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Reading and understanding: on some differences between Wittgenstein and 4E cognitive science

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Abstract along some striking and real convergences, are there also relevant differences between Wittgenstein and 4E cognitive science? This paper answers positively to that question, by focusing upon the cognitive or psychological status of reading and understanding in Wittgenstein's philosophy of psychology and in enactivism. The main difference deals with the posited relations between reading, understanding, and material processes. Despite its anti-representationalist, externalist and anti-intellectualist core, enactivism continues to conceive cognition as supervenient on processes, whereas for Wittgenstein, the relations between psychological phenomena and concomitant processes are mediated by psychological concepts, behavioural criteria and normative practices.

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0. Introduction

The basic methodological commitment of this paper is the following: when inquiring about the relations between some author or philosophical tradition – here: Wittgenstein – and a contemporary research program in cognitive science – here: 4E (embodied-embedded-enactive-extended) cognitive science –, *differences* are as important as *convergences* and *similarities*. Pointing to differences is not a way of undermining the importance and the value of the convergences, or of stopping the search for other similarities: it should rather be considered as an invitation to imagine new developments for the contemporary research program, and new challenges for the philosophical tradition.

Accordingly, the purpose of this paper is to articulate some differences between Wittgenstein and 4E cognitive science about the nature of language-related phenomena such as *understanding* and *reading*. This might sound surprising, since elaborated embodied, embedded, extended or enactive theories of reading and understanding do not exist yet[1]. Nevertheless, as cognitive *phenomena*, reading and understanding must

[1] At least one exception may be mentioned: in a set of papers, Richard Menary (2014, 2015) has suggested how socio-culturally shaped cognitive phenomena such as writing, mathematics and reading have emerged from continuity relations with phylogenetically older processes. The reuse and redeployment of cortical circuits for these new functions is crucial: ontogenetically, it is a precondition of a neural plasticity that

exhibit properties which are typical of cognition as a general kind *as it is conceived by 4E cognitive science*. My hunch is that we can already find stimulating convergences and differences between Wittgenstein and 4E cognitive science about reading and understanding at this level of generality: the differences and convergences do not concern the specific properties of reading and understanding, but the properties in virtue of which they are categorized by 4E cognitive science as cognitive phenomena, or in virtue of which they are qualified with psychological concepts (Wittgenstein).
Section 1 presents a brief state of the art of the various uses of Wittgenstein in cognitive science, and focuses on the recent relations that have been established between Wittgenstein and enactivism, probably the most radical and coherent version of 4E cognitive science. I then underline, in section 2, a basic difference between Wittgenstein and enactivism concerning the relations between psychological concepts and alleged 'mental' processes: for Wittgenstein, reading and understanding are *not* processes (be they representational or not, extended or not). Section 3 presents the general expressive approach of mental phenomena favoured by Wittgenstein. I show in section 4 how this approach is not incompatible with a scientific study of understanding and reading.

1. The uses of Wittgenstein in cognitive science: a map of the field

From 1946, more than thirty years after having conducted experiments on the psychology of music, Wittgenstein explicitly began a work on philosophy of psychology. By «philosophy of psychology», one must understand a reflection on the status of psychology as a scientific discipline, an attempt to classify the psychological verbs and concepts that are daily used in our linguistic practices, and a reflection on the origin of the differences between first-person judgments and third-person judgments. Before this work on psychology, Wittgenstein had proposed (in texts composing what we know as the *Philosophical Grammar, The Blue Book* or the first part of the *Philosophical Investigations*) remarks on the intentionality of thought, on intending, meaning and understanding, and on their relations with "mental processes".
Wittgenstein's philosophy of psychology was developed *before* the emergence of cognitive science: Wittgenstein mainly discusses the positions of psychologists such as Wolfgang Köhler, William James or Sigmund Freud. Still, this work has been applied to cognitive science and contemporary philosophy of mind. Nevertheless, different strands in these applications must be distinguished. Analysing the manifold dimensions of Wittgenstein's philosophy of psychology, several authors try or have tried to use it for criticizing cognitivism, the first classical "paradigm" of cognitive science: mentalism, representationalism, individualism, internalism, or formalism constitute some of the pillars of this classical paradigm that have been the object of (some) critical work by the Wittgensteinian scholarship. Works by Meredith Williams (2002), Michel ter Hark (1990), Paul Johnston (1993), Joachim Schulte (1993), or Malcolm Budd (1989) are here remarkable examples. Nevertheless, the primary intent of these works was not to propose a systematic and first-hand criticism of classical cognitive science. This is why they are different from works of authors such as Maxwell Bennett and Peter Hacker (2003), who have exploited the resources of Wittgenstein for building a systematic and

