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Toward a Cultural Evolutionary Psychology: why the evolutionary approach does not imply determinism or reductionism

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1791414> since 2022-07-14T07:53:55Z

Published version:

DOI:10.1007/s12124-021-09613-z

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I corrected Gray in Gray & Watts e De Luca Picione in 2020 and I added Ossorio's reference.

Toward a Cultural Evolutionary Psychology: Why the Evolutionary Approach does not Imply Reductionism or Determinism

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Abstract

Does evolutionary psychology (EP) properly account for the sociocultural context? Does it underestimate both the developmental and the relational aspects of the human psyche? Is it instantiated in a mechanistic epistemology? Does it imply determinism or reductionism? The commentaries on our previous *target article* raised similar questions and we try to tackle them in the current response. Our “epistemological assessment” of Psychology and our consequent unification claim under the banner of the evolutionary approach (Zagaria et al., *Integrative Psychological and Behavioral Science*, 54(3), 521–562, 2020) was deeply examined and discussed. The objections to our *target article* can be grouped into four main categories. We sum them up and argue why: 1) the pre-paradigmatic status of psychology is a problem rather than a richness of perspectives; 2) EP's criticisms stem from common misconceptions

—furthermore, *developmental* and *relational* aspects of human psyche might find their natural explanation in EP; 3) EP does not wipe out the emergence of the *sociocultural* context as something qualitatively different; 4) evolutionary meta-theory is not incompatible with *subjectivity*. Evolutionary psychology might be approached with caution and curiosity, rather than with prejudicial concepts. Incorporating some legitimate cultural criticisms, it may aspire to become a “cultural evolutionary psychology”, hence an integrative psychological meta-theory that tries to connect the biological “plane of existence” (Henriques, *Review of General Psychology*, 7(2), 150–182, 2003; ~~2011~~) to the cultural “plane of existence”. However, a basic philosophical concern has yet to be answered, i.e. what ultimately constitutes mind and thus the “psycho-logical” science. We argue that when trying to find the answer we know where to look at.

AQ2

Keywords

Evolutionary psychology
Criticisms of evolutionary psychology
Cultural evolutionary psychology
Determinism
Reductionism
Theoretical psychology

Our *target article* (Zagaria et al., 2020), assessed the “epistemological precariousness” of Psychology and proposed a way out, namely, Evolutionary Psychology (EP). Twenty-four commentaries have been published so far (Baucal & Krstić, 2020; Brinkmann, 2020; Chaudhary & Sriram, 2020; De Luca Picione, 2020; Di Nuovo, 2020; Gamsakhurdia, 2020; Gozli, 2020; Jensen, 2020; Loredo-Narciandi & Castro-Tejerina, 2021; Lundh, ~~2021~~2020; Marsico & Calandrini, 2020; Martí, 2020; Märtsin, 2020; Mascolo, 2021; Mazur, 2020; Mironenko & Sorokin, 2020; Misra et al., 2021; Morioka, 2020; Pinheiro, 2020; Smedlund, 2021; Tateo, 2020; Toomela, 2020; Uher, 2021; Wu & Xu, 2020). We were flattered to have received such a wide variety of comments: following the Socratic tradition, we believe that one of the main features of scientific inquiry is its *dialogical* process. This new paper might serve as a further point of discussion, as scientific inquiry must be constantly reflecting on itself.

The *target article* received mixed feedback, as well as alternative resolutions to the “problem” highlighted. Following the editorial guidelines requesting to

condense our reply in a single paper, we summarized the most transversal criticisms as follows:

- 1) First criticism: the shakiness of our “epistemological assessment” and the precariousness of labelling Psychology as a “soft” science;
- 2) Second criticism: the alleged scientific weakness of EP, its alleged threat to the *developmental* and *relational/systemic* aspects of human experience and its alleged *epistemological* shortcomings;
- 3) Third criticism: the alleged failing of EP to properly account for the *sociocultural* processes as qualitatively different;
- 4) Fourth criticism: the alienation of the *subjective* experience implied by EP

Beginning with the first issue, we will argue that the epistemological condition of Psychology seems to be really *pre-paradigmatic* and thus really “different” from the “harder” sciences. This condition rather than being an instance of scientific pluralism, ends up being a confounding problem. Regarding the second issue (“*reframing evolutionary psychology*”), we will maintain that criticisms of evolutionary psychology often stem from misconceptions. We will explain why evolutionary psychology does not underestimate the *systemic* nature of human beings nor the *developmental* one (“*reframing the development and the environment*”) and we will try to solve the epistemological criticisms through the concept of “psychological adaptation” (“*reframing the epistemology of EP*”). Getting to the third issue (*the “socio-cultural” problem*), we will attempt to explain why evolutionary psychology alone can account for the existence of the “sociocultural” plane of existence along with the concepts of person, meaning and sense-making, thus becoming a “cultural evolutionary psychology”. Finally, (i.e., fourth issue) we will argue that evolutionary psychology is not incompatible with *subjectivity*.

Psychological Science is *not* OK

The first criticism addressed the “epistemological assessment” attempted in our target article (Zagaria et al., 2020). Several commentaries claimed that psychology is intrinsically a “poly- paradigmatic”, “nomadic”, “ecologic” and “pluralistic” science, and that these epistemological characteristics prevent it from inevitably degenerating in a positivistic and non-dialectic discipline (Brinkmann, 2020; Chaudhary & Sriram, 2020; Loredano-Narciandi & Castro-Tejerina, 2021; Märtsin, 2020; Mironenko & Sorokin, 2020; Misra et al., 2021; Tateo, 2020; Uher, 2021).

Our sentence “the concept of scientific pluralism has been mistaken for the unrestrained proliferation of perspectives” (Zagaria et al., 2020, p.524) was indeed meant to address similar concerns. In a post-modern fashion, the only consensus in Psychology seems to be that there is no consensus – and that there should not be (Henriques, personal communication, February 2021). We will argue that this opinion is misplaced.

School of Thoughts not Reflecting the Swiss-Knife Ideal

The argument for Psychology remaining multi-paradigmatic and why this would be a merit is best described in the commentary by Mironenko and Sorokin (2020). The authors asserted that psychology's multi-paradigmatic status can be as functional as a Swiss-Knife, in that it is composed of different parts that work in harmony (Mironenko & Sorokin, 2020). This analogy seems to derive from shaky assumptions. The authors wrote “No science maintains the status of a paradigm sustainably” (Mironenko & Sorokin, 2020, p. 605). We agree and we did specify that “It is widely accepted that the scientific inquiry is a process of constant reviewing and redefining of its constructs (Kuhn, 1970)” (Zagaria et al., 2020, p. 529). This includes as well replacing an old paradigm with a new one. Psychology however has yet to enter a paradigmatic stage (Zagaria et al., 2020, p.533-534). The authors’ arguments then seem to be misleading.

Mironenko and Sorokin (2020) then maintained that:

“In most sciences, several paradigms coexist, for instance, in physics, which is often seen somewhat like an ideal science. Newton’s mechanics is still the major theoretical basis for engineering tasks. Fast processes in the Universe (as fast as the speed of light) call for relativity theory – a different “paradigm” (p. 605).

We partly agree. It is true that two paradigms - quantum mechanics (not Newton’s mechanics)¹ and general relativity - coexist in physics without undermining its status of “hard science”. It is also true that quantum mechanics and general relativity are not yet unified in a standard model and indeed one of the main theoretical aims of contemporary physics is to reconcile them. Why is this argument not applicable when it comes to Psychology? The answer echoes the one given above: Psychology has not even entered a paradigmatic stage yet; there are no different paradigms, only “school of thoughts” (Zagaria et al., 2020 p.530-534). As a consequence, it can not be said that different paradigms *co*-exist, because they do not seem to *exist*, if framed in Kuhn’s terms (Kuhn, 1970).

