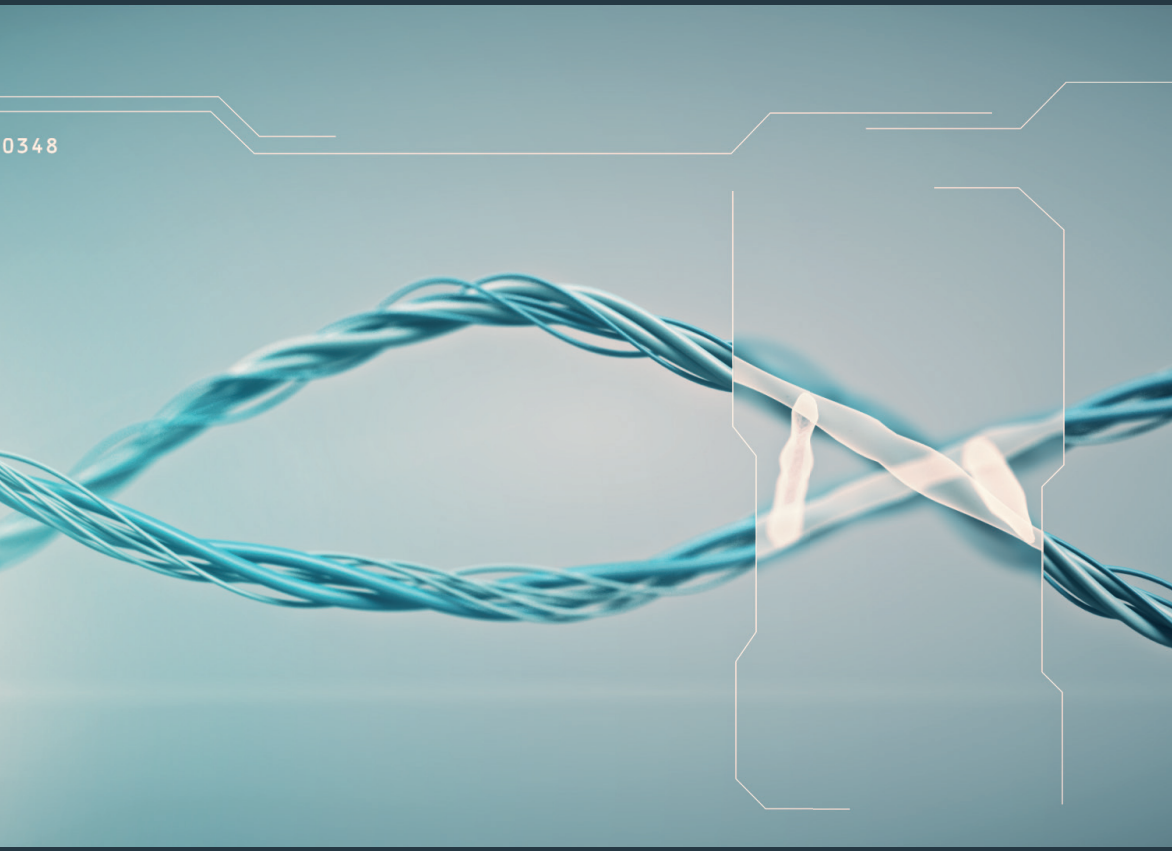
Selin Gerlek, Sarah Kissler, Thorben Mämecke
und Dennis Möbus (Hg.)

Von Menschen und Maschinen – Mensch-Maschine-Interaktionen in digitalen Kulturen

Digitale Kultur



Hagen
University
Press

Selin Gerlek, Sarah Kissler, Thorben Mämecke, Dennis Möbus (Hrsg.)

Von Menschen und Maschinen – Mensch-Maschine-Interaktionen in digitalen Kulturen

D | K

Digitale Kultur

Herausgegeben von Jennifer Eickelmann, Katrin Köppert
Peter Risthaus und Florian Sprenger

Band 1

Von Menschen und Maschinen – Mensch-Maschine-Interaktionen in digitalen Kulturen

Herausgegeben von

Selin Gerlek, Sarah Kissler,
Thorben Mämecke und Dennis Möbus

HAGEN
UNIVERSITY
PRESS

Impressum

Bibliografische Information der Deutschen Nationalbibliothek
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über http://dnb.d-nb.de abrufbar.

Die Arbeit an dieser Publikation wurde gefördert durch die Deutsche Forschungsgemeinschaft (DFG) Emmy Noether-Nachwuchsgruppe „Interaktion in der Mensch-Maschine-Interaktion“ (Projektnummer 418201802).

Cover: Sascha Senicer, Thorben Mämecke
Satzlayout: Nils Jablonski
1. Auflage 2022

ISSN 2751-4110 (Print)
ISSN 2751-4129 (Online)
ISBN 978-3-487-16202-7 (Print)
ISBN 978-3-98767-005-3 (E-PDF)
DOI 10.57813/20220620-160005-0

Der Text dieser Publikation wird unter der Lizenz Creative Commons Namensnennung –Weitergabe unter gleichen Bedingungen 3.0 Deutschland (CC BY-SA 3.0 DE) veröffentlicht.

