On the Boundaries of Cognition

Against Adams and Aizawa's Defense of the Intracranialist Thesis

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ABSTRACT. When it comes to the debate about the constitutive, supervenience basis for cognition and cognitive processes, two theoretical positions are often opposed to each other. The first is the intracranialist one, exemplified by Adams and Aizawa's idea that cognition has its supervenience basis just within the boundaries of the brain. The second is the transcranialist one, exemplified by Noë's and Clark and Chalmers's theses that the constitutive basis of cognition and the mind can span the brain, the body and the environment. In this paper, I want to maintain that Adams and Aizawa's main intracranialist argument against transcranialism does not hold. In this sense, the authors do not go any step further towards intracranialism and against transcranialism.

One of the main issues under discussion in contemporary philosophy of mind is what Shapiro calls "Constitution Hypothesis".[1] Shapiro recognizes this theoretical stance in Alva Noë and Kevin O'Regan's works.[2] The idea is that our body plays a fundamental role in shaping our perceptual experience[3] so that «our ability to perceive not only depends on, but is *constituted* by, our possession of […] sensorimotor knowledge».[4]

This idea, however, has been widely criticized. For instance, Block[5] and Aizawa[6] have underlined that Noë has not considered the distinction between the constituents and the causes of perceptual experiences. More specifically, Adams and Aizawa[7] maintain that Noë misses the distinction between

1 Shapiro 2011, 158.
2 Shapiro 2011, 164.
3 Noë 2004; O'Regan and Noë 2001.
4 Noë 2004, 2 (italics mine).
5 Block 2005.
6 Aizawa 2007.
7 Adams and Aizawa 2008.

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causation and constitution at all, casually shifting from one to the other.[8] This shifting would have led Noë to commit what Adams and Aizawa call the "coupling-constitution fallacy", which consists in the erroneous

> […] move from the observation that process X is in some way causally connected (coupled) to a cognitive process Y to the conclusion that X is part of the cognitive process Y.[9]

In this sense, Aizawa[10] recognizes that movement and knowledge of sensorimotor contingencies can affect perception but maintains that we can reliably describe them as *causal contributors* rather than actual *constituents* of perceptual processes – which, according to Adams and Aizawa,[11] have their constituents just within the boundaries of the brain.[12] The main point of contention, therefore, is about what *constitutes* an actual part of the supervenience basis for cognition and what can be regarded just as an external *cause* for it. The debate arises on the basis of the embodied, enactive and extended challenge against standard cognitive science.[13] The latter has been criticized for being oblivious of the fundamental role of the body in cognition. Indeed, several theoretical positions have underlined the strict coupling relationships between the brain, the body and the environment in cognition.[14] Likewise, many authors have highlighted the role of the body in shaping our mental life,[15] whereas some other authors have proposed different examples to show that, in order to accomplish several cognitive tasks, the body can take over many processes that are often considered to be an exclusive prerogative of our brains.[16] Such theories led supporters of standard cognitive science to clarify their position about the relationships between the brain, the body and the environment in cognition, and paved the way for the debate about the "boundaries of cognitive processes".[17]

In this framework, Adams and Aizawa's idea that cognition has its supervenience basis just within the boundaries of the brain is labelled as *intracranialism*, while Noë's (and Clark and Chalmers)'s thesis that the constitutive basis of cognition and the mind can span the brain, the body and

8 Adams and Aizawa 2008, 94.
9 Adams and Aizawa 2009, 81.
10 Aizawa 2007.
11 Adams and Aizawa 2009.
12 Adams and Aizawa 2009, 80-1.
13 Marraffa 2008; Shapiro 2011.
14 Chiel and Beer 1997; Van Gelder 1995.
15 Gallagher 2005; Gallagher and Zahavi 2008; Johnson 2007.
16 Clark 2008; Clark and Chalmers 1998.
17 Adams and Aizawa 2008; Menary 2010a; Shapiro 2011.

the environment is called *transcranialism*.[18]

In this paper, I want to maintain that Adams and Aizawa's main intracranialist argument against transcranialism does not hold. In this sense, the authors do not go any step further towards intracranialism and against transcranialism. Obviously, this does not mean that transcranialism is true and intracranialism is false. It just means that Adams and Aizawa's argument fails. This is exactly what I want to maintain here.

1. Adams and Aizawa's Strategy. The Mark of the Cognitive

Underlining Noë's commitment to the coupling-constitution fallacy, Adams and Aizawa maintain that in order to identify the actual constituents of cognitive processes – distinguishing them from mere causes – it is necessary to provide a theory of what cognition is. In other terms, if we want to identify the substrate of cognitive processes, we should have an idea of what differentiates such cognitive processes from non-cognitive ones[19] – that is, we need to identify those features that the former need to have while the latter do not. These features constitute what the authors call the "mark of the cognitive".[20]

> It seems to us reasonable to expect that a theory of the bounds of cognition should provide at least some plausible working account of what cognition is. If we have no idea what cognition is, then there is little substance in the claim that cognitive processing extends beyond the boundaries of the brain into the body and environment. It is not helpful at all to be told that cognition extends without some idea of what cognition is.[21]

I believe that the authors are right on this point. Given the differences between causes and constituents, in order to define the supervenience or the constitutive basis for cognition, it is useful to have a theory of what cognition is. On the contrary, I do not agree with Adams and Aizawa's conclusions, as I will show below. However, before doing that, we need to introduce the authors' own theory of the mark of the cognitive.