If this argument were still not accepted, and systemic theory, positive psychology, phenomenology, psychoanalysis, etcetera, were to be regarded as

paradigms, the comparison sustained by Mironenko & Sorokin would still not hold. Physical paradigms are domain-specific: if the subject matter is a quark, quantum mechanics will be the paradigm adopted. If the subject matter is the speed of light, relativity theory will be called into play. This would likely happen with no debate. Also, in order to build a house, Newton's mechanics will be sufficient. Now, we shall translate this example in psychological science.

When considering *a single phenomenon* the difference can be seen quite immediately. Take for instance an "intrusive thought" in OCD psychopathology. No single theory and no single specialist would be considered the most appropriate to scientifically approach it. Almost all psychologists could claim that they can study an "intrusive thought". A psychoanalyst will conceptualize it in so many ways as the number of existing sub-schools of the psychoanalytic tradition.² On the other hand, a biological psychologist would stress the *psychophysiological activity* underlying the subjective report of the "intrusive thought". Depending on her personal scientific view, psychoanalytic explanations will be ridiculed or refused (accepted only in a minority of cases). On the other hand, a psychoanalyst could accept the biological theory or reject it. A systemic clinician would claim that the *familiar context* is the best frame to understand the "intrusive thought". A phenomenologist would claim that the starting point has to be the *subjective experience*, rather than any theory or biological substrate. And so on...

Thanks to this example it is our hope to have shown that *the starting point* and the *ending point* of a psychological explanation are perpetually changing. *Sometimes* psychological theories can be complementary, though the epistemological focus is hardly ever the same. The evocative image of a "Swiss knife" (Mironenko & Sorokin, 2020, p.610) symbolizing poly-paradigmatic Psychology can only work if every theory is complementary and harmonic. Psychological theories are hardly ever so. On the contrary, they are competing with or mutually excluding one another. Every school of thought claims the primacy of its own view; and the practical therapeutic moves follow as such. Rather than working smoothly together like the parts of a Swiss Knife the school of thoughts' theories would stumble on one another eventually breaking the device into pieces. None of this would ever happen in physics, chemistry or biology, pluralistic thought notwithstanding. To restate: "scientific pluralism has been mistaken for the unrestrained proliferation of perspectives".

Additionally, in our assessment of the psychological "core-constructs", which are outlined with discordant and inconclusive definitions (Zagaria et al., 2020) - we have not dealt with "introductory books" as such, (Mironenko & Sorokin, 2020), but we have operationalized, in line with an influential tradition in

epistemology (e.g. Cole, 1983, 2001), the “core” of Psychology. We furthered our analysis with biblio-metric measures (Fanelli, 2010, 2020; Fanelli & Glänzel, 2013; Simonton, 2004). These measures have been recently replicated (Fanelli, 2020; Simonton, 2015).³

Another critique about our epistemological assessment has been the post-modernist-constructivist instance by Pinheiro (2020), Smedlund (2021), Jensen (2020) and Chaudhary and Sriram (2020). According to the authors the conceptual “problem of psychology” (Henriques, 2011, ch. 2) will never be solved due to the always-in-construction and intersubjective nature of language. The authors assert that no definitive psychological vocabulary can be developed because human vocabulary is always situated socially, and thus relative. We do acknowledge the importance of the Person-Culture “plane of existence” (Henriques, 2003, 2011, ch.6; see "The Socio-Cultural Context: Meaning and Person" section of the current paper). However, we do not share the post-modernist instance conferring epistemological priority to Culture over the other planes of complexity (e.g. Smedlund, 2021).⁴ Of course psychological concepts undergo cross-cultural variation, but without an underlying “universal” component, there would be no scientific process. Without a stable/universal component, there is no space for replicability, intersubjectivity-objectivity and falsifiability, the epistemological pillars of Science (Zagaria et al., 2020). If Psychology aims to be a science, it does need a shared and fixed vocabulary.

Moreover, it should be noted that many scholars who dedicated their academic life to the study of the epistemological status of Psychology reached the same conclusion: Psychology is a *fragmented* discipline in need of a unification or, at least, a re-naming (e.g. Koch, 1993; Toomela, 2007a, b; Henriques, 2011, ch.1-2).

Reframing Evolutionary Psychology

“The opposition arises, as Darwin himself observed, not from what reason dictates but from the limits of what the imagination can accept”

G.C. Williams (1996, p.3-4)

Criticisms against EP risk to be unsurprising. Although they might appear reasonable at a first glance, they usually stem from theoretical misconceptions. We discuss them here.

The first criticism can be led back to a well-known controversy: the “*panglossian paradigm*”, as baptized by a corner-stone paper in EP's history, *The Spandrels of San Marco and the Panglossian Paradigm* (Gould & Lewontin, 1979). In other words, like Dr. Pangloss, the overly optimistic character of Voltaire's *Candide*, an evolutionary psychologist would manifest the same unrealistic beliefs, in this case being overly *adaptationist*. The tautological reasoning and forced teleology in which a panglossian evolutionary psychologist could easily slip could be roughly summarized as follows: 1) every psychological trait exists because it was selected 2) it was selected because it was adaptive. The psychological adaptation and its related selective pressure might then constitute a “just-so-story” (Gould, 1978), a speculative confabulation lacking rigorous empirical testing.

Some commentaries (e.g. Brinkmann, 2020, p. 591, 592; Tateo, 2020) exposed a “panglossian” criticism. The core of the objection makes sense; however it has already been faced by evolutionists. First, the evolutionary perspective *does not* assume that *all* physical and psychological traits *are adaptations* (Buss et al., 1998). Evolution can shape the phenotype in several ways. These phenomena are (Buss et al., 1998; Buss, 2019, ch.2)

1. *adaptations*: traits whose function was designed by evolution
2. *by-products or “spandrels”*: traits whose function has not been designed by a selective pressure, nevertheless “carried along” with the evolved beneficial traits.
3. simple *noise*: the product of *casual* forces affecting the phenotype, such as random mutations, environmental insults or environmental sudden change

In everyday terms, the umbilical cord is an adaptation, the belly button is a by-product and the shape of the belly button is noise (Buss et al., 1998; Buss, 2019, ch.2). Note as well that an adaptation can be co-opted for a different function than the one it had been originally designed for (e.g. the birds' feather originally evolved for thermal regulation but have been subsequently selected for flying), a phenomenon called *co-opted adaptation* (Buss, et al., 1998). The same phenomenon can happen to a by-product, which originally had no specific adaptive function but subsequently ended up serving one and as such being selected thereafter (*co-opted spandrel*). These two different phenomena are usually grouped under the term “*exaptations*”, which is in fact an “historical” conceptual distinction about their phylogenetic path (Buss et al., 1998; Gould & Vrba, 1982). To complicate this tortuous scenario, psychological adaptations useful in the Pleistocene might no longer be adaptive in current times. This is better known as *evolutionary mismatch*: the exemplum par excellence being the

nutritional preference for high calorie-sugars, which probably has been adaptive in ancestral times, but that can easily prove itself as a problematic factor in health-related issues in our contemporary society (e.g. obesity). To restate: all our psychological traits are not adaptive by default, they might be different phenomena, which nevertheless find their place in evolutionary theory. For a thorough analysis of the concept of adaptation, see "Reframing the Epistemology of Evolutionary Psychology" section.