allows for the fact that processing routines can be altered as the individual acquires new abilities. Nevertheless, these new cognitive abilities also develop within a cognitive niche made of external representational systems (writing systems, number systems, etc.), skills and methods, and *normative* practices for manipulating tools and informational structures. The acquisition of new cognitive skills is distributed across neural and environmental variables.

precise criticism of several theories in cognitive science, especially those which have embraced the prospects and promises of neuroscience, going beyond the formalism and the functionalism of classical cognitive science. Representationalism, internalism, and reductionism remain pillars of the cognitive science that has taken a neurocognitive turn, and that has been under critical scrutiny by Bennett and Hacker.

But times have changed: one can now find, inside of cognitive science, many proclaimed "alternatives" to the cognitivist and to the "neuro-centered" project which insist on the *embodied*, *embedded (situated)*, *enactive* and *extended (distributed)* dimensions of cognitive processes (hence the now classical brand "4E cognitive science"). Notably inspired by original works in robotics, linguistics, developmental psychology, and anthropology, but also by the rediscovery of phenomenology and pragmatism, the various research programs of 4E cognitive science criticize the internalist, representationalist, individualist, formalist and reductionist tendencies of the dominant paradigm, and insist – as their names suggest – on the embodied, embedded, enactive and extended dimensions of cognition. *Cognition is not (only) in the head*; *it is not (only) a matter of mental representations*; *it unfolds (or is "enacted") in the coupling relations or interactions between embodied and living organisms and their social, cultural, linguistic, technological and biological environments* (Clark 1997; Chemero 2009; Hutto, Myin 2013). These models of cognition seem to escape from the previous criticisms of cognitive science that could be made from a Wittgensteinian point of view. And there is more than that.

In the midst of this burgeoning literature in theoretical cognitive science, one can indeed find some references to Wittgenstein's second philosophy: Wittgenstein would become an ally, or at least an important inspiration for post-cognitivist cognitive science. Various proponents of enactivism (or friends of enactivism) have for instance suggested these proximities: they do not claim that Wittgenstein was a kind of proto-enactivist; they rather suggest that enactive cognitive science (and, more broadly, post-cognitivist cognitive science) has a lot to gain by reconsidering Wittgenstein's remarks on psychology and, more generally, on mental phenomena (see for instance Boncompagni 2013, Moyal-Sharrock 2013, Hutto 2013, Loughlin 2014, and the collection edited by Racine, Müller 2009). Several points of confluence are generally mentioned:

(1) The rejection of intellectualism, as the idea that the primary relation between human organisms and the world is a matter of knowledge, and that the primary form of knowledge is propositional knowledge;
(2) The acceptance of a global pragmatism, according to which action, practice, practices and forms of life are the primary phenomena from which cognitive phenomena such as reasoning, perceiving, reasoning or talking are acquired, exercised and must therefore be studied;
(3) The criticism of representationalism, as the idea that there are mental signs (symbols in a language of thought, images, pictures, …) whose production and intrinsic presence "in the mind" must define and explain what it is to think, to reason or to understand (Goldfarb 1992);
(4) The social nature of rule-following and of meaning, so that there cannot be subpersonal rules (in the forms of programs) followed by brains, or meaning that could be fostered by subpersonal processes. Being actively integrated into social practices transforms the cognitive capacities of creatures, in the sense of a complexification;
(5) The criticism of the idea that the mind is an inner and private object, defined from a basic metaphysical dichotomy between the inner and the outer;

(6) A non-intentionalist conception of action, refusing to subordinate action to intention or to a former or accompanying mental act – without reducing action to a pure piece of motor behaviour.