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18 Noë 2004, 2009; Clark and Chalmers 1998. More precisely, Clark and Chalmers 1998 proposed the "Extended Mind Theory", according to which *cognitive processes* can span the brain, the body and the environment. Noë 2004 and 2009 proposed the "Active Externalism Thesis", according to which the vehicles of *perceptual experience* can sometimes extend out into the world.

19 Adams and Aizawa 2008, 32.

20 Adams and Aizawa 2008, 2009.

21 Adams and Aizawa 2008, 22.

According to Adams and Aizawa, cognitive processes have at least two different features that distinguish them from non-cognitive ones. Let us start with the first one.

> Part of what we think distinguishes genuine cognitive processes from non-cognitive processes is that cognitive processes involve representations. More specifically, cognitive processes involve non-derived, rather than derived, representations.[22]

Now, what do the authors mean by non-derived representations, and why are cognitive processes believed to involve them? First, the authors list thoughts, experiences, and perceptions as paradigmatic cases of items bearing non-derived content.[23] In fact,

> Roughly speaking, the idea is that *derived* content arises from the way in which items are handled or treated by intentional agents. For the most part, things with derived content are assigned that content by intentional agents who already have thoughts with meaning. *Underived* content arises from conditions that do not require the independent or prior existence of other content, representations, or intentional agents.[24]

The target difference is exemplified by the comparison between thoughts (or other mental states) and natural language.[25] As Shapiro has well shown, in Adams and Aizawa's view, words are examples of representations with derived content. For instance, the word "cardinal" does not naturally refer to cardinals. It does so only because of the conventions our linguistic practices have established. On the contrary, thoughts and other mental states do not derive their contents by some kind of convention. Our thoughts about cardinals are not about them because convention has established so. In this sense, thoughts' content is said to be non-derived.[26]

So, according to Adams and Aizawa, cognitive processes involve such non-derived representations. However, why would we need to maintain so? First, it seems the authors want cognitive processes to involve representations because they need to account for the fact that cognition involves intentionality and that cognitive processes operate on intentional contents. In fact, for standard cognitive scientists such as Adams and Aizawa, representations are actually those structures of information that cognitive mechanisms work on. Moreover,

22 Adams and Aizawa 2008, 32.
23 Adams and Aizawa 2008, 32-4.
24 Adams and Aizawa 2008, 32 (italics mine).
25 Adams and Aizawa 2008, 34.
26 Shapiro 2011, 187.

being able to stand for other things, representations can account for mental states' aspect of aboutness.[27]

However, Adams and Aizawa maintain that representations are necessary also because «cognitive agents are not merely stimulus driven».[28]Machines such as Brook's robot, Herbert, are an example of stimulus driven devices. Such robots are able to go around searching for aluminum cans and resetting their internal states every three seconds. But what they do is completely determined by their internal structures and what their sensors tell them. On the contrary, humans are able to recover past information, which can also influence their future actions. Humans remember dates, names, places, and many other pieces of information they can variously re-use. In this sense, according to the authors, they need representations.[29]

Moreover, cognitive processes specifically involve *non-derived* representations because such representations appear to be required to explain lone thinkers. Human beings are capable of thinking about things all by themselves. Mental states seem to have contents on their own, with no need of convention to establish them. In fact, even a lone human being can entertain perceptual states, desires, or other mental states which bear many different contents.[30]

Therefore, the result is that all cognitive processes involve non-derived representations.[31] According to the authors, this is the first aspect of the mark of the cognitive.

The second aspect is strictly connected to the first one. According to the authors, cognitive processes need to be distinguished from non-cognitive ones in virtue of the mechanisms involved in cognition.[32] Otherwise, all processes would be just grouped under the too general label of "causal mechanisms", without any further possibility of distinction.

If one views the world simply in terms of causal processes, then she will likely miss the difference between what goes on inside the brain and what goes on outside of it. After all, causal processes are transcranial.[33]

Moreover, according to the authors, for cognitive science to have an actual

27 The notion of "representation" is actually central for standard cognitive science's description of cognitive processes. Indeed, in this framework, cognition is generally conceived as *computation on representations*, see, FODOR 2001; FODOR AND PYLYSHYN 1988; MARRAFFA 2008. Nevertheless, the fact that all forms of intentionality (e.g. motor intentionality) necessarily involve *representational* content is at least debatable. See DREYFUS 2002 and GALLAGHER 2008.

28 ADAMS AND AIZAWA 2008, 32.

29 ADAMS AND AIZAWA 2008, 32.

30 ADAMS AND AIZAWA 2008, 34.

31 ADAMS AND AIZAWA 2008, 55.

32 ADAMS AND AIZAWA 2008, 57.

33 ADAMS AND AIZAWA 2009, 87.

scientific profile, it is necessary for it to delimit its target object in the best way possible, as more developed sciences already do. Physics, for example, deals just with physical processes, chemistry with chemical ones, biology with biological ones, and so on. These sciences regularly categorize such processes by reference to their underlying laws or mechanisms, which need to be of the same natural kind.[34] Now, are all mechanisms that realize cognition of the same natural kind? Adams and Aizawa's answer is affirmative. Even though, to date, insufficient attention has been paid to the correct description of the mechanisms that implement cognitive processes,[35] cognitive mechanisms seem to be at least all those mechanisms that work on non-derived representations. Involving the same kind of mechanisms is, therefore, the second part of the mark of the cognitive.[36] This seems to be the reason cognition cannot be transcranial. Transcranialists are not able to show that causal processes spanning brain, body, and environment are based on the same underlying mechanisms working on non-derived representations. Causal processes in the body and the external world do not operate on non-derived representations. For this reason, they cannot be grouped with brain mechanisms – which, on the contrary, actually work on such representations – under the same natural kind. However, if there is no common natural kind, there could not be any actual unified science of cognition.[37] Intracranialism, on the contrary, can easily «delimit a proper subject for a science of cognition»,[38] since brain mechanisms operate on non-derived representations.