Finally, Brinkmann, (2020) borrowing Tim Ingold's words (reference within), argued that discussing genes' "aims" is a "problematic anthropomorphism" (p. 591). This can be regarded as part of the *teleological* problem, a major issue in theoretical biology. Evolution, like many other scientific phenomena, can be understood through teleological metaphors, when in reality it has no scope. The scopes do not belong to evolution but are nevertheless useful in scientific reasoning. In fact, we specified in our work (Zagaria et al., 2020) that the "word "aim" is used in a deliberately metaphorical fashion, we do not imply teleology for genes" (2020, p. 538, footnote 20)

Genes do not "reason", "plan", or have "aims" at all. Trying to psychologize subcellular units would be naive; when we talk about genes' "aims" that is done in a purely educational fashion; because, as human animals, we seem to have been designed to better understand concepts when they are presented teleologically (Tooby & Cosmides, 2015). Genes do not have aims, at least in *mentalist* terms.

Reframing the Environment and the Development

Another major issue of contention is the *unit of selection* of evolution. Due to space limitation, in the target article we did not dwell extensively on this topic. We adopted a "genic selection" paradigm, claiming that evolution acts on genes. It may be questioned what was meant by "unit of selection". This concept is used with different meanings (Lloyd, 2020). First, the selected "unit" includes genes as well as their phenotypic effect (without them, no selection would be possible) (*the interactor issue*); another issue regards the exact amount of genome that is passed through generation as a single "unit" (*the replicator issue*); thirdly, it could be asked which is the beneficiary of the adaptations (*the beneficiary issue*); and finally, at what level do adaptations occur (*the manifestor of adaptation issue*) (Lloyd, 2020).

Several criticisms to our target article misinterpreted these different issues (Brinkmann, 2020; Smedlund, 2021), while Lundh (2021~~2020~~) appreciated the distinctions. Following Dawkins, when we stated that evolution acts on genes we

intended that evolution seems to maximize the benefits on genes (Lloyd, 2020). *According to this specific meaning alone*, genes are the units of selection.

We are in line with Brinkmann's (2020) words: "Natural selection, when it works, works on organisms in environments, and not on genes" (p. 591) (*interactor issue*). We do not think that natural selection can discriminate genes without "filtering" them through their phenotypic-environmental effects. The environment is not underestimated at all, we do not intend by any means the "genotype (...) as a context independent" (Ingold, p.234, cit in Brinkmann, p. 591). We can talk about genes as units of selection *as long as they are the only beneficiary of adaptations*. However, according to this meaning, it is almost impossible to shadow the importance of the environment, as the environment itself is the *major driver* of evolution. Evolution is at its core a process of adaptation to the environment.

The environment can be reflected faster in the genome also through the so-called *Baldwin Effect*. James Mark Baldwin and his principle of "organic selection" has been largely cited in our commentaries to contrast EP (Gamsakhurdia, 2020; Loredano-Narciandi & Castro-Tejerina, 2021; Marsico & Calandrini, 2020; Valsiner, 2020). However, this came to us as a surprise, because we believe that Baldwin Effect is in great harmony with EP.

The Baldwin effect is the "natural" (genetic) incorporation of "cultural" processes (learning behavior). As adamantly explained by Dawkins (2015) in a series of educational videos, the Baldwin Effect can be understood through the behaviors of *thrushes* and *blackbirds*. Thrushes smash the shells of snails to eat them, on the contrary, their congeneric blackbirds are not able to do so. The idea underlying the Baldwin Effect is that a bird, ancestor to the thrushes, learned how to smash a snail (the same not having happened for blackbirds). The other "ancestral" thrushes copied the first "smashing-behavior", and got an advantage (they succeeded in eating the snail without its shell). As a consequence, the behavior spread, because it brought rewards. Thrushes, then, continued to learn, even from one generation to the next. The individuals which learned faster were more likely to eat, and thus to survive and have offspring. Any genetic predisposition to learn how to smash shells would have been then facilitated by natural selection. By the end "natural selection, by choosing genes over many generations, would eventually build into the gene pool a skill which started out as a learned skill" (Dawkins, 2015, 1:57)

We did not explicitly mention the *Baldwin Effect* in our previous paper, though, we do know that it accounts for the incorporation of cultural practices in nature. Regarding the focus on this concept by many commentaries (e.g. Loredano-

Narciandi & Castro-Tejerina, 2021; Marsico & Calandrini, 2020), we do not understand why this effect alone, even if embedded in a richer theory of development (“organic selection”), could be a competitive meta-theory. A meta-theory has to account for all the manifold sub-disciplines of psychology (e.g., personality psychology, psychopathology, general psychology, neuroscience) and not only for the developmental branch. It has to explain the epistemological relationships with the other sciences as well (e.g., physics, biology, anthropology). We do not understand, indeed, why some authors (e.g. Loredo-Narciandi & Castro-Tejerina, 2021; Marsico & Calandrini, 2020) claimed Baldwin's theory as an “alternative” version of evolutionary psychology. The *Baldwin Effect* is currently embedded in mainstream evolutionary biology (and thus in EP).

A further common correlated critique of evolutionary psychology is that it underrates ontogenetic processes in spite of phylogenetic ones, thus underestimating “nurture” (environment) in front of “nature” (Brinkmann, 2020; Loredo-Narciandi & Castro-Tejerina, 2021; Marsico & Calandrini, 2020; Martí, 2020; Tateo, 2020). Actually, this asymmetry is not endorsed by many evolutionary scholars, especially evolutionary anthropologists, such as Micheal Tomasello. Tomasello clearly claims that what makes us human is primarily “cultural” (and thus “ontogenetic”) than “natural” (“phylogenetic”) (Tomasello, 2019). He furthermore explicitly labels his approach as “*neo-vygotskian*”, thus linking his approach to Vygotsky, who has been largely cited by our critics to undermine the evolutionary approach as a meta-theory (Baucal & Krstić, 2020; Gamsakhurdia, 2020; Loredo-Narciandi & Castro-Tejerina, 2021; Mironenko & Sorokin, 2020; Morioka, 2020; Tateo, 2020; Toomela, 2020). Intersubjectivity, which has been legitimately claimed as a defining feature of psychology (e.g. Mascolo, 2021), seems to have its root in evolutionary processes and in the need to sync up with other fellow humans in ancestral times (Zagaría et al., 2020). The work by Tomasello, on the other hand, extensively focuses on ontogenetic processes and on the “cultural origins of human cognition” (Tomasello, 1999) while steadily resting on evolutionary assumptions.

Moreover, the latest innovations in evolutionary theory, like Extended Evolutionary Synthesis (EES) and Developmental Evolutionary Biology (Evo-Devo)⁵ stress the importance of development in determining phylogenesis (Laland et al., 2015; Pigliucci & Müller, 2010). Though not incompatible with the main tenets of Modern Synthesis (MS) theory, EES and Evo-Devo have a preferential emphasis on ontogeny and on life-history strategies. This leads to different conceptions and different predictions. For example, EES compared to MS, predicts that (Laland et al., 2015):

1. “phenotypic accommodation can precede, rather than follow, genetic change, in adaptive evolution” (EES) instead of “genetic change causes, and logically precedes, phenotypic change, in adaptive evolution” (MS) (p.10)
2. "novel phenotypic variants will frequently be directional and functional” (EES) instead of “genetic mutations, and hence novel phenotypes, will be random in direction and typically neutral or slightly disadvantageous” (MS) (p.10)
3. "novel, evolutionarily consequential, phenotypic variants will frequently be environmentally induced in multiple individuals” (EES) instead of “isolated mutations generating novel phenotypes will occur in a single individual” (MS) (p.10)
4. "in addition to selection, adaptive variants are propagated through repeated environmental induction, non-genetic inheritance, learning and cultural transmission” (EES) instead of “adaptive variants are propagated through selection” (MS) (p.10)

EES is an *interactionist* account of evolution. It emphasizes the relationship between the phenotype and the environment. It focuses on development and social learning as well. So far we have seen that EP’s critics often risk to endorse *straw-man* arguments, i.e. reasonings that depict an account (of EP) which is false, and then undermine it.