Hagen UP (Hagen University Press)
FernUniversität in Hagen
Feithstraße 152
58097 Hagen

Einleitung **7**

Teil I: Soziale, kulturelle und ethische Folgen neuer Mensch-Maschine-Interaktion **14**

Thomas Bedorf: Maschinenhermeneutik 15

Alberto Romele: Automatic Pain Detection or the Evidential Paradigm Reversed 31

Johanna Seifert / Orsolya Friedrich: Interacting with Social Robots. Between Support, Surveillance, and New Sociality 50

Armin Grunwald: Soziale Roboter – vermenschlichte Technik und technische Menschenbilder 61

Kevin Liggieri: Anthropozentrismus in Mensch-Maschine Interaktionen 73

Jutta Weber: Brave New Kachel-World? Über Zoom-Booming, Datenkontrolle und öffentliche Infrastrukturen 94

Teil II: Digitale Subjektivierung und Sozialität **109**

Christian Leineweber: Paradoxien im Digitalen – Zum Phänomen der Mensch-Maschine-Interaktion aus bildungstheoretischer Perspektive 110

Eryk Noji: Das kybernetische Subjekt: Selbst-thematisierung im Self-Tracking 124

Selin Gerlek / Sebastian Weydner-Volkmann: Self-Tracking and Habitualization. (Post)-Phenomenological and Pragmatist Perspectives on Reflecting Habits with the Help of Digital Technologies 136

Hanna Klimpe: Politische Alltagspraktiken auf TikTok zwischen theatraler Ästhetik und Zensur durch Algorithmen 150

Teil III: Information – Daten – Wissen: Menschliche und künstliche Intelligenz in den digitalen Geisteswissenschaften 167

Almut Leh: „The answer is 42" – When Algorithms Take over Digital Memory. Experiences with Artificial Intelligence in the Archive *Deutsches Gedächtnis* 168

Tobias Hodel / Dennis Möbus / Ina Serif: Von Inferenzen und Differenzen. Ein Vergleich von Topic-Modeling-Engines auf Grundlage historischer Korpora 181

Matthias Hemmje / Dennis Möbus / Binh Vu: ADG-KM-EP: Modell einer Archivwerkbank zur Erschließung von historisch-biographischen Quellen 206

Autor:innenverzeichnis 227

ALBERTO ROMELE

Automatic Pain Detection or the Evidential Paradigm Reversed

Introduction

In this chapter, I discuss portable technologies for automatic pain detection. This is the case with the Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung* [BMBF]) LOUISA project in which I am currently involved at the University of Tübingen.[1] LOUISA is an acronym for „learning model for multidimensional quantitative movement analysis." The aim of the project is to develop a digital technology (an app for smartphones and smartwatches) for the automatic detection of pain through a multidimensional analysis of signs, or rather signals, traces, or clues of pain: artificial intelligence (AI)-driven analysis of emotions through facial movements, AI-driven analysis of body movements, electromyography, etc. My hypothesis is that by favoring the external or superficial traces of pain over the patient's words and narratives, these digital technologies risk preventing the development of „intelligent habits."

In Part 1, I discuss the communicational dimension of pain. Against a widespread tendency to view pain as personal and unsharable, I argue that pain has a communicational dimension that is as essential as its physical–neuronal and mental–emotional dimensions.

In Part 2, I present three cases of portable automatic pain detection technologies. The problem with these digital technologies, I argue, is not the externalization of pain as such but the manner in which it is achieved. Indeed, where clinical practice has traditionally understood the importance of patients' narratives of pain, these technologies give precedence to the most external and superficial traces.[2] This is an inversion of the evidential paradigm, a notion introduced by historian Carlo Ginzburg. Whereas for Ginzburg, the evidential paradigm points

---

1 Online: https://www.interaktive-technologien.de/projekte/louisa (10.1.2022).

2 On the value of narrative in medicine, see Rita Charon: *Narrative Medicine: Honoring the Stories of Illness*. Oxford 2008. On narrative and pain, see David B. Morris: Narrative and Pain: Towards an Integrative Model. In: Rhonda J. Moore (Hg.): *Handbook of Pain and Palliative Care*. Dordrecht 2013, pp. 733-751.

to a weak (though possible) epistemology, automatic pain detection technologies seem to want to establish an epistemology of pain that is more „certain" and „objective" than any knowledge of pain that might be derived from sufferers' narratives.
In Part 3, I argue that, in doing so, these technologies risk of preventing the development of intelligent habits. The concept of intelligent habits is drawn from John Dewey and the pragmatist tradition. These are plastic habits, that is, habits that can be adapted and changed according to the situation. It is also about reflexive habits in the sense that it is possible at certain times to turn conscious attention toward them. Now, my idea is that the repeated use of automatic pain detection technologies certainly has effects of habituation on the self, but these habits risk to be mechanical, and above all, insensitive to the individuality of a body and its actions in physical and social spaces.

The communicational dimension of pain

It is commonly believed that there is nothing more private than our own pain. Surely we talk about our pain to others, but we always feel that others do not understand what we are really feeling. Similarly, when we listen to others' accounts of pain, we cannot help but always feel like spectators, involved, of course, but only to a certain extent. I am sure that many of you will have had the experience of *catharsis* (that feeling of purification, based on pity and fear, that according to Aristotle, the spectator of a tragedy experiences) returning home after listening to a story of pain.
In short, pain seems to have something to do with the more authentic experience of death that Heidegger talked about, which, for him, is „always mine." Virginia Woolf talked about pain in this way: „English, which can express the thoughts of Hamlet and the tragedy of Lear, has no words for the shiver and the headache […]. The merest schoolgirl, when she falls in love, has Shakespeare, Donne, Keats to speak her mind for her; but let a sufferer try to describe a pain in his head to a doctor and language at once runs dry."[3] In her book *Giving Comfort and Inflicting Pain*, Irena Madjar writes, „[b]ecause bodily pain resists objectivation in language, this contributes to its unsharability. In other

[3] Virginia Woolf: On Being Ill. In: *The New Criterion* 4/1926, pp. 32-45.

words, pain actively destroys language, one of the culturally learned ways of being in the world with others."[4] These authors seem to believe that there is an unbridgeable gap between pain and its possibility of being shared with others through articulated linguistic expressions. Yet, that pain is a private matter, that it „destroys language," I am not quite sure. One thinks of Wittgenstein's famous argument for private language. In § 246 of *Philosophical Investigations*, he uses pain as an example:

> In what sense are my sensations private?—Well, only I can know whether I am really in pain; another person can only surmise it […] other people very often know when I am in pain.— Yes, but all the same not with the certainty with which I know it myself […] The truth is: it makes sense to say about other people that they doubt whether I am in pain; but not to say it about myself[5]

However, Wittgenstein advances the idea of private language to deny its existence shortly afterwards. In fact, he writes in the same passage, „Now, what about the language which describes my inner experiences and which only I myself can understand? How do I use words to stand for my sensations?—As we ordinarily do? Then are my words for sensations tied up with my natural expressions of sensation? In that case my language is not a 'private' one. Someone else might understand it as well […]"[6]. For him, there is no inner word, no inner experience, which is not always already forged by the language we use to describe it to others as well as to ourselves. As far as pain is concerned, we could then say that the way of saying pain has an impact on the ontology of pain itself. It is precisely this that I call the communicational dimension of pain in the sense that pain would be ontologically constituted, at least in part, by the way it is said and communicated within a certain linguistic, social, and cultural milieu.

The communicational element of pain is as fundamental as its other dimensions, namely the physical–neuronal and the mental–emotional. On the unity of the latter two, consider that the Greek term *algos* which

---

4 See Irena Madjar: *Giving Comfort and Inflicting Pain*. London/New York 1998, p. 40.

5 Ludwig Wittgenstein: *Philosophical Investigations* [1953]. Oxford 1958, p. 89.

6 Ibid., p. 91.

means physical pain as well as concurrent woe, ill, and misery. Therefore, in his brief introduction to pain, Rob Boddice writes that „[m]odern concepts that favor a dualistic tradition of mind and body do no more justice to the Greek *algos* as our separation of the concepts of speech and thought does to *logos*."[7] The unity of physical and mental pain is also demonstrated by the cognitive sciences. In his book *Feeling Pain and Being in Pain*, Nikola Grahek precisely distinguishes, through the analysis of puzzle cases such as pain asymbolia, between feeling pain and being in pain, or between painfulness and pain. However, his major thesis is that these elements need each other:

> In the first case [pain without painfulness], pain comes to nothing, because it does not carry out any meaning [...]. In the second case [painfulness without pain] pain comes to such indeterminacy that it loses informativeness about the location, intensity, and source [...]. So, as far as the two basic components of human pain experience are concerned, it is obvious that both of them are necessary, but neither of them is a sufficient condition for pain. The two phenomena give us *real* [emphasis added] pain only when they work together.[8]

I believe that in addition to these two basic components of human pain, there is a third element, which is the communicational element of pain. In this regard, in an article entitled „Pain and Communication" from which I have also taken some of the references above, the Stan Van Hoof writes:

> Certainly the experience [of pain] is irreducibly subjective. My pain is radically my own. But how do I learn to call it pain? I do so by noting that the way in which the term „pain" is used in the public domain is in order to describe a person who is grimacing, holding his mouth and making a dental appointment, or a person who has suffered an injury to his leg and is hobbling to a surgery for treatment. When such persons say they are in pain, they are not only expressing their inner state, they are also, in effect, teaching me what the word „pain" means. I will then be able to use the term to describe my own inner states when I suffer such or similar injuries, engage in similar behaviours, and experience hurtful sensations[9].

---

7 Rob Boddice: *Pain: A Very Short Introduction*. Oxford 2017, p. 43.

8 Nikola Grahek: *Feeling Pain and Being in Pain*. Cambridge (MA) 2012, p. 111-112.

9 Stan Van Hoof: Pain and Communication. In: *Medicine, Health Care and Philosophy* 6/2003, p. 255-262, p. 258-259.

Of course, this does not mean that people are always able to communicate their pain. The communicability of pain is instead understood as a challenge, which Van Hoof himself describes as such: „in the case of pain, the ethical challenge is to reopen the patient's world so as to break open the isolation into which their pain has forced them. In the clinical context, empathy, or compassion is the form that this challenge takes. Communication of and about pain must therefore be possible"[10]. Therefore, I speak here of the communicational dimension of pain and not of the actual possibility of communicating pain. In my opinion, this perspective is relevant because it allows giving a general ethical framework to many biases related to the measurement and evaluation of pain when dealing with underrepresented and marginalized social groups or with patients who, for whatever reason, cannot communicate their pain. In both cases, there is ample evidence, for example, that they receive less palliative pain care than they should. It can be hypothesized that this gap is due to the failure to recognize a communicational dimension of pain and the ethics that come with it.

Certainly, there is nothing wrong with wanting to objectify one's own pain and the pain of others. The words, often metaphors, that we use to describe pain are already, in effect, the first objectification of pain. In this sense, the attempt made with the McGill Pain Questionnaire to „domesticate" these words and metaphors is admirable.[11] Incidentally, the very fact that the questionnaire is effective for English but has proved problematic when translated into other languages (such as Arabic) shows that there is a deep link between pain and language.[12] Pain scales – the verbal rating scale (VRS), visual analogue scale (VAS), and numerical rating scale (NRS) – also have their legitimacy because the

---

10 Van Hoof: Pain and Communication, p. 260.

11 Boddice: *Pain: A Very Short Introduction*, p. 107 describes the McGill Pain Questionnaire (developed by Ronald Melzack and Warren Torgerson in 1971) in this way: „It was the first elaborate medical assessment technique for the quality of a person's pain experience to put control in the hands of the patient herself. The pain questionnaire grouped adjectives and metaphors of pain into categories of intensity and then divided the categories along the lines of sensation, affect, evaluation, and miscellaneous, combining these with a diagrammatic location of the pain on a representation of the body and a general appraisal of other symptoms and general lifestyle."

