseid, tegevusi ja käitumist. Uuringu eesmärgiks oli täita senist lünka arusaamises tehisaru mõjust selle kasutajatele, keskendudes eriti tehisaru soovitussüsteemide mõjule üksikisikutele, kes suhtlevad digitaalsetes keskkondades nagu sotsiaalmeedia. Töö käsitles igapäevaste tehisaru-suhtluste mõjusid inimestele kognitiivsel, füsioloogilisel, emotsionaalsel, aksioloogilisel ja pragmaatilisel tasandil, järgneva eesmärgiga mõista, kuidas need mõjud kujundavad sotsiaalseid tavasid ja kultuuri.

Probleemi, kuidas tehisaru-tehnoloogiad on kohanenud sotsiaalsete ja kultuuriliste dünaamikatega, vaadeldakse esimeses peatükis tõstatatud peamise uurimisküsimuse kaudu, nimelt kuidas tehisaru soovitussüsteemid võivad mõjutada inimeste otsustusprotsessi.

Teises peatükis käsitletakse erinevaid lähenemisviise otsustusprotsessile. Uuritakse, kuidas inimestel otsuste tegemine toimub erinevates valdkondades ja kuidas praegune tehisaru tehnoloogia püüab seda toetada.

Teine peatükk analüüsib, kuivõrd algoritmiline modelleerimine digikeskkonnas võib läheneda kasutajate otsustusprotsessile. Kasutades Lotmani (2005 [1984]) semiosfääri teooriat ja Bankovi (2020) platvosfääri kontseptsiooni, näidatakse, et algoritmiline lähenemine võib kasutajate jaoks seonduda digikeskkondade erinevate elementidega. Jaotus tuuma ja perifeeria vahel, mis põhineb digikeskkondade süntaktilistel omadustel, võib mõjutada semantilisi ja pragmaatilisi dimensioone kasutajate jaoks läbi suhete teiste elementidega digikeskkondades, mida juhivad algoritmid. Digikeskkonna elementide tähendus ja tähendusrikkus võivad olla mõjutatud tehisaru soovitussüsteemide poolt. Uurides, kuidas algoritmid loovad digiesitustes tähendusi, osutub, et kasutajail on kalduvus neid aktsepteerida, viies sisse algoritmilisi väärtusi oma vahetu füüsilise keskkonna tõlgendustesse. Selles ulatuses võivad tehisaru personaliseerutud soovitussüsteemid viia kasutajaid aktsepteerima statistiliselt domineerivaid kategooriaid, mida vahendab valitud soovitussüsteemi algoritm. See võib mõjutada kasutajate kognitiivseid, aksioloogilisi, emotsionaalseid ja pragmaatilisi tahke, mõjutades identiteeti, käitumist ja tavasid. Sel hetkel muutub otsustusprotsess kaasotsustusprotsessiks kasutaja ja tehisaru soovitussüsteemi vahel, mille aluseks on disainerite ja andmekogumite sisend. Otsustusprotsessi, mida toetab soovitussüsteem, saab kirjeldada läbi omavahel seotud etappide: eelotsus, kaasotsus ja järelotsus tehisaru ja sotsiaalsete otsustajate vahel. Eelotsuse protsess kirjeldab, kuidas IT-spetsialistide rühmade poolt loodud tehisaru mudelid ja andmekogumid, mis tulenevad järelotsuse vastuvõtu protsessist, mõjutavad kasutajate sisendit. Kaasotsustusprotsess kirjeldab otsustamist kasutaja ja tehisaru väljundi vahel sisendi kaudu. Ja otsustusjärgne protsess on see, kus tehisaru-vahendatud teksti kasutatakse mudelina uute tekstide genereerimiseks või dekonstrueeritakse see, et mõista nende tekstide aluseks olevat algoritmilist protsessi ning tehnilist, sotsiaalset ja kultuurilist potentsiaali.

Kolmas peatükk vaatab otsustusprotsessi kasutaja vaatenurgast. Ökosemiootilist lähenemist kasutades pakub see uurimus, et tehisaru-vahendatud tekste võib tajuda stiimulitena, mis mõjutavad kasutajate omailmu, nende taju, äratundmist ja tõlgendusi. Hüpoteesid, mis põhinevad nendel teoreetilistel leidudel, panevad ette, et see võib mõjutada kasutajate alateadlikku reaktsiooni, veebis ja väljaspool veebikeskkonda käitumist ning viia muutusteni individuaalsetes, sotsiaalsetes ja kultuurilistes tavades.