At this point, we have sketched the mark of the cognitive in Adams and Aizawa's view. A hypothetical process X bears the mark of the cognitive – and then counts as a cognitive process[39] – if it involves non-derived representations and is based on mechanisms that belong to the same natural kind. [40]

At this point, the fundamental issue is that of identifying the processes that bear the mark of the cognitive – that is, in Adams and Aizawa's words, the regions of space-time where we can find non-derived representations and mechanisms that work on them.

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34 Adams and Aizawa 2008, 58-60.

35 Adams and Aizawa 2008, 57.

36 Adams and Aizawa 2008, 57-75.

37 Adams and Aizawa 2010a, 76.

38 Adams and Aizawa 2010b, 597.

39 Adams and Aizawa 2008, 29.

40 Adams and Aizawa 2008, 32, 55, 57-75. Many different criticisms have been raised against Adams and Aizawa's position, both on the criteria used to define the mark of the cognitive, and on the distinction between causes and constituents themselves. It is not possible to deal with these criticisms here. For more details about them see Clark 2008; Di Francesco and Piredda 2012; Menary 2010b; Shapiro 2011.

As it can be easily imagined given what we have already said about the authors' position, Adams and Aizawa's thesis is that it is the brain that bears the mark of the cognitive. According to the authors, today empirical sciences teach us that non-derived representations are by and large to be found within the brain, making its mechanisms of a totally different natural kind from processes in the body and the environment.

Now, if the brain bears the mark of the cognitive, then cognition supervenes on the brain alone. In this sense, the body (and the environment) can have just a causal role for cognition and will not constitute the supervenience basis for cognition and cognitive processes.

In Adams and Aizawa's own words,

> That cognition involves non-derived representations is one empirical hypothesis; that non-derived representations are to be found in some particular regions of space-time is another. In addition to our hypothesis that cognition involves non-derived representations, we want to advance the further empirical hypothesis that, as a matter of contingent empirical fact, non-derived representations happen to occur these days only in nervous systems. Insofar as this latter hypothesis is true, we have some non-question-begging, defeasible reason to think that, contrary to what the advocates of extended cognition propose, cognitive processing is by and large to be found within the brain.[41]

Maintaining that the brain bears the mark of the cognitive, Adams and Aizawa can refute transcranialism. Cognitive processes are different from non-cognitive ones because the former involve non-derived representations and then have the mark of the cognitive. Since, today, empirical sciences tell us that non-derived representations happen to occur almost exclusively in the brain, then we can reliably hypothesize that the brain is the one that bears the mark of the cognitive. In this sense, only brain processes can be said to be the supervenience basis for cognition.

However, what I want to argue here is that Adams and Aizawa's argument is neither able to defeat transcranialism, nor to establish intracranialism. Of course, this does not mean that transcranialism is true – and, actually, I do not want to defend exactly this thesis. What I want to show, on the contrary, is that the authors' argument is not decisive. Given Adams and Aizawa's own theory, I will try to show that they cannot correctly ascribe the mark of the cognitive to the brain, so that they fail to demonstrate that cognition supervenes on the brain alone. The result will be that Adams and Aizawa do not go any step further towards intracranialism and against transcranialism.

41 ADAMS AND AIZAWA 2008, 55.

2. Who Really Bears the Mark of the Cognitive?

We know that there are two conditions that need to be satisfied for something to bear the mark of the cognitive in the target theory. The first condition is that the bearer of the mark of the cognitive involves non-derived representations; the second is that it is constituted by mechanisms of the same natural kind. Here I will concentrate just on one of these conditions, arguing that the brain cannot be said to satisfy it. Since Adams and Aizawa seem to maintain that both conditions are necessary for something to have the mark of the cognitive, then even just arguing that the brain does not satisfy one of them amounts to showing that the brain cannot bear the mark of the cognitive itself. In particular, I will concentrate on the first condition, so I will maintain that the brain does not imply actual non-derived representations.

As we know, Adams and Aizawa maintain that «cognitive processing is by and large to be found within the brain» on the basis of the «empirical hypothesis that, as a matter of contingent empirical fact, non-derived representations happen to occur these days only in nervous systems».[42] Indeed, according to the authors, research in cognitive neuroscience has vastly contributed to the idea that neuronal networks can represent different kinds of information in a biological cognitive system.

> […] single-cell recordings have suggested that there are neuronal representations of a vast array of environmental features. Seminal work by Jerome Lettvin and Humberto Maturana revealed cells in the frog retina that respond to moving black dots in regions of the frog's visual field. Pioneering work by David Hubel and Torsten Wiesel revealed the response properties of cells in the lateral geniculate nucleus and area V1 as well. This has culminated in an extensive theory of hypercolumns that appear to enable a more or less detailed combinatorial representation of an organism's visual field. There are also motion-processing cells in primate V5, shape-sensitive cells in the inferior temporal cortex in macaques, and action/performance cells (mirror neurons) in the macaque area F5, to name but a few. We would not want to claim that these neurons are representations simply in virtue of their causal connections to environmental stimuli, but we do think they are likely to turn out to be representations.[43]

The neuronal representations described here are a suitable kind of "representations" to be borne by the brain.