There is another fundamental issue that is often neglected by EP’s critics when considering the environment from an evolutionary perspective. The evolutionary paradigm is not incompatible with cognitive theories that focus primarily on the environment and on the body, as proved eloquently by Louise Barrett (2011) in her book *Beyond the brain: How body and environment shape animal and human minds*. Barrett rejects from an evolutionary perspective the computational postulation (*mind as computer*) and implements a *gibsonian* ecological approach, thus strengthening the importance of the *systemic* and *dynamic* interactions between the brain, the body and the environment. Barrett does that with the use of the Gibsonian concept of “*affordance*”, explicitly referring to the “*loopiness*” of behavior (Barrett, 2011, ch.6).

The author endorses the *e-cognition* paradigm (“e” standing for *embodied*, *embedded* or *enlarged*). Mind, according to this perspective, does not work like a computer; it is more like a “Watt Governor”, a sort of dynamic machine composed by the mind, the brain, the body and the environment (Barrett, 2011, ch.7). Cognition is embodied and embedded in an environment; the only way it

can be fully understood is by taking these relationships into account. Keeping all of this in mind, we do not understand the allegations of reductionism as an inherent part of evolutionary theory.

Another basic concept regarding ecology is widely mentioned in Louise Barret's work. This is the *Umwelt* (“environment” in German). The notion of *Umwelt* was firstly introduced by the biologist Jakob von Uexküll in the first half of the twentieth century. Uexküll conceives the *Umwelt* as the world perceived from the particular animal, juxtaposing it to the *Umgebung* (“surroundings” in German), the world seen from the third person perspective. The *Umwelt* can be understood directly through Uexküll's words:

“...we must first blow, in fancy, a soap bubble around each creature to represent its own world, filled with the perceptions which it alone knows. When we ourselves then step into one of these bubbles, the familiar meadow is transformed. Many of its colorful features disappear; others no longer belong together but appear in new relationships. *A new world comes into being* [emphasis added]. Through the bubble we see the world of the burrowing worm, of the butterfly, or of the field mouse; *the world as it appears to the animals themselves, not as it appears to us* [emphasis added]” (Von Uexküll, 1992, p.319).

The example offered by Uexküll is the world “seen” by a tick. “The tick does not recognize a mammal as we might from its size, four-leggedness, or furriness” (Wynne & Udell, 2013 p.18): it is *the odor of butyric acid* alone, emanated from the skin of these animals, that reveals their class. Once fallen onto the mammal, the “tick searches for a clear patch of skin so that she can burrow into her prey for a blood. At this stage, it is warmth alone that tells the tick she is heading in the right direction” (Wynne & Udell, 2013 p.18). The tick’s experience is radically different from the human one. Evolutionary theory legitimizes the idiosyncratic experience rather than denying it.

AQ3

Treating the organism and the environment as a whole of feedback loops, Uexküll has been a precursor of cybernetics and biosemiotics (Lagerspetz, 2001).⁶ Focusing on the subjective experience of every animal, he also largely influenced the phenomenological approach (Buchanan, 2008).⁷ Hence, evolutionary theory does not shadow the environment-organism interactions while acknowledging the idiosyncratic aspects of experience.

AQ4

In conclusion, EP is traditionally charged with allegations of reductionism and determinism, but if we take a closer look what we come to realize is that it does not imply them, rather, it frees us from anthropocentric prejudices and ideologies. The allegations of reductionism and determinism stem both from misconceptions and from the identification of EP with the “Santa Barbara” approach - which however is not “the only game in town” (Barrett et al., 2014, 2015; Zagaria et al., 2020). A “broad sense” EP (Mameli, 2007), on the contrary, seems to inherently imply an *interactionist* and *systemic* account of the psychological processes. This contrasts the allegations made by Chaudhary and Sriram (2020), De Luca Picione (2020), Gamsakhurdia (2020), Märtsin (2020), Mascolo (2021), Morioka (2020), Tateo (2020) and Wu and Xu (2020).

Reframing the Epistemology of Evolutionary Psychology

Many commentaries addressed the alleged epistemological weakness of EP (Chaudhary & Sriram, 2020; Gamsakhurdia, 2020; Martí, 2020; Mascolo, 2021; Mazur, 2020; Mironenko & Sorokin, 2020; Tateo, 2020; Uher, 2021). We will focus on the commentary by Aaro Toomela (2020) who manages to brilliantly summarize all the main criticisms. Toomela substantially agrees with our “epistemological diagnosis” of Psychology while disagreeing on the evolutionary proposal. However, he does not dismiss evolutionary theory due to some internal theoretical or empirical inconsistencies. Instead, he accuses both the quantitative and the qualitative methodology of contemporary mainstream psychology (EP allegedly included).

“[in hard sciences]it is agreed that questions determine what methods of study should be used and that new kinds of questions require new methods of study. In these sciences it would be absurd to choose a method of study first and adjust questions to the methods. The latter approach, adopted in mainstream psychology, is absurd from any logical perspective” (Toomela, 2020, p. 566-567).

This instance resembles what Koch (1981) coined as Psychology's *epistemopathic* tendency, i.e., the exclusive focus that emerged in the second half of mid-twentieth century on statistical and experimental methods, regardless of the discussion on the “ontology and nature of psychological phenomena” (Brinkmann, 2020, p. 590). Toomela's theorization is extensively presented in several publications (e.g. 2007a, 2007b, 2009, 2010, 2011, 2012); what we might offer here is a mere summary. To briefly summarize, Toomela claims that the scientific status of Psychology, quantitative analysis especially, can only allow

for *predictions*, whereas the “understanding (...) why the events were related” (Toomela, 2020, p. 567) can not be achieved. In other words, we can say that an event x can predict, with a variable amount of probability, the event y , but the real connections between the two events are too *broad* and *complex* to be claimed as *ontologically* relevant as it happens in physics, chemistry or biology.

“The nature of the studied things or phenomena” (Toomela, 2020, p.5) is left aside, because it is not what the actual statistical or qualitative analysis can achieve. Being or not being a “realist” (believing that what science studies is the “true reality” or believing that science is a mere approximation of reality), would change little here: there is certainly a better *material “anchor”* (borrowing Toomela's words again) in sciences like physics, chemistry or biology. Furthermore, quantitative analysis does not account for qualitative differences between phenomena, while often qualitative differences are foundational to the structure and the function of a given mechanism. Toomela (2010) makes a clear example borrowing concepts from biology:

“One extra chromosome does not just end up with more proteins; it ends up with qualitatively different pathologies, depending on the chromosome. It is also not meaningful to postulate a continuous quantitative series of events in the following continuum: one chromosome missing – the normal number of chromosomes – one extra chromosome in addition to the normal set” (p.5)

According to the author, neither *quantitative* analysis nor mainstream *qualitative* analysis could account for qualitative differences (Toomela, 2011). Posing the method before the question is absurd, we do not question the author on that. The limitations of quantitative and qualitative analysis are equally undoubtable, though we believe that the overall consideration Toomela has about them is too pessimistic. Quantitative analysis following a concept of efficient causality (Toomela, 2010, 2012) is far from useless. This is not our main reply though, as we believe that the epistemology of EP might not be in contrast with the basic features of the *structural-systemic* approach, which is the privileged way suggested by Toomela to overcome the “epistemopathic” *impasse* above mentioned.