Kolmandas peatükis tõstatatud hüpotees ütleb, et tehisaru soovitussüsteem (AIRS) kui digikeskkondade kommunikatsiooniprotsessi osa võib mõjutada kasutajaid järgmiselt:

1. AIRS võib sundida kasutajaid kohanema ja navigeerima keskkondades vaatamata piiratud teadmistele;
2. AIRS võib sundida kasutajaid korraga mitmes keskkonnas mitut toimingut tegema;
3. AIRS võib kasutajates esile kutsuda kategoriseerimisprotsesse digitaalsete keskkondade süntaktiliste elementide kaudu;
4. AIRS võib mõjutada enesetaju ja teiste taju;
5. AIRS võib üheaegselt esile kutsuda kontrollitunnet ja stressi eelaimust.

Teises ja kolmandas peatükis esitatud teoreetilised ülevaated koos esitatud hüpoteesidega pakuvad väärtuslikku metodoloogilist juhatust võrdlevaks juhtumiuuringute analüüsiks.

Neljas ja viies peatükk arendavad teoreetilist ja metodoloogilist raamistikku selle kohta, kuidas kasutajad võivad kogeda tehisaru-vahendatud digikeskkondi ja kuidas kogutud andmeid saab analüüsida kvalitatiivse lähenemise põhjal, mis põhineb semiootikal. Seejuures neljas peatükk keskendub teoreetilisele raamistikule, mis on välja töötatud selle uurimuse juhtumiuuringute jaoks, põhinedes väljaütlemisaktile. Kasutajad väljendavad oma kogemusi läbi keelte ja tekstide, digikeskkondades ning loomulikus keeles, peegeldades oma suhtlust tehisaru vahendatud digikeskkondadega. Peamine fookus kasutajate kogemuste uurimisel tekstina on esile tuua isotoopiad, mis tekivad tõlgendustes ja kategoriseerimisprotsessis, mida kasutatakse oma suhtluse ja soovitussüsteemide rolli kirjeldamisel.

Kuues, seitsmes ja kaheksas peatükk keskenduvad Itaalias, Eestis ja Hollandis läbi viidud poolstruktureeritud intervjuude tavaliste isotoopiate analüüsile ja sellele, kuidas neid saab tematiseerida, et näidata tehisaru soovitussüsteemide mõju nende kasutajatele.

Üheksas peatükk esitab võrdleva analüüsi nendes kolmes riigis läbiviidud 90 intervjuu kohta ja toob esile, kuidas semiootikal ja kvalitatiivsel analüüsil põhinev alt-üles lähenemine võib viia arusaamisele üksikisikute, sotsiaalsete ja kultuuriliste mõjude osas, mida tehisaru-tööriistad nagu AIRS kasutavad digikeskkondades nagu sotsiaalmeedia.

Empiirilised leiud, mis on tihedalt seotud semiootika vahenditel põhineva teoreetilise raamistikuga, mitte ainult ei kinnita selle metodoloogia sobivust kvalitatiivse lähenemise jaoks tehisaru ja inimeste vahelise suhtluse ja üldisemalt inimese ja arvuti suhte uurimisel, vaid annavad ka ülevaate praegusest olukorrast ses valdkonnas. Empiirilised leiud näitavad, et kasutajad õpivad tehisaru-vahendatud kategooriaid tõlgendamaks argielu kogemusi. Veelgi enam, erinevad vanuserühmad leiavad erinevaid sobitumisi, mis tugevdavad tehisintellekti tööriistu, et saada stiimuleid, mis mõjutavad soovitud seisundeid kõigil tasanditel, alates keha reaktsioonidest kuni individuaalse ja sotsiaalse käitumiseni.

Empiirilistest vaatlustest selgub, et AIRS võib erineval viisil mõjutada kasutajate erinevaid vanuserühmi, sõltumata nende digitaalsest kirjaoskusest. Tulemused näitavad, et sarnased vanuserühmad toetuvad sarnastele tavadele, mida tugevdab tehisaru kui vahendaja digikeskkonnas, ja nende endi vajadused peegelduvad platvormidel leitud sobimustes (*affordances*), mida tuvastatakse kui sotsiaalmeediat. Teiste võimalike AIRS-i mõjude seas nende kasutajatele on filtrimullid ja kajakambrid. See hõlmab ka mõju meeleolule, vaimsele ja füüsilisele seisundile ning kehastumist tehisaru-vahendatud eneseväljendusele. Mõjutatud võivad olla motivatsioon ja vajadus kasutada avalikke domeene individuaalsete haavatavuste ületamiseks, enesearenduseks ja sotsiaalseks edutamiseks. AIRSi mõjul võib tekkida ärevus domineerivate elementide suhtes, mida soovitab AIRS. Samuti võivad tehisaru-vahendatud sotsiaalsed standardid ning tagasilükkamine tekitada ülestimulatsiooni ja mitme asja korraga tegemist. See võib mõjutada sotsiaalset staatust ja suhteid läbi AIRS-i manipuleeritud digiesituste. Mõjutatud võivad olla ka enesearendus, ärevus sotsiaalse surve ja võrdluse suhtes läbi tehisaru-vahendatud kategoriseerimise ning eneseidentiteet (kaasa arvatud eneseohverdamine). Loomulik suhtlus võib asenduda tehisaru-vahendatud suhtlusega, mis mõjutab professionaalset staatust ja ajakohasuse hoidmist professionaalsete uudiste osas.