These convergences amply justify Dan Hutto's claim that

> in advocating the so-called embodied turn, enactivists touch on recurrent themes of central importance in Wittgenstein's later philosophy. More than this, today's enactivists characterize the nature of minds and how they fundamentally relate to the world in ways that not only echo but fully agree with many of the later Wittgenstein's trademark philosophical remarks on the same topics. (Hutto 2013: 281).

2. Cognitive processes and psychological concepts

I will not discuss here the relevance and the scope of these convergences between Wittgenstein and 4E cognitive science. In order to start introducing a neglected yet important *difference* between them, I would like to underline the following fact: for 4E cognitive science, psychological concepts ('perceiving', 'thinking', 'reasoning', 'understanding', 'reading' …) continue to denote activities and processes (even if they are non-representational, embodied, extended, cultural, …). Here are indeed several emblematic definitions of cognition proposed by 4E cognitive science and that invoke *processes* (or activities) in the *definiens* of cognition:

> Cognition is the exercise of skillful know-how *in situated and embodied action* (Thompson 2007: 13; emphasis mine).

> REC [*Radically Enactive, Embodied Cognition*] sees cognitive processes as wide-reaching, *spatially and temporally extended forms of embodied activity* (Hutto, Myin 2017: 217; my emphasis).

> Cognition is all embodied, all distributed, all activity, all a complex event in time […] *Mind is activity in time* – the real time of real physical causes (Thelen, Smith 1994: 337-338; emphasis mine).

> I take it that cognition is the *ongoing, active maintenance* of a robust animal-environment system, achieved by closely co-ordinated perception and action (Chemero 2009: 212 fn. 8; emphasis mine).

It is here that we meet a possible divergence between 4E cognitive science and Wittgenstein: in continuity with classical cognitive science, 4E cognitive science considers that the picture of the process – as something having duration and articulated parts – is the best way to approach what cognitive phenomena are, and what folk concepts like 'perceive', 'read', 'think' or 'understand' are supposed to designate. For 4E cognitive science, these processes are *not* necessarily brain-bound and representational... but they are processes anyhow. Cognition is a matter of spatial and temporal processes (or activities). This is not the case for Wittgenstein, as we will now see.

It may be easy to reduce Wittgenstein's criticism of psychology to a criticism of the «myth of interiority» (Bouveresse 1978): thought, understanding, meaning, are not hidden, inner or experiential phenomena or processes, that would consist in the occurrence of signs, pictures or sensations in a «queer kind of medium» (*BBB*, 3). Still, by reminding how Wittgenstein defined and rejected what he himself called "the myth

of mental processes" (*Z*, § 211), one can touch upon a more basic prejudice of cognitive science. From a Wittgensteinian perspective, in order to be clear on the nature of "mental phenomena", we must start from psychological concepts and verbs. They exist: «believe», «intend», «mean», «desire», «think», «read» or «understand» are examples of such concepts and verbs. One may think that those concepts designate specific objects, states or processes, as physical concepts («gas», «force», «mass») designate specific properties of bodies, or as physiological verbs («digest», «breathe») designate processes (*PI*, § 308). To be true, there are some mental processes: the hearing of a tune or the decreasing of a pain, for instance (*PI*, § 154). But it is a prejudice to consider that phenomena such as thought, intention or understanding *must* also be processes (*PI,* § 308; *RPP1,* § 292) or activities (*Tätigkeit*) (*Z*, § 446; *PG*, § 60-65; *PI*, § 105, § 307, § 452-453: 186). This description would be based on the assumption that psychological concepts necessarily *denote* processes, phenomena or states (be they representational or not, phenomenological or not, etc.) (*Z*, § 471, *PI*, § 176). However, nothing forces us to embrace this assumption, without accepting the idea that psychological concepts mean nothing.