This structural/systemic epistemology was popular in Europe before WWII and was associated with scholars like Vigogtsky and Lurija (Toomela, 2010, 2012). In addition to the study of efficient cause, it aims to understand what the *parts* of

the studied structure are, how they can *relate to each other* making emerge the *whole*, and in which direction the structure *develops* (Toomela, 2012).

These three components (“elements/structure”, “relationships/whole”, “development”), to whom the efficient cause (fourth component) is added, can be reframed in Aristotle's terms to be more evident (Toomela, 2010, 2012).

According to Aristotle, there are four types of causes: *material*, *formal*, *efficient*, and *final* (Aristotle, 1941).

1. The first – *material*—is the material “substratum” (e.g. the bronze of which the statue is made): in Toomela’s reframing, *the elements/structure*
2. the second one – *formal*—is the specific formal aspect of the phenomenon, i.e. how the different parts are interrelated to one other (e.g. what the statue eventually represents): in Toomela’s reframing, *the relationships* between the elements/*the whole*
3. the third – *efficient*—is the modern and most widespread notion of causality (e.g. the bronze assuming a form because it is scraped by the chisel): in Toomela’s reframing, *still the efficient causality*
4. the fourth – *final*—is the *aim* the statue is construed for (e.g. celebratory or political reasons): in Toomela’s reframing, *the development*

Of course, these categories are not mutually exclusive, on the contrary, they need each other for a complex outline of causality. Toomela suggests that *all* Aristotle’s causes have to be called into play in order to get successful scientific explanations (Toomela, 2012). According to Toomela (2020), the methodology of EP is limited to one of the four concepts of causality introduced by Aristotle: the *efficient causality*, that hinders a real understanding of psychological phenomena.⁸ We do not share the author's opinion.

The concept we will mainly use to confute Toomela's consideration of EP is known as *adaptation*. Adaptation is a foundation of modern evolutionary biology (e.g. Buss, 2019; Williams, 1996). Broadly speaking, *adaptation* corresponds to “*adaptive trait*”, even if its meaning might be different.⁹ An adaptation is a “integrated structure” (...) “well engineered to solve its particular adaptive problem” (Tooby & Cosmides, 2015, p. 24). It manages to achieve that with *precision* (it addresses one specific problem), *reliability* (its activation is consistent through different contexts), *economy* (in standard conditions, its expenditure of energy does not harm the organism) and *efficiency* (its expenditure of energy is well-suited for the given problem) (Williams, 1996; Buss, 2019, ch. 2). *Psychological* adaptations, specifically, are adaptations

involving the mind.¹⁰ Psychological adaptations can be identified as a *design evidence* through a process of *reverse engineering* (Tooby & Cosmides, 2015, p.30-33). The process is the following: first, “one starts with an adaptive problem encountered by human ancestors including what information would potentially have been present in past environments for solving that problem (i.e., its *information ecology*)” (Tooby & Cosmides, 2015, p.31) then, “hypotheses can be formulated about what kinds of programs might actually have evolved” (Tooby & Cosmides, 2015, p.31) to solve the problem with *economy, efficiency, precision* and *reliability* (Buss, 2019; Williams, 1996). Finally, the presence of adaptations can be tested empirically (Tooby & Cosmides, 2015). Crucially, psychological adaptations should a) unequivocally show the evidence of a special design, b) be very unlikely to be designed by random processes alone c) not be purportedly related to other traits as an exaptation or a by-product (Tooby & Cosmides, 2015). Adopting a classic analogy, the adaptation is like a key surprisingly fitting a lock (the adaptive problem situated in the environment). It is unlikely that the key fits the lock without an underlying specific design (hence, the name *reverse engineering*.)

The paradigmatic example of a psychological adaptation may be the primates' “fear module” for reptiles.¹¹ The aversion against snakes *et similia* has been found among humans and many other primates; it is well-documented and has demonstrated robust empirical findings against competing proposals (Öhman & Mineka, 2001; Simpson & Campbell, 2015). Other proposed psychological adaptations with considerable empirical support are mechanisms implicated in survival (e.g. preference for sugars; aversion against new foods; sex differences in spatial abilities; freezing, fleeing, fighting, etc.) in mating processes (e.g. male preference for women with low waist-to-hips ratio, female preference for a man with stable resources, etc), in parenting and in kinship (e.g. sex difference in parenting's investment etc.) as well as in group living (e.g. cheater-detector module) (Buss, 2019). This list's aim is merely to show a bunch of significant adaptations, not to highlight the most important ones. For a proposed taxonomy of psychological adaptations see Balachandran (2011). This taxonomy is built upon the theoretical guidelines for the evaluation of evolved psychological mechanisms (Schmitt & Pilcher, 2004).

In the end, how does all of that relate to Toomela's concerns? Our idea is that the concept of psychological adaptation is the best candidate to represent the concept of psychological “*parts*” (Aristotle's material cause). Psychological adaptations are *constrained*, i.e. they have specific boundaries and can be separated one from another. They could not exist in themselves without differentiation and specificity. This allows an epistemology which is seeking for parts, “atoms” upon which more complex processes arise.

The second structural-systemic postulate is the emerging *whole* (Aristotle's final cause, that is, the irreducible system that arises from the interactions between the more foundational parts). Psychological mechanisms interact in complex ways and comprehend super-ordinate and self-regulation mechanisms as well (e.g. Del Giudice, 2018; Buss, 2019, ch.1, 2). Therefore the psychological whole could be easily referred to as “epistemologically emergent”, i.e., not completely predictable by the more basic adaptations. Following the e-cognition paradigm, Barrett (2011) explains how adaptations might be integrated in a more general, coherent whole made of the brain, the body and the environment.

Regarding the third kind of cause (efficient cause), Toomela acknowledges it as the only one being properly investigated by mainstream psychology (EP included).

Getting to the fourth cause (Aristotle's final cause, reframed by the structural-systemic approach as “development”), Toomela recognizes how the epistemology of EP accounts for it; in his opinion, the developmental dimension highlighted by EP is the phylogenesis (Toomela, 2020, p. 568). It is noteworthy that the evolutionary approach might also account for ontogenesis, as we argued earlier. EP could thus be coherent with the basic features of the “structural/systemic” approach.

Eventually, we address the alleged “epistemopathic” attitude of EP, which poses the methods before the questions. We think this a wrong allegation. The actual process is the opposite. As we argued earlier, typical evolutionary hypothesis: a) starts with an adaptive problem faced by humans during Pleistocene (e.g. avoiding maladaptive mutations of inbreeding); b) makes an hypothesis about a possible well-designed adaptation (e.g. avoiding sex with close relatives, which implies a “kin detection” mechanism influencing the sex attractiveness of potential mates) c) estimates what kind of information was relevant in ancestral times – *information ecology* (e.g. hunter-gatherers' social and family life) d) just finally (Tooby & Cosmides, 2015) the presence of adaptations can be identified

“using methods from cognitive, social, and developmental psychology, cognitive neuroscience/neuro-psychology, experimental economics, cross-cultural studies—*whichever methods are most appropriate for illuminating programs with the hypothesized properties* [emphasis added]” (p.31).