12 See Ann Harrison: Arabic Pain Words. In: *Pain* 32/1988, pp. 239-250.

objectivation of pain paves the way to the possibility of treating it clinically. It could be said that all practices of pain objectification do nothing but prolong the process of externalization of pain that, considering its communicational dimension, is essential to pain itself. The problem, if anything, is in the way pain is externalized: there is in fact a breaking point beyond which the externalization of pain no longer has anything to do with its communicational dimension. This is exactly what is likely to happen with portable technologies for automatic pain detection.

Automatic pain detection and the evidential paradigm

Today, there is a growing development of portable technologies for automatic pain detection. Most are based on the recognition of facial movements using the 2D camera of a smartphone and a machine learning algorithm. Such technologies fall into the field of gesture recognition and, more specifically, of emotion recognition from face gestures, which belongs also to the field of affective computing. There is, for example, the application PainCheck,[13] which is used to recognize pain in patients who cannot verbalize pain (such as patients suffering from severe forms of Alzheimer's disease). This technology works like a smartphone application. By placing the camera of the smartphone in front of the patient, the application, which uses an artificial intelligence (AI) algorithm, recognizes micromovements of facial muscles that can reveal a state of pain. In addition to this fully automated facial recognition technology, the caregiver will manually select five other fields and possible signs of pain for each of them: voice, movement, behavior, recent activity, and the body domain. For each, the caregiver can choose among several predefined domains. For example, in the case of the body: profuse sweating, pale/flushed, feverish/cold, rapid breathing, painful injuries, and painful medical conditions are choices. The system summarizes these multiple features into an overall pain severity rating, ranging from no pain to mild to moderate or severe pain.
Another example is the Fraunhofer-funded project called PainFaceReader,[14] which is based on the Facial Recognition Software

[13] Online: https://www.painchek.com/uk/ (10.1.2022).

[14] Online: https://www.iis.fraunhofer.de/en/ff/sse/imaging-and-analysis/ils/shore-medicine/ils-painfacereader.html (10.1.2022).

SHORE[15] and the Facial Action Coding System (FACS). The aim of the project is similar to that of the previous project, but here the emphasis is on the fact that the system also has to work in the absence of medical staff, thus reducing costs. These are two passages from the presentation of the project (from the „Objective" and „Background" sections, respectively): „our goal is to create an autonomous system that can automatically detect pain in patients who are unable to communicate – and do so in a timely manner and when medical staff are not present" and „the proposed system is to function autonomously so that medical staff are called only in an emergency, which means more targeted use of personnel while reducing costs."

However, the use of FACS is scientifically, technically, and ethically problematic. FACS is a system used to taxonomize human facial movements by their appearance on the face. According to Kate Crawford,[16] FACS is based on scientific hypotheses that have never really been demonstrated empirically. The first problem is the disputable claim that all humans exhibit a small number of universal emotions or affects that are innate, and cross-cultural. The second is the likewise disputable claim that emotions or affects are accurately recognizable through facial expressions. If we consider the economic, social, and political role that automatic facial recognition plays today, the scientifically fragile ground on which it rests cannot but be even more worrying.

It is to avoid or at least mitigate some of the risks associated with emotion recognition from facial gestures that the LOUISA project proposes a „multidimensional" approach. LOUISA will also work with a smartphone and its camera to which a smartwatch can be added. LOUISA will also use emotion recognition from facial gestures. However, the idea is to integrate this with other elements, such as body movement analysis and electromyography.

There are also scientific, ethical, and technical problems regarding the other dimensions that LOUISA is intended to measure. For example, the motion analysis is based on the use of the neural network PoseNet

---

15 Online: https://www.iis.fraunhofer.de/en/ff/sse/imaging-and-analysis/ils/tech/shore-facedetection.html (10.1.2022).

16 See Kate Crawford: Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence. Yale 2021, pp. 165-169.

(in its faster but less accurate version MobileNet, in its improved version called MobileNet 100) to roughly determine the user's position, to which is added the more reliable convolutional neural network ResNet50 combined with the Smoothing Filter created by members of the project in the context of the AIMO app.[17] ResNet50 has been trained on more than a million images from the ImageNet database, the latter still an object of criticism by Crawford and Paglen[18]. These authors write that „when it was finished, ImageNet consisted of over 14 million labeled images organized into more than 20 thousand categories. For a decade, it has been the colossus of object recognition for machine learning and a powerfully important benchmark for the field" (n.p.). According to the authors, the problem with ImageNet is that its underlying structure is based on the semantic structure of WordNet, a database of word classifications developed in the 1980s at Princeton University. They show how the semantic structure of WordNet is full of social and cultural biases, in particular with regard to the classification of people, and how these same biases recur in the classification of images of people in ImageNet, which contains 2,833 subcategories under the category „person." Some of these are ethically problematic: Bad Person, Call Girl, Drug Addict, Closet Queen, Convict, Crazy, Failure, Flop, Fucker, Hypocrite, Jezebel, Kleptomaniac, Loser, Melancholic, Nonperson, Pervert, Prima Donna, Schizophrenic, Second-Rater, Spinster, Streetwalker, Stud, Tosser, Unskilled Person, Wanton, Waverer, and Wimp.

But, what I want to talk about here concerns LOUISA and all such pain detection technologies in what I call the inversion of the evidential paradigm. The concept of the evidential paradigm was introduced by Carlo Ginzburg in an article entitled „Clues: Roots of an Evidential

---

17 AIMO app is the major product of AIMO, the start-up that is co-funding the LOUISA project: https://aimo-fit.com/. At the core of the app there is an algorithm that scans body movements (squats) and rates their quality.

18 Kate Crawford/Trevor Paglen: Excavating AI: The Politics of Images in Machine Learning Training Sets. In: *AI & Society* 2021. Also available at https://excavating.ai/ (10.1.2022).