Indeed, since Adams and Aizawa want to maintain that cognitive processes are to be found within the boundaries of the brain, they need to explain how a

42 Adams and Aizawa 2008, 55.

43 Adams and Aizawa 2008, 32-3.

physical mechanism such as the brain can actually run *cognitive* routines. In order to do so, they need to have adequate *naturalized* notions of cognition, intentionality, and representations. Let us better explain this point.

Cognition is an activity of subjects, not an activity of physical objects *per se.* Thus, if we want to explain how information processing can occur in a physical system we need to adopt a notion of information processing that is suitable for such a system. For instance, representations cannot be such that they ultimately rely on an internal *subjective* interpreter. In fact, being an object, a physical mechanism has neither the semantic ability of interpreting contents, nor does it bear the intentional, first-person-perspectival stance that is necessary to be a real subject.[44]

In this sense, our mental life needs to be appropriately *naturalized*. Indeed, the *naturalizing project* is one of the cornerstones of standard cognitive science,[45] which is actually the theoretical paradigm that Adams and Aizawa support.[46] Briefly, the idea is to show that mental states can be properties of the *natural* world studied by natural sciences. In other terms, mental states are natural entities that are *causally* connected to each other and the other objects in the natural world. In this sense, our mental life can be described as the *mechanistic* functioning of a physical device since it is conceived as the result of causal relationships between objects.[47]

As for representations in particular, many different theories have been proposed in order to have an adequate naturalized notion.[48] One important issue that all these theories had to face was that of providing a notion that could fit with the requirements of naturalism while respecting also minimally shared (even intuitive) criteria for something to be a representation. This latter aspect, in particular, seems to be necessary in order to avoid the risk that any correlation or causal relation can be described as a representational relationship,[49] leading to a confusing and totally useless "pan-representationalism".[50]

Adams and Aizawa's neuronal representations seem to fit perfectly the requirements of naturalism. They are not considered to be representations for an internal subjective interpreter, but just states of the physical system that can

44 Fodor 2001, 13.

45 Marraffa 2008.

46 Adams and Aizawa 2010b.

47 Fodor 2001; Marraffa 2008; Zahavi 2010. For more details on stronger and weaker varieties of naturalism see, for instance, De Caro and Macarthur 2010.

48 Fodor and Pylyshyn 1988; Dretske 1994; Ramsey 2007.

49 Gallagher 2008; Ramsey 2007; Van Gelder 1995.

50 Ramsey 2007, 8-14.

be used by the system itself as providing information about the world. In this sense, they can be actually said to be borne by the brain.

However, one might still ask if neuronal representations actually do the job they are supposed to in Adams and Aizawa's theory. That is, if such representations are actually that kind of non-derived representations that partly define the mark of the cognitive. Indeed, one might legitimately underline that neural or, generally, naturalized representations are quite different from thoughts, perceptual experiences and other mental states – which are the typical examples of non-derived representations that Adams and Aizawa themselves refer to.[51]

Therefore, are neuronal representations actually non-derived representations? This is the crucial question. If they were not, according to Adams and Aizawa's own criteria, the brain would not bear the mark of the cognitive and would not be shown to be the only physical support that realizes cognition and cognitive processes. Therefore, Adams and Aizawa would not have made any relevant step towards intracranialism and against transcranialism.

My strategy here is questioning the idea that neuronal representations can be actual non-derived representations. Yet, clarification is needed here.

In recent years, several theories have openly challenged the standard cognitive science's idea that cognitive processes can be described as «the rule-governed manipulation of internal symbolic representations».[52] In particular, many theories have tried to replace the representationalist view of mental states and cognitive processes with the hypothesis of non-representational *coupling* mechanisms between the organism (its brain and its non-neural body) and the environment.[53] However, I will not follow this line of research here. My aim is not to show that the standard model of cognition as 'computation on representations' fails. Rather, my aim is just to critically consider the *nature* of so-called neuronal representations, arguing that they can be shown to be different from actual non-derived mental representations. As I will clarify at the end of this paper, this does not necessarily mean that the notion of 'neuronal representation' has to be abandoned, but just that it needs to be critically re-considered. This would have important consequences for Adams and Aizawa's thesis of the brain as the bearer of the mark of the cognitive.

So, let us consider neural representations closely.

First, can we say that such representations are *actual* representations? I will

51 Adams and Aizawa 2008, 32-4.
52 Van Gelder 1995, 345.
53 Hutto 2005, 2011; Van Gelder 1995.

try to show that this is at least debatable.

Representations represent something *to* someone. In a mere physical world, for instance, there seems to be no actual representations. There needs to be at least a hypothetical interpreter – a subject – for something to represent (or even present) any content.

Now, if this is true, who is the *subject* neuronal representations represent to? As we have said, for standard cognitive scientists such as Adams and Aizawa, such representations cannot represent to *subjective* internal mechanisms, since this would contradict the naturalistic attitude assumed. Moreover, the cognitive system itself could not be the actual subject. In fact, it is a physical mechanism with no semantic abilities nor first-person perspective.