Indeed, there are phenomena of reading, understanding, seeing or intending, and psychology observes these phenomena as «aspects of our human lives» (*RPP2*, § 35; *Z,* § 470), attempting to understand their *causes* (*LWPP1*, § 434, §787). Nevertheless, for Wittgenstein, psychological concepts and verbs do not *refer* to phenomena (*RPP2*, § 35, §77): it is the use of psychological concepts and verbs which turns phenomena into "psychological phenomena". As Paul Johnston writes,

> the phenomena are what can be observed, but what our concepts express is the interest which makes us link these events together. A pause during activity, a pensive look, the sudden start of inspiration, all these might be called the phenomena or manifestations of thinking, but the key element that binds these elements together is not some observed common quality but our concept of thinking and hence the language-games we play with the words "I think…", "She is thinking…", etc. (Johnston 1993: 210).

In addition to *concomitant* physiological processes, phenomena of seeing, believing, thinking, etc. include expressive reactions, typical behaviours, and other observable events. (*RPP2,* § 132-133). These events may serve as *criteria* for the ascription of psychological verbs and concepts; these verbs and concepts *qualify* phenomena, and turn them into psychological (or mental) phenomena - that is, as phenomena which are (then) *observed* by psychology. There is no nature or defining mark of "psychological phenomena" or "mental phenomena" defined in this sense (*RPP1*, § 200); psychological or mental phenomena are not *psychical* phenomena. It is in this sense that Wittgenstein uses the expression "psychological phenomena" (*RPP1*, § 129, § 282, § 358, § 379, § 685) as covering for instance thinking, pain, anger, joy, wish, fear, intention, or memory, and is very cautious about the expression "mental phenomena" as suggesting the existence of a special mental realm. "Psychological" or "mental" phenomena are parasitic on psychological concepts and, we will see, expressive behaviour.

In paragraphs 156-171 of the *Philosophical Investigations*, Wittgenstein carefully examines the phenomenon of reading[2]. Reading is defined as involving «the activity of rendering out loud what is written or printed; and also of writing from dictation, writing out something printed, playing from a score, and so on» (*PI*, § 156): Wittgenstein does not deliberately include here "understanding" in reading, in order to show how such a

[2] These paragraphs often rephrase reflections one can already find in the *Brown Book* (*BBB*, 119-125).

simple activity is not a process – the previous paragraphs 152-155 already suggested how much "understanding" was not a process. What must happen in *X* when we say that *X* is reading? Various answers are examined by Wittgenstein: a particular lived experience, a specific mental process, neural processes, some conscious attention, motor behaviour[3] etc. Reading has a variety of inner and outer accompaniments. For any of these accompaniments, we can imagine a situation in which someone will turn this accompaniment into a necessary condition for ascribing a reading capacity to *X*, but also other situations in which this accompaniment is neither necessary nor sufficient for reading (and not, for instance, pretending to read) to be ascribed. These accompaniments are neither necessary nor sufficient for us to ascribe reading abilities to a person. The word «read» has various conditions of application. Reading is not a determined process (*PI*, § 165): it is primarily related to the possession of (and exercise of some) abilities such reading out loud, correcting oneself, answering questions, transcribing etc.

It is now well known that the left ventral occipito-temporal cortex is reliably associated with visual word recognition in adult normal readers (Cohen, Dehaene 2004; Dehaene, Cohen 2011). However, should we infer from this association that this area IS *the visual word form area* (McCandliss *et al.* 2003; Kronbichler *et al.* 2004)? Dehaene (2009) famously argued that this area is basically part of a wider network for recognizing faces, objects and abstract shapes: neural plasticity then alters its function so as to recognize visual symbols. This area does not just have one function. Moreover, is the observation of the activation of this area necessary or sufficient for us to ascribe reading capacities to an agent? Mechanisms and experiences *may* underpin the possession and the manifestation of reading as an ability, but they play no role in the grammar of the expression 'can read' (Baker, Hacker 1980: 335). On the contrary: inquiring about the neural foundations of the ability of reading presupposes that this ability has *already* been attributed to *X*; this causal inquiry is thus parasitic on the grammar of 'can read' (see *LWPP2*, 51 for an analogy with «seeing»). In the Wittgensteinian idiom, *criteria* are the circumstances, behaviours or reactions that conventionally justify the ascription of psychological concepts. They can also be used when we teach the correct use of an expression: how and when the expression should be used. Still, psychological phenomena are not *identical* with the criteria that justify the use of psychological concepts, which turn these phenomena into *psychological* phenomena: we can always imagine circumstances in which we would be justified in recognizing the presence of a psychological phenomenon even though the usual criteria would be absent (Chapman 1987).