Paradigm."[19] The English term „evidential" can be misleading, precisely because the paradigm of which Ginzburg speaks has nothing to do with evidence – from the Latin *evidens*, meaning „obvious to the eye or mind." The Italian term is *indiziario*, *indiciaire* in the French version of the article – closer, although not equal to „index" in Peirce's sense. As for „clues," it translates the Italian „*spie*," a strange term that means, at the same time, „spies" and „warning lights." In French, three words are even used in the title, „*Signes, traces, pistes*." Finally, the German version talks about „*Spurensicherung* – although the term „*Indizienparadigma*" is then used in the text.[20]

Ginzburg's text begins with a description of the Morellian method. Giovanni Morelli, an Italian art historian in the second half of the nine-

---

19 See Carlo Ginzburg: Clues: Roots of an Evidential Paradigm. In: *Clues, Myths, and the Historical Method* [1986]. Baltimore 1989, pp. 96-125.

20 Trace (*Spur* in German, *trace* in French, *traccia* in Italian, *rasto* in Portuguese) is probably the best term to use here. For an introduction to the concept of trace, its attributes, and epistemologies, see Sybille Krämer: Was also ist eine Spur? Und worin besteht ihre epistemologische Rolle? Eine Bestandaufnahme. In: Sybille Krämer/Werner Kogge/Gernot Grube (ed.): *Spur: Spurlesen als Otientierungstechnik und Wissenskunst*. Frankfurt a. M. 2016, pp. 11-33. She points out that the evidential paradigm is only one of the possible epistemologies of the trace, alongside those of elementary orientation techniques, trace memory, trace metaphysics, and trace in hard and natural science. I would instead place all these epistemologies under the aegis of the evidential paradigm, with the exclusion of the metaphysics of trace—what Krämer (Sybille Krämer: Immanenz und Transzendenz der Spur: Über das epistemologische Doppelleben der Spur. In: Krämer/Kogge/Grube (ed.). *Spur*, pp. 155-181, p. 157) calls an „*Entzugsparadigma* (Withdrawal paradigm)." For Ginzburg, the trace is the first element of a weak but possible epistemology. For the metaphysicians of the trace (Heidegger, Levinas, and Derrida), it is the first element of an ultimately impossible epistemology. By placing all the other elements within Ginzburg's evidential paradigm, I think I am arguing in favor of and, at the same time, against Ginzburg himself. I am arguing in favor of him, because for him the evidential paradigm is, as will be discussed below, far older than its codification in the second half of the nineteenth century. I am arguing against him, because the evidential paradigm is read by Ginzburg, as it will be shown below, in opposition to the Galilean paradigm. However, as Krämer (Was also ist eine Spur?, p. 26) notes, science studies in the last 30 years have shed new light on the work of scientists in the hard and natural sciences. It has been discovered that their knowledge is not so much constituted from objects as from the traces of these objects that are recorded by machines and that allow the supposition of the existence of those objects. In short, hard and natural sciences are much more engaged in evidential practices than Ginzburg seems willing to admit.

teenth century, was concerned with the attribution of paintings. Museums, he said, are full of misattributed paintings. The problem is that in order to attribute a painting to its artist, it is not necessary, as was mostly done at the time, to look at the most obvious and therefore easiest to imitate features of a painting: the eyes to the sky of Perugino's characters, the smile of da Vinci's portrait subjects, etc. Rather, it is necessary to look at the more apparent insignificant details where the influence of the school that the master belongs to is less marked: the lobe of an ear, the nails, the shape of the fingers, etc. Ginzburg also refers to Freud (who was inspired by Morelli) and Conan Doyle as other inventors/discoverers of the evidential paradigm: it is no coincidence that all of these people had medical training.

The evidential paradigm is not, to tell the truth, an invention of the second half of the nineteenth century. One thinks of Hippocratic medicine. Indeed, writes Ginzburg:

> man has been a hunter for thousands of years. In the course of countless chases, he learned to reconstruct the shapes and movements of his invisible prey from tracks on the ground, broken branches, excrement, tufts of hair, entangled feathers, stagnating odors. He learned to sniff out, record, interpret, and classify such infinitesimal traces as trails of spittle[21].

The evidential paradigm would explain the historical emergence of a number of disciplines that are aimed at deciphering a variety of different signs, from the symptoms of a disease to writing. At the heart of these disciplines would be a certain „epistemological fragility." They are in fact opposed to the Galilean apodictic paradigm. The evidential disciplines do not fall within the criteria of scientificity proposed by the latter. They are based on conjecture and on the value of the individual, while the Galilean scientific method is oriented toward the reproducibility of the phenomenon and therefore its mathematical abstraction. Ginzburg's attempts to induce us to recognize the scientific legitimacy of the evidential paradigm, not in spite of, but because of its epistemological fragility.

We live in a time when the boundaries between the humanities and the sciences are blurring, largely due to the use of computation and the

---

21 Carlo Ginzburg: Clues, p. 102.

wide availability of digital data. On the one hand, the humanities are increasingly using computation and digital data to detect patterns where previously only the genius of the individual was seen. On the other hand, the sciences are becoming less theory-centric and more data-centric. This distinction is introduced by Sabina Leonelli in her entry „Scientific Research and Big Data" for the *Stanford Encyclopedia of Philosophy*.[22] The overabundance of digital data (which should rather be called „digital traces") is saturating the evidential paradigm and ends up reversing it. The presence of too many digital traces cancels the trace, which is ontologically a presence-absence. Krämer presents this ontological status of the trace in terms of „*Zeitenbruch* (timebreaking)": „The trace indicates something that is irreversibly gone at the time the trace is read. The being of the trace is its having-been (*Gewordensein*)."[23] According to Sebbah, „in a sense, it [the digital trace] 'presentifies' more than any type of traces; one might believe that it saves the ghosts of the past better than any other; but, by saving them too much, it consumes them."[24] Thus, it happens that the research based on digital traces or clues claims to be more „certain" and „objective" than what their evidential nature allows it to be. However, and this is central for

---

22 Sabina Leonelli: Scientific Research and Big Data. In: *Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/entries/science-big-data, 10.1.2022, n.p. writes: „[For the former], scientific knowledge consists of justified true beliefs about the world. These beliefs are obtained through empirical methods aiming to test the validity and reliability of statements that describe or explain aspects of reality. [...] However, much recent philosophy of science, and particularly modelling and experimentation, has challenged theory-centrism by highlighting the role of models, methods and modes of intervention as research outputs rather than simple tools, and stressing the importance of expanding philosophical understandings of scientific knowledge to include these elements alongside propositional claims. The rise of big data offers another opportunity to reframe understandings of scientific knowledge as not necessarily centred on theories and to include non-propositional components. One way to construe data-centric methods is indeed to embrace a conception of knowledge as ability, such as promoted by early pragmatists like John Dewey [...]."