If this is so, it seems that something necessary for a neuronal structure to count as an *actual* representation is missing. Indeed, as Gallagher says, an actual representational relationship

> […] involves a vehicle (sign) mediating between an object and an interpreter. A neuronal pattern or event might be considered a representational vehicle, but only in connection with an object (some event in the environment, perhaps) and a consumer or interpreter (to produce an interpretant or meaning). The missing element is the consumer (interpreter). The experiencing subject is not an interpreter of its own brain events, but neither is the brain itself, unless one is willing to say that one process in the brain interprets another process in the brain as a sign of something happening in the environment.[54]

Nevertheless, there is another possibility we need to consider. In fact, it can be argued that neuronal representations actually represent to subjects. They can be said to represent to subjects who judge from a third-person perspective – for example, cognitive scientists who are studying and trying to explain cognitive processes. Johnson analyzes neural maps' representative function in this way. According to the author, we can surely decide to name such maps as "representations", but we need to be careful and avoid confusion. Neural maps appear as "representations in the brain" *from the point of view of the scientist*, not from the point of view of the experiencing organism.[55]

> When scientists use terms such as retinal maps, pitch maps, sensorimotor maps, and color maps to describe the operations of various neural arrays in a frog's or a human's nervous system, they do so from their standpoint as observers and theorists who can see mappings and isomorphisms between the neural patterns and their

54 GALLAGHER 2008, 367.

55 JOHNSON 2007, 132.

> own experience of the "external world".[56]

In this sense, neural representations can be said to represent – therefore to function as actual representations – just for the external observer, not for the cognitive system which is supposed to bear them. I would be happy to concede this. Indeed, in such a framework, representations could function as a useful tool to interpret causal mechanisms in a cognitive way.

However, this is not something that is easily accepted by standard cognitive scientists. Ramsey, for example, opposes the idea that representations are just a heuristic way to interpret neural – or other mechanical – processes,[57] and maintains that naturalized representations need to function *as such* for the cognitive system itself, not just for the explanatory purposes of cognitive scientists. Adams and Aizawa seem to maintain a similar position. As they say,

> Suppose one wanted to build a genuine thinking machine. To do this, one would have to design the machine in such a way that the machine's symbols *meant something to the machine* in virtue of satisfying some conditions for non-derived content […].[58]

According to Adams and Aizawa, symbols need to be meaningful for the machine itself if we want the machine to be a genuine thinking one. In the same way, it seems that also representations need to be meaningful for the system itself for it to be an actual cognitive system. Therefore, representations cannot be actual representations just for an external interpreter. They need to be representations for the system itself.

If this is so, it seems that for Adams and Aizawa there would be no actual, adequate, subject neuronal representations can represent to. It could be neither the physical mechanism that runs the cognitive process, nor just an external observer who looks at the cognizing processor from a third-person perspective.

But then, can naturalized representations, such as neuronal ones, still be said to be *actual* representations? Ramsey would give an affirmative answer to this question. Subpersonal naturalized representations can be considered as actual representations because they *serve* and *function* as such in the cognitive system.[59] They do not need to be apprehended as such by the system to count as representations for it. They just need to be *used* by it as representations of something else. However, the same question can be raised again: do they really *function* as representations *for the engaged system* if they are not really

56 Johnson 2007, 131.

57 Ramsey 2007, 96-102.

58 Adams and Aizawa 2008, 38 (italics mine).

59 Ramsey 2007, 83-92.

representing *to* that system? Or, in other terms, assuming just the cognitive system's perspective, can we say that they are actually representing? The point seems to be that they cannot even *function* as real representations if there is no subject to represent to.

Now, if neuronal representations do not function as actual representations, given Adams and Aizawa's position, the brain *alone* cannot be the adequate physical support for cognition. It would not imply *actual* representations, and so it would not bear the mark of the cognitive. This is obviously a very important step for our discussion. But we need to go even further in order for our analysis to be more precise.

Let us even assume that Adams and Aizawa admit that neuronal representations are actual representations since they represent to external subjects who judge from a third person perspective. Indeed, I have said that I would concede this possibility myself.

But, if this were so, would it mean that the brain can be said to bear the mark of the cognitive? If the answer is 'yes', then my overall strategy against Adams and Aizawa's position will fail. But, as I will try to prove, the right answer to this question is 'no'.

We know that bearing the mark of the cognitive means involving non-derived representations. We also know that, according to Adams and Aizawa, derived content arises from the way items are treated and interpreted by intentional agents, whereas underived content does not require prior nor independent existence of other contents nor intentional agents.[60]

Now, if neuronal representations are representations just for external subjects judging from a third person perspective they could not count as *underived* contents. Indeed, they would require the independent and prior existence of other contents, that is the contents of the mental states of the intentional agents they represent to. As we know, on the contrary, the contents of thoughts, beliefs, perceptual experiences – which are the common examples of contents of non-derived representations that Adams and Aizawa use – do not need other previous intentional contents to count as such. They are intentional contents on their own.

In this sense, even if neuronal representations were actual representations because they represent objects in the world for subjects interpreting them from the third person perspective, they would not be actual *non-derived* representations, since their contents would depend on the intentional contents of the interpreting subjects. Therefore, even if the brain implied such representations, it would not bear the mark of the cognitive and it would not

60 Adams and Aizawa 2008, 32.

count as physical support for cognition all alone.

If my analysis is correct, neural or, generally, naturalized representations are very different from thoughts, perceptions, and other mental states. The latter have real intentional contents for the subject who entertains them, while the former do not. Naturalized representations do not function as actual representations for the cognitive system that implies them because such cognitive system is not a subject, it is just a physical object. As such, it does not have the semantic ability of interpreting contents, and it does not bear the intentional, first-person-perspectival stance that is necessary to be a real subject. Therefore, naturalized representations can be actual representations just for other intentional subjects who interpret them from a third person perspective. But this would mean that their contents are derived from the intentional contents of the subjects they represent to. As we have seen, on the contrary, mental states' contents are underived.