The methodology clearly stems from the hypothesis rather than constraining it *a priori*. The allegations of “epistemopathy”, consequently, are not consistent.

In conclusion, we have to specifically address the criticism made by Tateo (2020), who states that EP implies a *binary logic*, which rigidly counterposes one concept vs another (e.g. nature vs nurture; stimulus vs response; qualitative vs quantitative, etcetera...), without accounting for continuum, boundaries, or “grey zones”. However, as clearly put by Tooby and Cosmides (2015) evolutionary psychology rejects the inflexible dichotomies between “instinct versus reasoning, innate versus learned, biological versus cultural, nativist versus environmentalist” (p.33). There is an ongoing interaction between these two concepts (nature and nurture), as well as between the entities they refer to. The difference, although not absolute, is meaningful and useful in scientific explanations.

The Socio-Cultural Context: Meaning and Person

If we had to pinpoint the most transversal criticism to our target article, it would have to be the *cultural criticism*, an argument such as: “ human beings are also cultural beings, and EP can not account for cultural processes as something qualitatively different” (Baucal & Krstić, 2020; Chaudhary & Sriram, 2020; De Luca Picione, 2020; Gamsakhurdia, 2020; Gozli, 2020; Martí, 2020; Mazur, 2020; Morioka, 2020; Wu & Xu, 2020). Due to the length of our previous target article, we could not explore this issue further. This response is a chance to elaborate our perspective, that is somehow unorthodox compared to mainstream naturalism. We will borrow some excellent analysis by the American theoretical psychologist Gregg Henriques to outline our reply.¹²

First, we are aware that the problems about the “overextension of biological metaphors and methods” to cultural studies have a long history (Gray & Watts, 2017). For example, Steven Jay Gould (2010, as cited in Gray & Watts, 2017, p.7849) famously stated:

“Human cultural evolution proceeds along paths outstandingly different from the ways of genetic change... Biological evolution is constantly diverging; once lineages become separate, they cannot amalgamate (except in producing new species by hybridization—a process that occurs very rarely in animals). Trees are correct topologies of biological evolution... In human cultural evolution, on the other hand, transmission and anastomosis are rampant. Five minutes with a wheel, a snowshoe, a bobbin, or a bow and arrow may allow an artisan of one culture to capture a major achievement of another”.

This powerful claim in fact contains some misconceptions (see Gray & Watts, 2017 for further details), however, it makes its point: overextending biology to cultural domains might bring some misleading reductionism to it.

EP is an excellent tool to understand *the animal component* of human behavior; however, humans might not only be primates, but *persons* as well (Henriques, 2019). There are some species-specific processes which seem to be epistemologically *irreducible* to EP (e.g. cultural systems and norms, religions, social narratives, political ideologies, mythologies)¹³ (Henriques, 2004, 2019). A significant amount of our commentaries contend that *humans, as socio-cultural beings, can not successfully be reduced to their biological functioning*. We agree.

First, evolutionary *psychology* should not be identified with evolutionary *biology*. The laws of biology are not sufficient to explain human behavior, as some “greedy reductionism” (Dennett, 1995, quot. in Henriques, 2008, p.753) assumes. In other words: the “Mind” plane of existence (Psychology) is emergent and autonomous from the “Life” plane of existence (Biology) (Henriques 2003, 2011, ch.6).¹⁴

Additionally, Psychology seems to be a tripartite discipline (Henriques, 2019)

1. Psychology as a *basic science*: “a natural science discipline that has the behavior of animals in general as its subject matter” (Henriques, 2019, p. 225)
2. Psychology as a *human science*: it has an “emphasis on the human mind and human self-consciousness” (Henriques, 2019, p.226)
3. Psychology as a profession: it “has as its primary goal (...) the improvement of human well-being” (Henriques, 2019, p. 227).

The relationship between professional psychology and (basic and human) psychology mirrors the one occurring between medicine and biology, i.e. an applied science focused on the improvement of health versus basic research.¹⁵ On the other hand, the division between basic psychology and human psychology is necessary because:

“the behavior of persons is fundamentally different from the behavior of other animals. Human persons are deliberative actors who have the capacity to self- consciously justify their actions on the social stage (Ossorio, 2006). This capacity for self-conscious justification changes the behavioral equation dramatically. Not only does it open up a wide variety of higher thought processes

and reasoning capacities, but it also means human persons develop cultural systems of justification that coordinate human activity and evolve over time.” (Henriques, 2019, p. 226)¹⁶

Human psychology is thus “a hybrid between basic psychology and the social sciences” (Henriques, 2021a). Some of the commentaries (e.g. Baucal & Krstić, 2020; Wu & Xu, 2020) conceded that EP could be a meta-theory for psychology as a basic science; however, they went on saying that it can not account for the “uniquely human” traits (human science).

This apparent dilemma can be solved (Zagaria et al., 2020, p.537-539). EP is the only paradigm able to yoke the “Life”-“Mind” planes of existence (Basic Psychology) to the “Person-Culture” plane of existence (Human Psychology and Social sciences).¹⁷ It is the only approach that might explain our evolution “*from primates to persons*” (Henriques, 2019, p. 22). Whatever is the link between the natural and the social sciences, it can be searched only through EP, because only EP can explain our bio-psychological functioning. Unless psychologists are ok with Psychology fluctuating in the “epistemological space” with no direct link to biology and no consilience, *there is no alternative to evolutionary psychology*.

Of course, *how exactly* the “Person-Culture” plane of existence emerged from the bio-psychological “substrate” has not been answered yet; it is one of the greatest unresolved issues in contemporary science (Wilson, 1999). There are different proposals. We sympathize with Henriques' Justification Hypothesis (Henriques, 2003, 2011, ch.5). The human capacity to *justify* - i.e. to account for reasons and to ask for reasons - is supposed to be the dividing line between persons and primates. The ability to engage in reasoning and reason-giving might have led to the emergence of “justifications” that, aggregating to each other progressively, might ultimately have brought to the emergence of larger “justification systems”, i.e. systematic cultural beliefs and values (Henriques, 2003, 2011, ch.5) The “justifying ability” might have derived from a “tipping point” reached in the evolution of human language: the advent of full-fledged propositional discourse (Henriques, 2003, 2011, ch. 5).¹⁸ To summarize, the ability to *justify* might prelude the emergence of a new plane of complexity (Person-Culture) as well as the ability to engage in *sense-making* and to produce *meaning*. This addresses the concerns expressed by De Luca Picione (2020), Gamsakhurdia (2020), Baucal & Krstić (2020), Mascolo (2021), Martí (2020), Märtsin (2020), Mazur (2020), Misra et al. (2021), Morioka (2020), Smedlund (2021) and Wu and Xu (2020) about the concepts of person, meaning and sense-making.

Of course, the Justification hypothesis is not the only viable one. What is crucial is that only evolutionary-informed hypotheses are apt to explain the basic neuro-cognitive functioning and are able to account for the emergence of the Person-Culture plane of existence. However *it does not necessarily follow that EP is sufficient to explain this new plane of complexity* (Gozli, 2020, p. 575-576). That mirrors Biology, as in it accounts for the emergence of Psychology, though it is not apparently sufficient to explain it.

Can EP overcome such an impasse? Can it explain the “human science” part of Psychology? By becoming *cultural evolutionary psychology*, we argue that it might aspire to take a first step in that direction.