Criteria are not to be confused with *symptoms*: symptoms are empirical evidences; they support a conclusion through theory and induction, whereas a criterion *B* for a claim *P* is a ground or reason for the truth of *P*, not in virtue of empirical evidence, but of grammatical rules or internal relations. It is part of the meaning of *P* and *B* that *B*'s being the case is a ground or reason for the truth of *P* (*BBB*, 24-28). In our case, the *criteria* from which we recognize and ascribe reading (and learn to master the concept 'read') are independent of the consideration of any mechanism or experience. Physiological concomitants of reading are *symptoms* of reading: they play no role in teaching someone the conditions of use of 'reading'. The symptoms studied by the cognitive science of reading are not criteria of reading, but we may imagine circumstances in which they would become criteria: in some specific contexts (instrumented observations in an experimental laboratory for instance), a typical

[3] See Joseph *et al.* (2013) for the observation that beginning readers make more fixations (i.e. acquisition of visual information in the absence of oculomotor activities), oculomotor activities, and backward saccades, and exhibit longer fixation durations than proficient readers.

symptom of a given state or ability can come to be used as a criterion of attribution of an ability. The instrumentally observed neural correlates of reading may become for a community of researchers *defining features* of reading. However, the danger is to infer that this local, instrument-dependent and contextual fact is a precursor sign of a general change in our linguistic practices:

> Nothing is commoner than for the meaning of an expression to oscillate, for a phenomenon to be regarded sometimes as a symptom, sometimes as a criterion, of a state of affairs. And mostly in such a case the shift of meaning is not noted. In science it is usual to make phenomena that allow of exact measurement into defining criteria for an expression; and then one is inclined to think that now the proper meaning has been *found*. Innumerable confusions have arisen in this way (*Z*, § 438).

Instead of saying that neuroscientists would have found a defining property of reading *as a psychological phenomenon*, it might be wiser to say that they would have forged a new concept of reading, based on criteria that are not the criteria associated with reading as a psychological, folk concept. Alternatively, for us to adopt this new concept of reading and abandon the older one, we would need *first* to change the conditions of observation in virtue of which we attribute reading capacities to other agents. For instance, the use of cerebroscopes should become generalized in our forms of life.
One must not confuse enabling conditions of reading with defining conditions: if the absence or a transformation of some specific neural processes or area *N* is sufficient for reading not to occur (or to be abnormal), that does not mean that *N* is sufficient for reading to be produced (or that reading is a process located in *N*). *N* might not even be necessary for reading to occur, in the sense of being attributed to a creature: when we ascribe reading capacities to a creature, we do not normally take *N* to be criteria justifying this attribution. We consider behavioural capacities and their context of exercise. Should a creature not possess *N* anymore, but exhibit the correct and regular behaviour associated with reading, we would not have any hesitation attributing to her reading capacities! The uncertainty we may meet when ascribing reading capacities to a creature does not mean reading is a mystery, or that we will find certainty by staring inwards (*BBB*, 177):

> It could be said that it can't be decided by outward observation whether I am *reading* or merely producing sounds while a text runs before my eyes. But what is of interest to us in reading can't be essentially something *internal*. Deriving a translation from the original may also be a visible process. […] Every such more or less behaviourist account leaves one with the feeling that it is crude and heavy handed; but this is misleading we are tempted to look for a "better" account, but there isn't one. One is as good as the other and in each case what represents is the *system* in which a sign is used (*PG*, § 60).