All this means that, if the mark of the cognitive is defined on the basis of typical mental states, as Adams and Aizawa seem to do, naturalized representations can hardly fit with these requirements. Indeed, the way we understand intentional life – therefore also mental representations – at a personal, subjective, level seems at least reluctant to be completely and straightforwardly translated into the world of objects.

If this is actually so, then Adams and Aizawa would have not succeeded in defending intracranialism. The brain would not bear the mark of the cognitive since, as a physical mechanism, it cannot imply actual non-derived representations as mental ones. Then, according to the authors' criterion itself, the brain could not be said to be the only supervenience basis for cognitive processes and cognition.

Obviously, this does not mean that intracranialism has been definitively refuted. There can be many other ways in which one can defend an intracranialist view. For instance, one could say that, even though the brain does not bear the mark of the cognitive since it does not imply actual non-derived representations, intracranialism can still turn out to be true if it turns out that cognition at the personal-subjective level is fully and completely realized by the activity of the brain.[61] This is actually a possible strategy, but it is not at odds with what I am trying to maintain here. Indeed, I am not trying to show that intracranialism is false. I am just arguing that Adams and Aizawa's defense of intracranialism fails.

Having just tried to criticize Adams and Aizawa on their thesis, I want to focus now on a more general problem that I believe the authors' position

61 I am grateful to an anonymous referee for pointing this out to me.

shows. Indeed, I think that this issue is at the basis of Adams and Aizawa's entire theory and, therefore, it is worth dealing with in order to better clarify and elaborate on my criticisms and on the target theory itself.

We have said that Adams and Aizawa maintain that it is necessary to define the mark of the cognitive in order to identify the regions of space-time that can be said to bear it and constitute the supervenience basis for cognition. We know that according to the authors at least part of the mark of the cognitive is involving *non-derived representations* or *non-derived intentionality*. However, here is the main point. Involving non-derived intentionality is a feature of *subjects*, not of *objects*. I have tried to argue that objects cannot have actual non-derived representations. If this is correct, *no* region of space-time in itself can bear the mark of the cognitive, since the latter is defined on the basis of a feature that only subjects can actually have.

Therefore, I agree with Adams and Aizawa on the idea that at least part of the mark of the cognitive is involving non-derived intentionality. But this criterion is of no help for the authors themselves. It cannot be applied to objects and so it cannot help identifying the regions of space-time on which cognition supervenes. Indeed, involving non-derived intentionality defines a feature of what is constituted – the cognizing subject –, not an aspect of the constitutive physical basis.

This latter point allows me to underline another important related issue. Cognitive acts such as beliefs, thoughts, desires, and so on, are *subjective* acts. They are the acts of subjects who are intentionally directed to their objects from a first-person perspective. Moreover, they may have a specific qualitative character for the subjects entertaining them.[62] But in the third-person-perspectival world of objects, there is no space for the first-person perspective, as there is no space for subjects bearing first-person perspective intentionality.[63] In this sense, cognition as a *subjective* activity cannot be ascribed to mere physical objects. I would say that, ascribing non-derived intentionality to the brain, Adams and Aizawa are exactly trying to force a subjective activity on a physical substrate.

However, there is something that it is worth clarifying at this point. Empirical sciences commonly teach us today that the brain is the main center for the elaboration of cognitive information. Actually, it is even common sense that the brain has this role. Moreover, there are lots of data and empirical studies that discuss and try to understand how different brain networks elaborate different kinds of information. Does my thesis that the brain does not bear the mark of

62 Nagel 1974.

63 Baker 2013.

the cognitive contradict all this? In other terms, if the brain does not bear the mark of the cognitive, does this mean that it is not involved in information processing? I believe the right answer here is 'no', or at least 'not necessarily'. Indeed, I do *not* want to deny here that the brain has a central role for cognitive abilities and for the elaboration of cognitive information. I believe empirical data are actually coercive on this point. What I want to dispute, on the contrary, is *the way* we can say that the brain elaborates information. The brain *per se* is a physical object. As such, it can be said to elaborate information *just as* a physical object.

In this sense, and for this particular aspect, the brain is not so different from any other machine that can be said to process information. I agree with Noë on this point.[64] Computers, calculators, and similar mechanisms can be said to process information since they give us consistent outputs to given inputs. Nevertheless, this does not mean that they involve non-derived intentionality. Computers are not intentional subjects with a first-person perspective. Therefore, for what we have said before, they can be said to involve just *derived* representations. They elaborate information because we treat them as if they actually do. But computers are physical objects themselves: they cannot really think, represent or compute information. Actually, this is something that even Adams and Aizawa admit.[65]

But the brain is a physical object as a computer. It can be said to process information just as any other physical object might do. It does not actually think, and it does not have real non-derived intentionality. Human *subjects* do.

Noë expresses all these points in a very clear way.