Though there is no shared consensus about what *cultural evolutionary psychology* is, there are many models at frontier research that explicitly merges cultural and evolutionary assumptions (e.g. Creanza et al., 2017; Gray & Watts, 2017; Heyes, 2018, ch.9). Regardless of the differences, what lies at the core of such programs is the acknowledgment of the strict association between “nature” and “nurture”. One of the main aims of this paper is indeed to theoretically outline the possibility of a “new” EP, i.e. a *cultural EP*. Cultural EP’s explanations shall escape both *biological* and *social* determinism merging a bottom-up approach with a top-down one. To get a sense of what cultural EP might be, we shall consider an example.

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Normativity has been cited in the commentaries to undermine EP (Brinkmann, 2020; Gamsakhurdia, 2020; Gozli, 2020). Normativity is a wide concept; it might be described as the tension between *is* and *ought*, the moral need to perceive and act right rather than wrong (Brinkmann, 2020). Brinkmann (2020, p.593) outlines a paradigmatic Pleistocene-like scenario to explain normativity: the encounter with a snake in the forest. The individual is suddenly frightened by the snake's appearance and he is immediately prone to react accordingly, only later (due to its “normative” need to perceive “good”) he realizes that he has mistaken a simple branch for a dangerous reptile. He then calms down and does not engage in self-defense.

As discussed above, the fear-module for reptiles is a well-known psychological adaptation, and that is ironic, given that Brinkmann's account of normativity is laid to undermine EP. Through the concept of fear module and the associated concept of emotion the example by Brinkmann can be reframed in simpler evolutionary terms. The fear module is a mechanism triggering a specific, automatic and relatively independent emotion of fear to aversive stimuli, like spiders, snakes, crocodiles (Öhman & Mineka, 2001). Emotion on the other hand

is generally characterized by a physical arousal triggered by a stimulus; it is an experience fluctuating between negative and positive that informs the organism about the response behavior via the mediation of the cognitive processes (Zagaria et al., 2020, p.528). EP is the best way to frame the emergence of the fear module and the wider concept of emotion. As a consequence, it can also explain the events in the example. The stimulus (snake) makes the fear-module activate, triggering the automatic arousal and the negative experience of fear. The fast-automatic emotional reaction generally overrides the slow-cognitive appraisal. A more accurate recognition of the stimulus (the identification as a branch) might have prevented the emergence of fear. However, it is better to have (fast) false positives than (slow) false negatives in evolutionary terms - the “smoke-detector principle” (Nesse, 2001). That is exactly what happens in Brinkmann's example.

The slow-cognitive appraisal (the recognition that there is no real danger) then mediates the behavioral response (no active defense). Brinkmann would label the perception of the branch as “normative” (i.e. the motivation to perceive “well” rather than to perceive “wrong”). However, there does not seem to be anything non-evolutionary about normativity. The tension to “perceive well” can be easily seen as the *cognitive accuracy* which naturally follows the emotive response in the routine assessment of a *stimulus*. Could normativity be boiled down to the concept of emotion and cognitive accuracy? A standard naturalistic approach would have its right in doing so.

However, we believe this is not the whole story. The “emotion” side of normativity is only the “bottom-up” part of it. To appreciate the “top-down” side of normativity, we shall consider a more appropriate example from anthropology.

Japanese people always take off their shoes before entering the house, a long-established cultural custom (Hendry, 2017; Murachi, 1989). Western people generally are not accustomed to such rituals, so, being in Japan, it is likely they are reproached more than once if they do not follow the practice (e.g. Murachi, 1989). We can imagine that, after many reprimands, a westerner begins to feel “bad” about entering a house without removing his shoes and begins to act according to the custom (i.e. he tries to behave “good”). This account of normativity sounds better because it does not involve a “universal” and “innate” motivation (e.g. fear module for reptiles). On the contrary, it is a cultural norm: a non-universal and non-innate prescription for specific behaviors (i.e. “remove your shoes before entering the house”).

We might speculate that the reason for removing the shoes (and thus, the dirt) is associated with some benefits to inclusive fitness. However this explanation would reasonably sound odd. Otherwise, we could interpret such norm with

memetics (i.e. the only reason for the custom to be is that it can replicate and propagate itself) (Blackmore, 2000).

Again, something crucial would go unnoticed, namely, that this social norm is embedded in a complex account of symbols, narratives and norms that are not intertwined by chance. They rest on the same *symbolic meaning*: the separation between the private and public self (Hendry, 2017). The division of the private and public self seems indeed to be a characteristic of Japanese culture, and it spans through different domains, such as mental health, the upbringing of kids and the display of emotions (Hendry, 2017). If we take the *symbolic meaning* off, all alternative explanations will sound weak.

The symbolic-meaning aspect of culture can shape normativity “top-down” via the “bottom-up” psychobiological substrate (i.e. emotions and learning). A “mature psychological science” (Lundh, 2021~~2020~~, p.196) will always be incomplete without these complementing explanations. The Culture-Person plane of existence exhibits a game-changer: the *sense* (i.e. the human ability to account for reason).

Cultural EP could be unique in acknowledging both the bottom-up-biological substrate and the top-down-symbolic influence. This way, both biological reductionism (“ultimately it’s all about genes”) and social reductionism (“ultimately it’s all about sociality and culture”) would be avoided. Cultural evolutionary psychology would differentiate itself from scientific theories postulating “weak” interactions between culture and biology (e.g. memetics) as well. According to these “gene-culture theories” biology and culture can merely have an “arm’s length” influence on each other (Wells, 2021). On the contrary, cultural evolutionary psychology supposes a “strong” interaction between culture and biology, linking to EES and Evo-Devo. Even though *cultural evolutionary psychology* is, as of now, more an idea than an unified research program, we nevertheless think that it is an idea that needs to be strongly pursued.

Reframing Subjectivity

Many commentaries stated that EP underestimates subjectivity (Gamsakhurdia, 2020; Martí, 2020; Märtsin, 2020; Uher, 2021; Wu & Xu, 2020). Regarding the mainstream evolutionary approach (the amount of scientific studies on human subjectivity produced in EP) that may be true. However, this is not a good argument for the theoretical incompatibility per se. On the contrary, our claim is that the *subjective conscious experience* has deep evolutionary roots (Feinberg & Mallatt, 2016; Ginsburg & Jablonka, 2019; Henriques, 2021b).

EP rests on its universal “first principles” (Zagaria et al., 2020) as much as any other psychological “school of thought”. There is no implicit denial of the subjective experience. Psychodynamic universal “first principles” (e.g. Eros and Thanatos) do not exclude qualitative studies as much as evolutionary “first principles” (survival and reproduction) do. The focus on group rather than on idiographic studies does not entail an elimination of subjective experience. In other words, the scientific objectivist lens does not rule out the legitimacy of the subjectivist perspective on the human experience: the third-person perspective is not incompatible with the first-person one.

Conclusion

Psychology seems to really suffer from its pre-paradigmatic status. On the other hand, EP is far from suffering the epistemological weaknesses many ascribe to it: it might account for the *developmental*, *systemic* and *subjective* aspects of psychology. Additionally, we argue why we believe it rests on a solid non-epistemopathic base. Regarding the emergence of the sociocultural context, EP is the only approach that can lay the foundation of the cultural “plane of existence” in a consilient fashion, thus attempting to be a “cultural evolutionary psychology”.