Lisaks võib tekkida usaldusväärsuse probleem, deformeeritud saab nõuannete otsimine ja arvamuste kokkulangevus faktidega.
Semiootilise lähenemise rakendamine omab potentsiaali ümber kujundada tehisaru vahendatud otsustusprotsessi, pakkudes sügavamat arusaamist selles osalevatest märgisüsteemidest ja tähendusloomest. See sügavam mõistmine võib viia nüansirikkamate algoritmide ja liideste loomiseni, mis on paremini kooskõlas kasutajate kognitiivsete protsesside ja eelistustega, lõpuks parandades tehisaru-uurimise praktilisi rakendusi otsustustoetussüsteemides ja mujalgi. See uurimus kirjeldab, kuidas tehisaru soovitussüsteem võib ümber kujundada käitumismustreid ja ühiskondlikke ning kultuurilisi norme. Semiootiline lähenemine selles uurimuses aitas ühildada olemasolevaid teadmisi psühholoogias, otsustusmudelite modelleerimises, käitumisuuringutes ja kultuuriuuringutes, samuti näidata, kuidas inimese ja arvuti suhet saab täna mõista ja uurida kasutaja vaatenurgast. Samuti aitas see ületada lünka tehnoloogiale orienteeritud otsuste tegemisel, kui teadustöö keskendub peamiselt sellele, kuidas luua täiustatud lahendusi ja parandada tehisintellekti praegust taset. Selle asemel pakutakse välja kasutajakeskne otsuste tegemine, mis keskendub inimeste vajadustele ja võimetele neid tehnoloogiaid kõige optimaalsemal viisil kasutada. Kokkuvõttes rõhutab see uurimus vajadust nüansirikkamate tehisarusüsteemide järele, mis respekteerivad ja tugevdavad kasutajate toimivust ja kultuurilist mitmekesisust, luues seeläbi keskkondi, kus tehnoloogia aitab inimkogemusi rikastada, mitte neid dikteerida. Selle uurimuse tulemused kutsuvad üles terviklikumale ja inimkesksemale lähenemisele tehisaru arendamisel ja rakendamisel.

Abstract in English

How Artificial Intelligence recommender systems impact human decisions-making process

This research employed semiotic approaches to address the communication mechanisms underlying AI-mediated environments for their users, exploring how Artificial Intelligence recommender systems (AIRS) as a tool can aid and impact users' decisions, actions and behaviours. This research aimed to fill the existing gap in understanding the influence of AI on its users, focusing specifically on the impact of AIRS on individuals engaging with digital environments such as social media. It addressed the effects of daily interactions with AI on individuals across cognitive, physiological, emotional, axiological and pragmatic dimensions, with the subsequent goal of understanding how these effects shape social practices and culture. The question how AI technologies adopted to the social and cultural dynamics highlighted through main research question on how AIRS can influence human decision-making process in Chapter One.
Chapter Two aimed to understand different approaches to decision-making process. It explored how human decision-making approached among various fields and how current state of technology in AI aims to aid it.
Chapter Two analyses how algorithmic modelling within digital environment can come close to their users' decision-making. Revising dominant algorithmic approaches used in AIRS through Lotman's (2005 [1984]) theory of semiosphere and Bankov's (2020) Platfosphere, this research suggests that algorithmic approach can impact different elements of digital environments for their users. Division between centre and periphery based on syntactic features of the digital environments can impact semantic and pragmatic dimension for their users through relations to other elements within digital environments operated through an algorithm. The meaning and signification of the elements shared within digital environments can be influenced by AIRS. Further exploration of this phenomena of algorithmic meaning-making behind digital representations suggest that users may tend to accept it, holistically introducing

algorithmic values behind digital representations to their immediate physical environment. To this extent the personalisation qualities of AIRS for each user can lead users to accept statistically dominant categories mediated through selected AIRS' algorithm. This can impact users' cognitive, axiological, emotive and pragmatic dimensions, influence their identity, behaviours and practices. At this point the decision-making process become co-decision-making process between a user, AIRS, based on the input from designers and datasets. The decision-making process aided through AIRS can be described through interconnected stages of pre-decision, co-decision and post-decision between AI and social actors. Pre-decision process describes how AI models, created by groups of IT professionals and data sets, resulting from reception of post-decision process, impact users' input. Co-decision process describes the decision-making between user and AI output through an input. And post-decision process, where the AI-mediated text is used to generate new texts as a model or deconstructed to understand the underlying algorithmic process and technical, social and cultural potential of these texts.