23 Krämer: Was also ist eine Spur?, p. 17.

24 François-David Sebbah: Traces numériques: plus ou moins de fantômes? In: Claire Larsonneur et al. (ed.): *Le sujet digital*. Dijon 2015, pp. 114-127, p. 124. I have extensively discussed digital traces in Alberto Romele: *Digital Hermeneutics. Philosophical Investigations in New Media and Technologies*. New York/London 2020, p. 75-80.

the sake of my argument, there does not even need to be an overabundance of digital traces or clues for this to happen. Even before a technological change, we are in fact facing a change in terms of imaginaries, world pictures, or worldviews.

This is precisely what happens or could happen, in my opinion, with automatic pain detection technologies. Whether the digital traces are many or few, whether they are collected diligently or not, and whether they are superficial or deep, it matters little. The digital traces of pain become a means of access to a reality of pain that is truer than any experience of pain that can be narrated. In short, it seems that the ability of a machine to read the interiority of external or superficial signs is superior to the ability of a human being to look inside themselves. We do not trust what a person (or ourselves) can say about their pain, but we are increasingly willing to trust a machine to do it for us, reading the symptoms without, as they were, listening to the words. The evidential paradigm is inverted because fragile epistemology makes a claim to radical strength and truth. The link with the communicational dimension of pain is broken. We must beware. The problem is not that we credit symptoms that are themselves communicational. The problem is that we want to make the analysis of these symptoms something fundamentally anti- and even meta-communicational – as if the symptoms of pain were not always already part of its communicational dimension.

In the automatic detection of pain, we can then see in some way the realization of a dream whose roots lie in the pseudoscience of physiognomy and phrenology of Cesare Lombroso. It is not by chance that it is in a Lombrosian atmosphere that the first instruments for the „objective" measurement of pain (algometers and dolometers) were developed in the second half of the nineteenth century.[25] Indeed, the idea of phrenology was that external signs (in that case, skull shapes) were manifestations of an inner nature (for Lombroso, the criminal mind). There is no room here to go into the meanderings of a story that, from physiognomy and phrenology led, via the work of the neurologist Guillaume-Benjamin Duchenne at the Salpetrière asylum in Paris, to the 1978 publication of FACS by Ekman and Wallace Friesen—this story

[25] See Boddice: Pain, p. 97-100.

is told in detail by Crawford.[26] I can only add that the attempt to objectify pain by analysis of outward signs and signals such as facial and body movements probably played no small role. Consider the work of another French neurologist, Jean-Martin Charcot, also at the Salpetrière asylum, on hysteria (Charcot, in fact, was a student of Duchenne). The imaging (through photography) of an inner supposed disease such as hysteria was one of the major issues for Charcot, precisely because showing the disease, „blocking" it in the photograph so to speak (facial grimaces, body contractions, etc.), also meant being able to quantify it to study it scientifically. Giving visibility to the interior of that malady, that pain that was hysteria, was Charcot's clinical and pedagogical promise writes Georges Didi-Huberman[27]. One cannot see a diseased brain functioning, but one can find on the symptomatic body the effects of the disease and the pain it causes. On the same page, Didi-Huberman writes: „How could all this passion be produced from figures of pain? This is the crucial phenomenological problem of approaching the body of the Other and of the intimacy of its pain. It is the political problem of the *spectacular interest* paid by the observed in return for the 'hospitality' (the hospital's capitalization) that he enjoys as a patient. It is the problem of the *violence of seeing* in its scientific pretensions to experimentation on the body."

Intelligent habits

Miranda Fricker's concept of „epistemic injustice,"[28] particularly in the sense of „testimonial injustice," seems to be a very effective way to explain what can happen with the use of such technologies. The expression „testimonial injustice" indicates when a person says something to a listener, and this listener does not attribute an adequate level of credibility to the word of the speaker. With automated pain detection technologies, it is clear that the risk is to no longer believe in the

---

26 Crawford: Atlas of AI, see above.

27 Georges Didi-Huberman: The Invention of Hysteria: Charcot and the Photographic Iconography at the Salpetrière [1982]. Cambridge (MA) 2003, p. 8.

28 Miranda Fricker. *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford 2007. On pain, epistemic justice, and narrativity, see Daniel Z. Buchman/Anita Ho/Daniel S. Goldberg: Investigating Trust, Expertise, and Epistemic Injustice in Chronic Pain. In: *Journal of Bioethical Inquiry* 14/2016, pp. 31-42.

patient's words. One can only imagine the ethical implications if similar technologies were to be used by a medical insurance company, employer, or medical staff who might experience, for instance, a release from their responsibilities (I must not decide, the technology does!), especially the responsibility to practice what Fricker herself calls the „virtue of testimonial justice."[29]

In this context, however, I want to try a different route, centered on the concept of „intelligent habits" proposed by John Dewey. My idea is that the use of automatic pain detection technology does have habituation effects on the self, but that these habits are more mechanical than anything else, insensitive to the individuality and individual experience of pain.