In a nutshell, EP does not imply epistemological reductionism and determinism. It does not imply that the laws of psychology can successfully be *reduced* to the laws of biology; that, broadly speaking, “it's all about the genes” (biological reductionism). Additionally, it does not entail that a given set of genes would inevitably trigger a specific behavioral pattern (biological determinism). It does not imply either that the existence of a stimulus-related psychological adaptation will mean that, given that stimulus, the adaptation will be working mechanically (psychological determinism). It is necessary to account for the whole environment (which is quite impossible, at least in naturalistic settings) and for other psychological adaptations that can be triggered simultaneously. Also, the psychological adaptations could be regulated by second-order mechanisms and eventually there may be emergent properties associated with the adaptations working together. That does not imply that evolutionary psychology has no predictive power or accuracy, rather, that it is a complex non-mechanistic and non-deterministic approach.

We eventually address the problems raised in our target article: how can EP build better psychological “core-constructs”¹⁹ and be a psychological meta-theory? EP can build better core-constructs by grounding them to the concept of psychological adaptation (see "Reframing the Epistemology of Evolutionary Psychology" section).²⁰ On the other hand, it can root psychology in biology

while explaining the emergence of the social sciences from the former, becoming thus a “cultural evolutionary psychology”. However, such a claim could be seen as vague: Psychology being somewhere between *natural* (“evolutionary”) and *social* sciences (“cultural”) is no news (Tateo, 2020, p.667). The news is the structure of the link between these two kinds of science. Cultural evolutionary psychology is the only discipline capable of such consilient design (see "Reframing the Epistemology of Evolutionary Psychology" section, 3).

Eventually, the pre-paradigmatic status of psychology is the only reason such adjectives (*evolutionary* and *cultural*) are necessary: in the long run, the “evolutionary” adjective, as well as the “cultural” one, might not be useful anymore. Psychological science shall be able to define itself simply as Psychology.

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Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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¹ Newton's mechanics, though largely implemented in engineering, is better conceptualized as a good approximation rather than an accurate theory. From a theoretical standpoint, it has been superseded.

² Trying to summarize them would be unprofitable; though it is worth noting that the variety of explanations probably would be mutually excluding in psychoanalytic thought alone.

³ The analysis of introductory books has been criticized by Baucal and Krstić (2020, p. 582) as well. The authors argue that Natural Language Processing (NLP) on research papers could be a more profitable methodology. We do not rule out replicating our results with this method in the future, however, we believe that our epistemological assessment remains solid.

⁴ A similar instance of the importance of everyday-intersubjective-folk psychology is shared by the commentary by Uher (2021). Though labelling her account postmodernist would be misleading;

“subjectivist” would do better.

⁵ The commentary by Di Nuovo (2020) explores the Evo-Devo approach.

⁶ Uexkül has been cited in the commentary by De Luca Picione (2020~~2021~~) and Morioka (2020).

⁷ Including Merleau Ponty, who has been extensively cited by Brinkmann (2020) to undermine the epistemology of EP.

⁸ A similar critique of the epistemology of evolutionary psychology is made by Tateo (2020 p.673-675), who stresses that the epistemology of psychology should be “eco-systemic”, thus considering the relationships between the phenomena, “which is more than the mere sum of parts” (Tateo, 2020,p.673).

⁹ According to Dobzhansky (1968) the concept of adaptation can be clarified as follows: a) *adaptation* is “the *process* of becoming adapted” (p.7) b) an *adaptive trait* is a phenotypical “structural or functional characteristic (...) of the organism” (p.7) c) *adaptedness* “is a state of being adapted” (p.7) and d) “*adaptability* “means that the organism or population concerned can remain or can become physiologically or genetically adapted in a certain range of environments” (p.7) .

¹⁰ However, “psyche”/“mind” are far from being consistently defined (Zagaría et al., 2020). What is the meaning of the adjective “psychological” applied to “adaptation” then? We will tentatively argue that psychological adaptations are *neural networks associated with consciousness*. If a basic form of sentience were not included in an account of the mind, all evolved neural networks would be considered as psychological. However, a neural network responsible for neural reflexes could be hardly defined as “ mental” (think about the ventilation reflexes occurring during sleep). The structure and the implications of the association between consciousness and neural networks might be debated elsewhere. For now, note that “minimal consciousness” is probably shared by a large part of non-human animals (Feinberg & Mallatt, 2016; Ginsburg & Jablonka, 2019), and that with “association” we do not mean the “substrate” of consciousness as a specific process. We are aware that consciousness is one of the trickiest concepts in science, but when it comes to psychology it seems to be necessary nonetheless.

¹¹ The term “module” has been used until now without dwelling on it. Due to space limitation, we cannot address the long-standing debate about the nature of modularity. What we want to stress though is that the terms “module” and “modularity” are here used as mere synonyms respectively of “domain-specific” and “domain-specificity”. With regards to this issue, we do not side with any theory of “massive modularity” or “soft modularity”, claiming that *Homo Sapiens* has for sure “*some degree* of modular structure” (Dunbar & Barrett, 2007, p.5) and that is enough for a coherent evolutionary theory.

¹² We then directly address Gozli's argument, who states we did not account properly for Henriques' theory (Gozli, 2020, p.575).

¹³ Many non-human animals seem to show cultural traits, linguistic abilities and a minimal consciousness as well (e.g. Feinberg & Mallatt, 2016; Ginsburg & Jablonka, 2019; Tomasello, 1999). However, the kind of language, culture and consciousness exhibited in non-human animals seems to be significantly *different* from the kind exhibited in humans.

¹⁴ The ultimate “function” of the “Life” plane of existence (Henriques, 2003, 2011, ch.6) seems to be the replication of genes. What is the ultimate “function” of the “Mind” plane of existence, on the

contrary, is not clear. Additionally, its functioning is often conflated with a biological one. We tentatively argue that the “function” of the “Mind” plane of existence could be that of “making decisions” (i.e. “selecting among alternatives”) and that that function could be emergent while autonomous from the biological functioning. Space room does not allow further analysis. For now, note that in order to be defined as “mental” the process of “decision-making” as such should be defined thanks to its association with consciousness (see footnote 10, this article).

¹⁵ Misra et al. (2021, p. 175) questioned the utility of EP in professional psychology (e.g. psychotherapy). Space limit does not allow further analysis, however, evolutionary insights do inform therapeutic practice (e.g. Liotti, 2005; Siegel, 2020)

¹⁶ As Smedlund (2021) argued: “our actions and reactions are explicable in terms of reasons, which we balance against the norms, customs and conventions of a culture” (p.184)

¹⁷ The “Person-Culture” plane of existence does not include only human psychology; for the most part it includes other social sciences (i.e. anthropology, sociology, economics, political science) (Henriques, 2021a).

¹⁸ What exactly constitutes a justification is not entirely clear in Henriques’ writings (Henriques, 2011, ch. 1). Our idea is that justification can be defined as “*an argument aimed at explaining why*”. Indeed, we narrow Henriques’ hypothesis (i.e. emergence of propositional language equating emergence of justifications) and speculate that the emerge of justifications, more specifically, equate the emergence of *causal connectives* in human language (i.e. the emergence of *why-because* question–answer dynamics). In other words, justifications, as well as the Person-Culture plane of existence, might have emerged with the appearance of “why” in our evolution (Zagaria, 2021).

¹⁹ Gozli (2020) and Mascolo (2021, p. 201) argue that we highlighted a problem (the absence of core-constructs) without explaining how EP can overcome such impasse.

²⁰ Note that psychological adaptations are always associated with by-products and noise (see “Reframing Evolutionary Psychology”).