> […] the fact that computers don't think may be a good reason to hold that brains don't think because they are computers. The philosopher John Searle […] has made this point persuasively. This leads Searle to go on to claim that consciousness and cognition arise from the intrinsic nature of neural activity itself. They are "caused by and realized in the human brain". Computers solve problems and represent only derivatively, thanks to the fact that we treat them as if they do. But brain's powers are not derivative; they are original. The brain thinks and represent. But this is exactly the wrong conclusion to draw from the fact that brains don't think by computing: they don't, but not because they think some other way. Brains don't think. The idea that a brain could represent the world on its own doesn't make any more sense than the idea that mere marks on paper could signify all on their own (that is, independently of the larger social practice of reading and writing) […] Cognitive science sought to reveal how the brain can be a

64 Noë 2009, 162-65.

65 Adams and Aizawa 2008, 35-6, 54.

> subject of thought by supposing that it is, in effect, a kind of digital computer. But what now emerges is that computers cannot think (or see, or play chess), and for the very same reasons that brains can't.[66]

And then Noë concludes

> […] we make no progress in trying to understand how brains think by supposing that they are computers. In any case, brains don't think: they don't have minds; animals do.[67]

Saying that if brains are information processors then they are information processors such as computers means saying that brains do not have non-derived intentionality on their own. If so, I maintain that Adams and Aizawa have correctly recognized that physical objects such as computers do not involve non-derived representations, but I believe they are wrong in maintaining that another physical object – the brain – does. Moreover, as we have previously said, the authors themselves admit that to build a genuine *thinking* machine, the machine's symbols, or representations, need to mean something to the machine itself. But we know that the brain, as any other object, does not have semantic abilities. This does not mean that it is not involved in cognitive processes and in the elaboration of cognitive information. It just means that it cannot bear that non-derived intentionality that thinking subjects have.

Now, we can imagine how a standard cognitive scientist who wants to defend a naturalistic account of cognition and cognitive processes could reply to my own points. She could say that, obviously, standard cognitive science does not claim that the brain in itself is a thinking machine or that it has the first-person-perspectival intentionality that subjects have. Nevertheless, cognitive scientists' aim is trying to understand how cognitive processes can be realized by a physical mechanism, since the brain turns out to be crucially involved in cognition. In this sense, we need a naturalized theory of cognition, with naturalized concepts of representations, intentionality and so on. This does not mean that *all* aspects of our personal, intentional life can remain exactly the same at a naturalized subpersonal level. It just means that we can try to have naturalized concepts of *some* aspects of our mental life that can help us understanding how a physical mechanism as the brain can realize cognition.

However, there are two points that I would dispute here. The first one has been sketched before about representations. We can wonder, in fact, whether the naturalized versions of our intentional, mentalistic vocabulary are

66 Noë 2009, 164-65.

67 Noë 2009, 169.

appropriate – that is, if they respect all necessary conditions to be reliable naturalized versions of intentional terms. Are naturalized representations actually representations – or can they function as real representations – if they do not represent to an adequate subject?

Nonetheless, even if our naturalized concepts were appropriate, there would be another fundamental issue, at least for the present debate and for Adams and Aizawa's position. As we have seen, the point is that the way we understand intentional life – therefore also mental representations – at a personal, subjective level is reluctant to be *completely* and *straightforwardly* translated into the world of objects. In this sense, we can at least say that an account of cognition and cognitive processes in terms of naturalized intentionality is likely to lose some important aspects of our mental life, for instance subjectivity, the first-person perspective or the qualitative character of experience.

If this is so, can something said to bear the *mark of the cognitive* be such that it does not bear *all* aspects of intentionality and cognition? We can even say that some aspects of cognition and cognitive processes can be naturalized. But, from what we have said, it seems that not every aspect can. So, even if something as the brain can account for a naturalized interpretation of cognitive processes, it does not need to be necessarily able to account for all other non-naturalized aspects of cognition. In this sense, at least it can be doubted that it can actually bear the *mark of the cognitive*, especially if "the cognitive" is exemplified, as Adams and Aizawa actually do, by typical intentional, subjective items such as thoughts, perceptual experiences, and so on.[68] Cognition is a subjective, intentional activity; but subjective intentionality is something that gets lost in the world of natural objects, so that whatever object cannot bear that specific *mark*. This is the reason I would say that, even if we had a naturalized theory of (some aspects of) cognition, the brain could still not be said to bear the actual, entire, mark of the cognitive. In this sense, I would maintain that, even if a naturalized theory of cognition were acceptable, Adams and Aizawa would not be allowed to draw from it the philosophical conclusions they draw about the bearer of the mark of the cognitive.

These considerations about the limits of a naturalized theory of cognition allow me also to clarify my position about the idea of neuronal, naturalized representations. As I previously mentioned, I did not want to argue here for an alternative theory to the computation-and-representations model of subpersonal cognitive processes, nor did I want to maintain that the standard cognitive approach is completely useless and wrong-headed. At the same time,

68 ADAMS AND AIZAWA 2008, 32, 34.

I did not want to dispute the epistemic usefulness that naturalized representations can have in order to understand how the brain is involved in cognitive processing. On the contrary, I wanted just to underline how such naturalized entities would be different from actual mental representations, and then propose that the former could not be simply considered as the actual naturalized counterparts of the latter. This does not mean we could not legitimately have some technical notions of representation that do not need to respect all necessary conditions to be *actual* representations. Indeed, we could have such technical notions, and they could turn out to be very useful to analyze brain processes.

However, what I believe we should *not* do is drawing wrong conclusions from this explanatory strategy, and from such technical terms. In other words, we should not forget that we are dealing with technical terms which are *not* supposed to share all aspects of actual representations, especially of mental ones. In particular, for our debate, this means that from the fact that we can have some naturalized technical notions of representation, we should *not* draw the conclusion that the objects that involve such representations can bear the *mark of the cognitive*. Cognition is something different; it is something more. It involves *actual* non-derived intentionality and representations, and it is an activity of subjects, not objects.