«What represents is the system in which a sign is used» should be understood as: what instantiates *reading* – by being ascribed the ability to read – is a system consisting of an agent who manipulates or produces signs, following certain normative patterns as we will see in a moment. The same strategy applies for understanding: there is not a single process that defines what understanding is (*PG*, § 35). Understanding is an ability which is ascribed on the basis of specific performances involving the manipulation of signs:

> It is true that various processes are going on inside me when I hear or read a proposition. An intuitive image may surface, and various other images may be

> associated with it, which may in turn be imbued with certain subtle shades of emotion. But all these processes are not what really interest us here. We want to know in what consists what is called *understanding* the proposition. The answer we wish here to support runs: I understand a proposition by *applying* it. The point of a proposition is that we should operate with it. And we understand it if we have the ability to operate with it (*VW*, 437; see also 441).

Clarifying what he means by «ability», Wittgenstein writes:

> Understanding is always an ability to apply [words]; it is not a *single* process, but rather something spread out over many instants of time, [namely] the whole extensive network of words, operations and actions which makes up the application [of a word]. It is, as stated, an ability, and this ability unfolds only in the course of time (*VW*, 443).

In the *Philosophical Grammar*, Wittgenstein adds that «understanding» occurs «against a background, or in a context, of facts of a particular kind, viz. The actual use of a learnt language or languages» (*PG*, § 35). Indeed. It is in virtue of their inclusion in normative linguistic practices that some performances are criteria for the ascription of understanding abilities. An activity is an instance of a cognitive capacity when it is observed and described as being in accordance with norm-governed practices and contexts. Nobody doubts that phenomena such as reading, understanding or meaning are related to processes, inner and outer. Nevertheless, it is not processes that define what reading, understanding or meaning *are*. These processes causally support rule-governed performances that we take as expressive of reading, understanding or meaning depending on our criteria of the application of the related psychological concepts. Psychological concepts are used for qualifying behavioural performances and abilities that we take as being expressive of reading, thinking, remembering because they accord with wider norms, patterns and expectations. These concepts do not apply to specific processes: they rather highlight certain aspects of human activity. Wittgenstein and fully-fledged 4E approaches concur with the idea that neuroscientific findings on the relations between the left ventral occipito-temporal cortex and reading data do not entail that reading is a brain-bound activity. But right after that point, they diverge: for 4E approaches, reading is an activity which is distributed across brain processes, but also and especially bodily and environmental processes, such as manipulating external representations or participating to cultural practices. The relations between brain processes and reading is a constitutive relation of parts to whole (parts are not limited to cerebral parts). For Wittgenstein, reading is not a matter of processes and activities. A phenomenon is called «reading» because it consists in a set of normative abilities and public performances which are clearly enabled by physiological processes; but these processes are not parts of reading. A psychological phenomenon, remember, is a phenomenon we may describe and identify from psychological concepts; it is not the direct exercise of a cognitive faculty that could be defined and studied independently of the use of concepts in norm-governed practices. Similarly, mental life is not *realized* inside our bodies or outside of them; it does not *supervene* on coupling relations between organisms and their environment: it is *expressed* in our life, and more precisely, in our ways of behaving. Let us see that in more details.

3. Mental life as expressed in behaviour

With Wittgenstein, let us call *mental life* (*Seelenleben*) the fact a creature thinks, desires, intends, wishes, or is sad (*RPP1*, § 284, § 1079; *Z*, § 465). Giving up the picture of

mental life as a set of inner processes does not entail one identifies mental life with a set of external processes, or reduces mental life to our ways of talking about it. *Expressivity* is a way to overcome the false alternative between Cartesian mentalism and behaviourism:

> But if we dispose of the inner process in this way, - is the outer one now all that is left? – the language-game of description of the outer process is *not* all that is left: no, there is also the one whose starting point is the expression [*Äusserung*] (*RPP1*, § 659).