To bridge the gap between Fricker's epistemic injustice and Dewey's intelligent habits, I turn to Shannon Sullivan, and in particular to her chapter „On the Harms of Epistemic Injustice" for the *Routledge Handbook of Epistemic Injustice*.[30] The author refers directly to Dewey not to deny but to integrate the concept of epistemic injustice that, according to her, tends to rely on a representational account of knowledge (i.e.,

---

[29] Of course, this does not mean simply believing what the patient says, nor to trust one's own intuitions or even competences as a member of the medical staff. In a lecture given in 2015 at the University of Sheffield, Fricker addresses the issue of epistemic injustice in healthcare (online: https://www.youtube.com/watch?v=duNAXfOAvK0). She distinguishes between evidential stance and trusting stance. The former concerns „all symptoms ready for expert interpretation" while the latter „take patient's word for it." According to Fricker, the doctor has to move between them. We all do it to some extent, but doctors have to do it under much more complex conditions. The doctor has to trust the patient, but they do not have to trust the patient completely because of their scientific training and competence as a doctor. They have the responsibility of care, not to mention stress (e.g., fear of failure) and often times poverty. In medical practice, there are basically two extremes. The first is epistemic objectivation, that is, treating a patient as nothing more than a body of evidence. The second is epistemic shirking, that is, failure to assume expert responsibility for judgments made. The epistemic virtue of medical practice would be, in this respect, the golden mean between the two. In the case of automatic pain detection, however, the relationship is not one of two (the patient on one side, with their stories, the doctor on the other side, with their skills) but of three, because there is a technology – which remains, at least in part, a black box to the doctor.

[30] See Shannon Sullivan: On the harms of epistemic injustice. In: Ian James Kidd/José Medina/Gaile Pohlhaus (Hg.): *The Routledge Handbook of Epistemic Injustice*. New York/London 2017, pp. 205-212.

knowledge understood as a piece of information, an accurate representation of the world that can be deposited to and withdrawn from a common account). For Dewey, knowledge is not representational but transactional. According to him, „knowing is not a process of mirroring reality, but instead an activity undertaken by a bodily organism-in-the-world who helps shape what is known"[31]. „Pragmatist philosophies," she says, „understand human knowers as necessarily embodied and thus inevitably situated and perspectival beings"[32]. In the perspective opened by Dewey, the truth value does not depend on whether or not a statement adheres to the world; the criterion is „whether, when acted upon, a claim brings about the desired transformations in the world. If it does, it is true, and if it does not, it is false"[33]. From this, Sullivan derives the idea that „the harm of epistemic injustice is a harm done to the flourishing of a human organism, rather than an unfair exclusion from a process of pooling knowledge." In other words, the real harm of epistemic injustice „is that the speaker isn't allowed to epistemologically transact with the world in ways that enable her own, as well as others' flourishing"[34].

For Dewey, habits are not incidental, but an essential element of human existence. Human beings are their own habits. Habits refer to the wide variety of responses, patterns, and ways in which we engage in our worlds, from physical ones to mental ones. For Dewey, habits are always context responsive. In the first pages of *Human Nature and Conduct*, Dewey writes, for example, that „[w]alking implicates the ground as well as the legs; speech demands physical air and human companionship and audience as well as vocal organs [...]. They are things done by the environment by means of organic structures or acquired dispositions."[35] But our habits can lose their responsiveness, thus locking us into patterns of action that inhibit our abilities to live creatively in complex social situations. Intelligent habits are habits that remain „open"

---

31 Ibid., p. 205.

32 Ibid., p. 207.

33 Ibid., p. 208.

34 Ibid., p. 210.

35 John Dewey: Human Nature and Conduct. In: Jo Ann Boydston/Murphey G. Murphey (Hg.): *The Middle Works of John Dewey, 1899-1924* (vol. 14). Carbondale 1988, p. 15.

to possible changes of situation, stable in time but not locked in patterns that are destined to repeat themselves, always identical. Dewey writes, a little further on, that „while it is admitted that the word habit has been used in a somewhat broader sense than is usual, we must protest against the tendency in psychological literature to limit its meaning to repetition [...]. Repetition is in no sense the essence of habit"[36]. To be intelligent, habits must be plastic[37]; to be plastic, they must imply a certain degree of self-awareness. In the case of bodily habits, we can speak of body awareness, as the pragmatist philosopher Richard Shusterman does.[38] In my case, I would speak of pain awareness. It may seem strange to speak of pain awareness as something that can improve the flourishing of an individual. Is not pain something we really do not want to think about? Is it not precisely when we focus on our pain that we do not increase but decrease our opportunities for flourishing? When I speak of pain awareness, I am not talking about constant attention but rather about attention that is always possible. Reactivating or not, this awareness is not something mechanical, but rather depends on what could be called a *virtue of pain awareness* that teaches us when it is right for us and for others around us to bring the attention toward our pain and when it is not.[39]

---

36 Ibid., p. 32.

37 For an extended discussion on intelligent (or plastic) habits, see Peter J. Nelsen: Intelligent Dispositions: Dewey, Habits and Inquiry in Teacher Education. In: *Journal of Teacher Education* 66/2014, pp. 86-97. He presents the Dewey's perspective in these terms: „Dewey helps us to understand how dispositions can be *both* relatively stable and unchangeable while also simultaneously subject to educational influence. A disposition to act in a certain way can appear rigid and unchanging if the agent perceives the action as offering a valued response to a given situation (whether that perception is conscious or not). In contrast, when a response is less entrenched, less rigidly habituated, there is much more openness to considering alternative response strategies" (90).