Chapter Three revises decision-making process from a user's perspective. Adopting ecosemiotic approach, this research suggests that AI-mediated texts can be perceived as stimuli and impact users' Umwelten, their perception, recognition and interpretations. The hypotheses based on these theoretical findings suggest that this can influence users' unconscious reaction, online and offline behaviours and lead to changes in individual, social and cultural practices.

The hypothesis raised in Chapter Three suggest that AIRS as a part of communication process of digital environments can influence users in following:

1. AIRS can coerce users to conform and navigate environments despite limited knowledge
2. AIRS can compel users to multitask across multiple environments simultaneously
3. AIRS can induce categorisation processes in users through syntactic elements in digital environments
4. AIRS can influence perceptions of self and others
5. AIRS can elicit feelings of control and anticipation of stress concurrently.

The theoretical insights presented in Chapters Two and Three, along with the proposed hypotheses offer valuable methodological guidance for conducting comparative case study analyses.

Chapters Four and Five develop theoretical and methodological framework on accessing how users may experience AI-mediated digital environments and how the collected data can be analysed using qualitative approach based on semiotics. Chapter Four focuses on theoretical framework elaborated for the case studies of this research based on the act of enunciation. Users enunciate their experiences through the languages and texts, on digital environments and in natural language as a reflection on their interactions with AI-mediated digital environments. The main focus of exploring users' experience as a text is to highlight isotopies that emerge within interpretations and categorisation process used in describing their interactions and role of AIRS in it.

Chapters Six, Seven and Eight focus on the analysis of common isotopies in semi-structured interviews conducted in Italy, Estonia and the Netherlands and how they can be themed to represent the influence AIRS on their users. And Chapter Nine provides a comparative analysis between 90 interviews concluded in these three countries and highlights how bottom-up approach based on semiotics and qualitative analysis can bring closer understanding to individual, social and cultural effects of AI-tools like AIRS used on digital environments like social media.

The empirical findings that are closely connected to theoretical framework based on semiotics tools not only prove this methodology for qualitative approach in studying AI-human interactions and HCI in general but also give highlights on the current situation within the field. Empirical findings show that users learn AI-mediated categories to interpret daily experiences.

Moreover, different age categories find different affordances reinforcing AI tools to receive stimuli that impact desired states at all levels, from body reactions to individual and social behaviours.

Empirical contributions highlight that different age groups of users can be affected in different ways by AIRS, independently on their digital literacy. Findings show that similar age groups rely on similar practices reinforced by AI as a mediating agent in a digital environment and their own needs are reflected on the affordances, they find on platforms identified as social media. Among other possible AIRS effects on their users are filter bubbles and echo chambers, impact own moods, mental and physical conditions, disembodiment through AI-mediated enunciation, motivation, need to use of public domains, e.g. aesthetics, to overcome individual vulnerabilities, self-enhancement and social promotion, anxiety towards dominant elements suggested by AIRS and AI-mediated social standards and rejection, overstimulation and multitasking, impact social status and relationships through AIRS manipulations of digital representations, self-enhancement, anxiety towards social pressure and comparison through AI-mediated categorisation, self-identity (including self-victimisation) though AI-mediated categorisations, substitution of natural communication through AI-mediated one, impact own professional status and keep updated on professional news, problem of trustworthiness, advise seeking and convergence of opinions to facts.

Adopting a semiotic approach has the potential to reshape the AI-mediated decision-making process by providing a deeper understanding of the symbolic representations and sign systems involved. This deeper understanding can lead to more nuanced algorithms and interfaces that better align with users' cognitive processes and preferences, ultimately enhancing the practical applications of AI research in decision support systems and beyond. This research addresses how AIRS have capacity to redefine behavioural patterns and societal and cultural norms. Semiotic perspectives in this research helped to align existing knowledge in psychology, decision-making modelling, behavioural studies, cultural studies, to highlight how HCI can be understood and researched today from a user's perspective. It also helped overcome the gap in technology-oriented decision-making when research is mainly focused on how to create more advanced solutions and improve current state of art in AI. Instead, it proposes a user oriented decision-making focused on human needs and capacities to adopt these technologies in most optimal ways. Overall, this research underscores the need for more nuanced AI systems that respect and enhance user agency and cultural diversity, thereby fostering environments where technology serves as a facilitator of enriching human experiences rather than dictating them. The findings of this research call towards more holistic and human-centred approaches in AI development and applications.