Both *Äußerung* and *Ausdruck* may mean expression as a case of *expressivity* (a face, a picture, a painting, or a musical piece can be expressive), but also as *verbal* or *linguistic* production. In the case of mental life, when one says that mental life is expressed in what we do, Wittgenstein generally refers to the first sense of expressivity. In general, mental life is expressed (and not realized or represented) in situated patterns of behaviour: that is, not in doings, sayings, or actings, but in ways of ϕ-ing (where 'ϕ' stands for an active verb). These ways of ϕ-ing include *fine shades of behaviour* (*feine Abschattungen des Benehmens*) (*PI*, 173-176): the manner in which doings are carried out, but also (and not exhaustively) the tones of sayings.
For Wittgenstein, expecting (*PI*, § 452-453; *BT* 265e), looking for the right word (*PI*, § 335), intending (*PI*, § 647), having a sensation (*PI*, § 244), or aspectual perceiving (*LWPP1*, § 437) can be cases of *Ausdruck*. Another way to argue that mental life is expressed in situated patterns of behaviour is to defend an *adverbial* conception of mental life:

> Suppose we are talking of the phenomena we get in connection with human speech. We might be interested in: the speed of talk, the change of intonation, the gestures, the length or shortness of sentences etc. etc. – Now when one says of a human being that he has a mental life: he thinks, wishes, fears, believes, doubts, has images, is sad, merry etc., – is that analogous to: he eats, drinks, speaks, writes, runs, – or analogous to: he moves now fast, now slow, now towards a goal, now without any goal, now continuously, now in jerks? (*RPP1*, § 284)

Wittgenstein opts for the second answer, very close to John Dewey's and Gilbert Ryle's adverbialisms. For adverbialism, mental verbs do not stand for specific activities or actions; they rather qualify embedded ways of acting (see for instance Ryle 1980 and Steiner 2017). The fact one thinks, intends or desires that *p* is not analogous to the fact one writes, cooks or plays tennis: it can rather be exemplified in the way one writes, cooks or plays tennis (and in the way one will describe this activity accordingly):

> Comparison of bodily processes and states, like digestion, breathing etc. With mental (*geistigen*) ones, like thinking, feeling, wanting, etc. What I want to stress is precisely the incomparability. Rather, I should like to say, the comparable bodily states would be *quickness* of breath, *irregularity* of heart-beat, *soundness* of digestion and the like. And of course all these things could be said to characterize the behaviour of the body (*RPP1*, § 661).

«All these things could be said to characterize the behaviour of the body». Indeed. But "behaviour", here, is not reducible to some motor performance, to bare bodily movement, or to some stereotyped response (*RPP1*, § 652). The behaviour that is expressive of mental phenomena is not only coming with shades. It is wide: it has a history; it is directed towards aims; and it occurs in specific *surroundings* – shared forms

of life, including rules, customs, institutions and, relatedly, psychological concepts which are used for qualifying that behaviour. When Dan Hutto and Erik Myin write that

> Mentality […] is in *all* cases concretely constituted by, and thus literally consists in, the extensive ways in which organisms interact with their environments, where the relevant ways of interacting involve, but are not exclusively restricted to, what goes on in brains (Hutto, Myin 2013: 7)

They are not far from Wittgenstein's perspective (even if in other places, they rather express the idea that mentality is realized by extensive and world-involving *processes*): they would have no problem agreeing that these ways of interacting are norm-governed not only in a biological sense, but especially in a cultural sense. Nevertheless, from a Wittgensteinian perspective, these ways of interacting are not realizers or constituents of mentality anymore: they are *expressive* of it. Another way to express this is to say that phenomena and concepts such as intentions, hope, belief, pain or expectations are embedded in the patterns making human life (*PI*, § 337; *Z*, § 67; *RPP2*, § 16, § 150; see also von Savigny 1994: 10). The embedded character of psychological phenomena in the patterns making human life is not identical to the fact cognitive phenomena are embedded, embodied, enactive and extended processes: in the first case, psychological phenomena derive from concepts we use in order to qualify embodied and situated activities that exhibit rule-governed patterns; in the second case, cognitive phenomena are defined as embedded and embodied processes independently of our ways of using and ascribing psychological concepts. Embodiment, embeddedness, and reliance on environmental resources are present in the two cases, but their relations with psychological and cognitive phenomena are different: this defines both important convergences and differences between Wittgenstein and 4E cognitive science.