38 See. Richard Shusterman: *Body Consciousness: A Philosophy of Mindfulness and Somaesthetics*. Cambridge 2008.

39 Shusterman (*Body Consciousness*) distinguishes among four levels of body awareness: (1) primitive modes of grasping that we are not really consciously aware of at all, (2) conscious perception without explicit awareness, (3) a third level in which we are consciously and explicitly aware of what we perceive, whether such perception is of external objects or of our own bodies and somatic sensations, and (4) a fourth level in which „we are not only conscious of what we perceive as an explicit object of awareness but we are also mindfully aware of this focused consciousness as we

My thesis is that by tearing pain away from its communicational essence and by approaching pain from the side of symptoms instead of narratives (and considering symptoms as truer than any narrative), these technologies are indeed able to change the patient's bodily and mental practices, but the risk is that this will happen in a mechanical rather than intelligent way. I believe that this is the paradox of so-called „personalized medicine": even if it is more and more personalized, it is often quite indifferent to personalities, that is, to the styles with which each individual brings on stage their being in the world in a given situation.

On another occasion with a colleague, we coined the concept of „digital *habitus*".[40] The notion of *habitus* is inspired by Pierre Bourdieu's sociology. Compared with Dewey's habits, Bourdieu's *habitus* has a more markedly social nature – which is not to say, however, that Bourdieu forgets its bodily and mental dimensions. Moreover, their major difference lies in the fact that while Dewey insists on the plasticity of habits, Bourdieu insists on the static nature of *habitus*. For him, *habitus* is the continuous reiteration, from individual to individual, from generation to generation, of those conceptual, practical, and emotional patterns that depend on the social class or group one belongs to. Our idea has been to use Bourdieusian *habitus* to describe the effects of habituation of the self resulting from the repeated use of digital technologies. Indeed, through the articulation between algorithms and big datasets that is at the heart of contemporary digital media and technologies, individuals are systematically reduced to general tendencies – clusters – for example, in terms of musical tastes, access to information, purchases of productions, or even sexual desires. We have spoken of „personalization without personality" where the concept of personality is borrowed from Gilbert Simondon, who used it to indicate the principle that gives unique style to each human process of individualization.

For the same reason, one could also speak of „digital anti-hermeneutics of the self," in the sense that if individuals are reduced to generic

---

monitor our awareness of the object of our awareness through its representation in our consciousness." (p. 55-56)

40 See Alberto Romele/Dario Rodighiero: Digital habitus or Personalization without Personality. In: *Humana.mente* 37/2020, pp. 98-126.

tendencies, then they are reduced to their sameness without any consideration for their selfhood – where „sameness" and „selfhood" correspond to identity-*idem* and identity-*ipse* as discussed by Paul Ricœur.[41] In terms of the role of digital technologies in automatic pain detection, I would say that they can certainly help to correct pain, but the risk is that such correction remains on the „mechanical" side of sameness without any consideration for the „plastic" side of selfhood.

Conclusion

In this chapter, I have discussed digital technologies for automatic pain detection. In Part 1, I have dealt with the communicational nature of pain, which means that the ontology of pain (including any expression of pain) is always linguistically determined. I do not mean to say that pain is anything other than language, neither are fully the linguistic the external and superficial signals of it. It just means that one must consider language, culture, and society as elements that essentially contribute to the ontology of pain. In Part 2, I have talked about the inversion of the evidential paradigm in automatic pain detection. For Ginzburg, the evidential paradigm points to a weak (though possible) epistemology; automatic pain detection technologies seem to want to establish an epistemology of pain that is more „certain" and „objective" than any knowledge of pain that might be derived from sufferers' narratives. In Part 3, I have introduced the concept of intelligent habits, borrowed from Dewey. While automatic pain detection can certainly promote forms of mechanical habits, it is much less certain that they can also promote forms of intelligent habits, and hence the flourishing of a human organism.

I would like to conclude this chapter by saying that, for me, this is not an intrinsic limitation of automatic pain detection technologies. Indeed, the next step after this criticism will consist of proposing the implementation of design solutions capable of considering the communicational nature of pain, that is, its subjective (narrative) dimension as well as its contextual dimension. I think this is exactly what we are trying to do in the LOUISA project. At this moment, for example, we

---

41 See Alberto Romele: Digital Hermeneutics as Hermeneutics of the Self. In: *Discipline filosofiche* 30/2020, pp. 187-203.

are starting to run the experiment in the lab for multidimensional pain analysis. Our test subjects will perform a series of movements (based on a decisional tree that has been previously defined), and various parameters will be measured through 6 electromyography (EMG) sensor on the body (connected, via Bluetooth, to the DICAM software[42]). In addition, the tests will be filmed in order to allow for the analysis of body and face movements. Now, already at this level, we are working in the direction of a subjectification and contextualization of pain, at least in three ways: (1) first, progress in the decision tree (now as in the final application) is determined not only by automatic analysis, but also by the feeling of the patient, who is asked (a) whether they felt pain during the movement and (b) where they felt pain; (2) second, in addition to using the six EMG sensors on the body, we are studying a way to add another sensor with which the subject can report (a) the exact moment of pain emergence and (b) its intensity for them; and (3) at the beginning and the end of the experiment, test subjects respond to questionnaires administered through the painPool platform.[43] The questionnaires are based on the *Deutscher Schmerz-Fragebogen* (German Pain Questionnaire[44]), which considers not only the physical but also the psychological and social dimensions of pain. Of course, it is not yet clear, apart from the case of (1), how these elements will be algorithmically „translated" into an application for smartphones and smartwatches. There are obviously many risks of over-simplification. And even if the tool were sufficiently robust and fair, equally great and perhaps even greater are the risks of using it in inappropriate contexts. Eliminating, or at least mitigating, these risks is one of the major tasks we have set for ourselves in this project.

---

42 Online: https://diers.eu/en/products/dicam-software/ (10.1.2022).

43 Online: https://www.manula.com/manuals/smart-q/painpool/1/de/topic/was-ist-painpool (10.1.2022).

44 Online: https://www.schmerzgesellschaft.de/schmerzfragebogen (10.1.2022).