Conclusion

In conclusion, what I have tried to do here is showing that Adams and Aizawa have failed to demonstrate that cognition and cognitive processes supervene just on brain processes. This is because the authors are not allowed to say it is the brain the one that bears the mark of the cognitive. In fact, as I have tried to argue, the brain, as a physical object, cannot be said to involve actual non-derived representations. This does not mean the brain is not crucially involved in cognition. It just means it cannot bear that kind of non-derived intentionality that actual cognizing subjects have.

References

ADAMS, F., AND AIZAWA, K. 2008. *The Bounds of Cognition*. Malden MA: Blackwell.

ADAMS, F., AND AIZAWA, K. 2009. «Why the mind is still in the head», in ROBBINS P., AND AYDEDE, M. (Eds.), *The Cambridge Handbook of Situated Cognition*. Cambridge: Cambridge University Press, pp. 78–95.

ADAMS, F., AND AIZAWA, K. 2010a. «Defending the bounds of cognition», in MENARY, R. (Ed.), *The Extended Mind*. Cambridge MA: The MIT Press, pp. 67–80.

ADAMS, F., AND AIZAWA, K. 2010b. «The value of cognitivism in thinking about extended cognition». *Phenomenology and the Cognitive Sciences*, 9/4, pp. 579–603.

AIZAWA, K. 2007. «Understanding the embodiment of perception». *The Journal of Philosophy*, 104/1, pp. 5–25.

BAKER, L. R. 2013. «Can subjectivity be naturalized?». *Metodo. International Studies in Phenomenology and Philosophy*, 1/2, pp. 15-25.

BLOCK, N., 2005. «Review of Alva Noë 'Action in Perception'». *Journal of Philosophy*, 102, pp. 259–272.

CHIEL H.J. AND BEER R.D. 1997. «The brain has a body: adaptive behavior emerges from interactions of nervous system, body and environment». *Trends in Neurosciences*, 20, pp. 553-557.

CLARK, A. 2008. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford; New York: Oxford University Press.

CLARK, A., AND CHALMERS, D. 1998. «The extended mind», *Analysis*, 58/1, pp. 7–19. Reprinted in CLARK, A. 2008. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford; New York: Oxford University Press, pp. 220–232.

DE CARO, M. AND MACARTHUR D. 2010. *Naturalism and Normativity.* New York: Columbia University Press.

DI FRANCESCO, M., AND PIREDDA, G. 2012. *La mente estesa. Dove finisce la mente e comincia il resto del mondo*. Milano: Mondadori.

DRETSKE, F. 1994. «If you can't make one, you don't know how it works». *Midwest Studies in Philosophy*, 19/1, pp. 468–482.

DREYFUS, H. L. 2002. «Intelligence without representation: Merleau-Ponty's critique of mental representation the relevance of phenomenology to scientific explanation». *Phenomenology and the Cognitive Sciences*, 1/4, pp. 367–383.

FODOR, J. A. 2001. *The Mind Doesn't Work That Way: The Scope and Limits of Computational Psychology*. Cambridge, MA: MIT Press.

FODOR, J. A. AND PYLYSHYN, Z. W. 1988. «Connectionism and cognitive architecture: A critical analysis». *Cognition*, 28, pp. 3–71.

GALLAGHER, S. 2005. *How the Body Shapes the Mind*. Oxford, New York: Clarendon Press.

GALLAGHER, S. 2008. «Are minimal representations still representations?». *International Journal of Philosophical Studies*, 16/3, pp. 351–369.

GALLAGHER, S., AND ZAHAVI, D. 2008. *The Phenomenological Mind: An Introduction to Philosophy of Mind and Cognitive Science.* London, New York: Routledge.

HUTTO, D. D. 2005. «Knowing what? Radical versus conservative enactivism». *Phenomenology and the Cognitive Sciences*, 4/4, pp. 389–405.

HUTTO, D. D. 2011. «Enactivism: Why be radical?». In BREDEKAMP, H. AND KROIS, J. M. (Eds.), *Sehen und Handeln*. Berlin: Akademie Verlag, pp. 21–44.

JOHNSON, M. 2007. *The Meaning of the Body: Aesthetics of Human Understanding*. Chicago: University of Chicago Press.

MARRAFFA, M. 2008. *La mente in bilico. Le basi filosofiche della scienza cognitiva.* Roma: Carocci.

MENARY, R. 2010a. *The extended mind*, MIT Press, Cambridge, MA.

MENARY, R. 2010b. «The holy grail of cognitivism: a response to Adams and Aizawa». *Phenomenology and the Cognitive Sciences*, 9/4, pp. 605–618.

NAGEL, T. 1974. «What is it like to be a bat?». *The Philosophical Review*, 83/4, pp. 435-450.

NOË, A. 2004. *Action in Perception*. Cambridge MA: MIT Press.

NOË, A. 2009. *Out of Our Heads. Why You are Not Your Brain, and Other Lessons from The Biology of Consciousness*. New York: Hill and Wang.

O'REGAN, J. K. AND NOË, A. 2001. «A sensorimotor account of vision and visual consciousness». *The Behavioral and Brain Sciences*, 24/5, pp. 939–1031.

RAMSEY, W. M. 2007. *Representation Reconsidered*. Cambridge; New York: Cambridge University Press.

SHAPIRO, L. A. 2011. *Embodied Cognition*. New York: Routledge.

VAN GELDER, T. 1995. «What might cognition be, if not computation?». *The Journal of Philosophy*, 92/7, pp. 345–381.

ZAHAVI, D. 2010. «Naturalized Phenomenology», in SCHMICKING, D. AND GALLAGHER, S. (Eds.), *Handbook of Phenomenology and Cognitive Science.* Dordrecht: Springer, pp. 2–19.