4. Doing cognitive science with Wittgenstein

The reader might object that seeing cognitive life as made up of processes is nevertheless the only way to study it scientifically. As such, expressivity does not tell us how we can study mental life; and it is not even sure it is compatible with such a project. More generally, a classical objection against Wittgenstein's philosophy of psychology is that it would reject the very possibility of a scientific study of the mind. Replying to this objection, I would now like to mention some positive insights we can gain from the expressivist conception of mental life I have drawn from Wittgenstein.

Persons read and understand, but that does not mean that 'reading' or 'understanding' consist in specific mental processes[4]: the verb «read» applies to persons who exhibit specific behavioural criteria in particular surroundings, warranting our application of the verb. By studying the mechanisms (inner and outer) that make possible these behavioural performances, one does not study reading or understanding: one studies the conditions from which persons can display behaviour that is taken – in our forms of life – as expressing reading. In the same vein, psychology does not study what we are talking about when we use the concept 'see': psychology is not about what seeing really is; this would be assuming that the concept 'see' designates something. Psychology of vision deals with some of the conditions and processes in virtue of which a person exhibits – or does not exhibit – a behaviour that we usually directly describe (or not) with the concept 'see', because that behaviour satisfies (or not) our criteria of use and application of the concept 'see' (*RC*, § 16, § 86-88). Psychology does not tell what these criteria are:

[4] See *PI*, § 306 for similar remarks about remembering.

every person mastering the concept 'see' knows them (*LWPP2,* § 78). Using psychological concepts, we characterize the patterned and situated dimensions of the behaviour of persons; we do not ascribe to these persons states which would give rise to these patterns[5].

Psychological concepts are not theoretical concepts (*RPP2,* § 62, § 194): their very primary use is not to designate processes or entities that would have to be scientifically explained, but to qualify and to identify the expressive dimensions of behaviour. These concepts cannot be used for defining what psychology (or cognitive science) studies (*PI,* § 577). Psychological concepts are not about *processes*; but there are processes in virtue of which we can produce behaviour that can serve as a criterion for the ascription of psychological concepts. Cognitive scientists claim that they study what our psychological concepts denote; but one might rather say that cognitive science actually deals with some of the processes and enabling conditions in virtue of which we can produce behavioural performances which may be *contextually* characterized by psychological concepts. These performances can serve as criteria for the ascription of psychological concepts. Behavioural criteria do not express mental life; they warrant our application of psychological concepts to persons and organisms, and not to parts of them – as their brain or their behaviour (*PI*, § 281). By studying the mechanisms (inner and outer) that make possible these behavioural performances, one does *not* study psychological phenomena or their realizers: one studies some of the enabling conditions from which persons exhibit behaviour that may be directly (i.e. non-inferentially) taken or perceived – *in* our forms of life, and *before* any scientific inquiry – as expressing psychological phenomena, and that can justify the ascription of psychological concepts. The "cognition" cognitive science deals with is *not* a general kind that would cover what our daily psychological concepts would designate (that is why it is misleading to define perception, reasoning, remembering or understanding as "processes", even if these processes are defined as embodied, extended or embedded processes). The psychologist observes a behaviour that is expressive not because it is produced by unobservable mechanisms that are inductively posited by the psychologist, but because it is embedded in the patterns making human life.

5. Conclusion

In this paper, I have argued that along valuable and real similarities, one could find interesting divergences between Wittgenstein and 4E cognitive science. The main difference I have focused upon concerns the relations between cognitive phenomena and material processes (be they inner or outer, representational or not): whereas 4E cognitive science considers that cognition supervenes on, or is realized by extended processes (like patterns of interaction), Wittgenstein denies that cognitive phenomena are (realized by) the processes which are concomitant with them. I have exemplified this difference with the cases of understanding and reading. I then went on to outline the main features of Wittgenstein's *expressivist* conception of psychological phenomena, and its relations with adverbialism and enactivism. I also countered the objection that this expressivist approach would be incompatible with a scientific study of the mind. If this expressivism is viable, then embracing it might be, for 4E cognitive science, a significant and supplementary step toward a real revolution in the scientific study of the mind.

[5] I develop this idea in Steiner 2014.

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