

Functionally Extended Cognition*

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ABSTRACT: The hypothesis of the Extended Cognition (ExCog), formulated by Clark and Chalmers (1998), aims to be a bold and new hypothesis about realisers of cognitive processes. It claims that sometimes cognitive processes extend above the limits of the skin and skull and include chunks of the environment as their partial realisers. One of the most persuasive arguments in support of this assertion is the famous “parity argument” which calls upon functional similarities between extended cognitive processes and relevant internal processes. This very kind of reasoning gave rise to several arguments against ExCog by way of comparing it to functionalism about the mental, which conclude that ExCog must be trivial, radical or unjustified. In this paper ExCog and the underlying parity principle will be defended against four different kinds of “functionalist” arguments. It will be argued that ExCog *can* be justified as a *special* form of functionalism, that it is not trivial nor entailed by the known versions of functionalism, and that the accusation of it being too radical is unwarranted.

KEY WORDS: Extended cognition, functionalism, Martian intuition, parity principle.

Although the hypothesis of Extended Cognition (ExCog) and functionalism share some common assumptions, the former is not reducible to the latter, nor is it the case that functionalism simply entails ExCog.** Many

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authors have observed that these two views have more than one thing in common (see, e.g., Rupert 2004, 2009; Menary 2007; Clark 2008; Adams & Aizawa 2008; Wheeler 2010; Walter 2010; Sutton 2010; Drayson 2010). Some of them argued that ExCog is a special form of “extended functionalism” (Clark 2008; Wheeler 2010), and some of them even claimed that ExCog is just a consequence of a radical form of role functionalism (Sprevak 2009). Nevertheless, it is extremely important to drive a wedge between them, if ExCog is to be regarded as an independent and philosophically interesting thesis. In order to separate the common forms of functionalism and ExCog, we shall start with the foundational claims of ExCog as they are formulated by Clark and Chalmers, and we will proceed with addressing four types of argument which question ExCog’s plausibility by way of comparing it to functionalism.

1. ExCog and the Parity argument

Most of us believe that the neural body is a physical basis of all mental and cognitive states and processes, and that they causally interact with the rest of the world in a direct, non-mysterious way. We are also aware of a strong influence of the environment on the ways we think about it, perceive it and act upon it. So, what is usually taken for granted is the physical realisation or constitution of the mental and the cognitive and its dependence on environmental factors. The core ExCog claim that separates it from this mainstream physicalistic assumptions, is that *sometimes parts of the cognitive systems or processes literally extended into the environment*. That is, the proponents of ExCog argue that besides neurons parts of the environment and our non-neural bodies sometimes constitute, in the most robust sense of the word “constitute”, processes traditionally recognised as cognitive.

The argument in favour of the contemporary version¹ of ExCog that started an avalanche of responses was brought forward by Clark and Chalmers in their seminal paper “The Extended Mind”. The argument was later dubbed “the parity argument” because it was based on parity considerations. It was originally stated with the omitted second premise (b), and the affirmation of the antecedent of (a) is justified later in their paper with the use of two cases of extended cognitive states and processes:

- a) “If, as we confront some task, a part of the world functions as a process which, *were it done in the head*, we would have no hesitation in recog-

¹ The predecessors of the ExCog being Dewey, Heidegger, Merleau-Ponty, etc. amongst philosophers, Bertalanffy, Maturana and Varela, Bateson, Gibson, etc. amongst scientists.

nizing as part of the cognitive process, then that part of the world *is* (so we claim) part of the cognitive process.” (Clark & Chalmers 1998/2008: 222): “The Parity principle”

- b) A case of an external (or partly external) process which functions as a process which were it done in the head we would not hesitate to call it a cognitive process (see Clark & Chalmers 1998/2008: 220–221, 226–230, section 3 of this paper).
- c) “Cognitive processes ain’t (all) in the head!” (Clark & Chalmers 1998/2008:222): Core claim of ExCog

Even if the conclusion of this particular argument could be regarded as strange and “over the top”, allowances need to be made for the fact that there is nothing unfamiliar or strange in the way it was argued for. As Shapiro wittily notices, this kind of argument has been around for a long time and “perhaps the best known parity argument concerns a duck: If it walks like a duck, quacks like a duck, and flies like a duck, it is a duck” (2010: 182). What this argument does is draw on our intuitions about a) what should be regarded as cognitive (“we would have no hesitation in recognizing...”) and b) what should be regarded as functionally similar (“if, ..., a part of the world *functions as...*”), which consequently enable, some will think, a somewhat awkward conclusion about cognitive extension. We can say that there are too many intuitions and not enough theory in this story, but calling upon our intuitions should not be considered as a particularly weak spot of this argument. This is because, unfortunately, there is no commonly accepted theory of what makes a cognitive process cognitive so making informed intuitions is all we have to go by. And for that reason, there are no *a priori* grounds for excluding parts of the environment as parts of the cognitive processes. There is another worry, though: that “the parity principle stresses the functional isomorphism of inner and outer processes and states” (Sutton 2010: 195)² and that building an argument on functional similarities makes ExCog just a disguised version of functionalism. If extended cognitive processes are just those processes which are partly executed in the environment and are functionally isomorphic to internal processes widely recognised as cognitive, what is the difference between functionalism and ExCog? And what are the consequences if they are not in fact different?

² Sutton distinguishes between two kinds of ExCog thesis: “first wave” based on parity principle, and “second wave” based on complementarity principle which stresses not the similarity but the complementarity of external and internal processes. We will be focusing exclusively on the “first wave” ExCog.

2. Four “functionalist” types of argument threatening ExCog or the Parity principle

There are several types of argument that can be found in the recent literature aimed to dismiss either ExCog itself or the Parity principle (PP), based on their relations to functionalism. We can distinguish among at least four types of them. They all share the assumption that PP is a form of a functionalist thesis from which they reach different conclusions concerning the plausibility of ExCog supported by PP.³

I Anti-functionalist arguments

Robert Rupert is certainly one of the most prominent critics of ExCog. He notices a strong functionalist strain brought into ExCog by PP. But instead of regarding this as an independent support for ExCog he argues that because extended processes do not satisfy common functional roles it has to be justified independently of functionalism and PP (2004: 422–426; 2009: 90–96).

- 1) Extended processes do not satisfy appropriate functional roles of internal cognitive processes which are defined in ordinary language or in science (for examples see section 7).
- 2) ExCog cannot be entailed by any kind (commonsense nor scientific) of functionalism. (Rupert 2009: 92–93)
- 3) PP cannot be effective as an argument for supporting ExCog if it uses functionalism to support it.

In other words he denies premise b) of the “parity argument” by reading the “function as” as a “function as” of functionalism. The justification of 1) is given by a number of examples showing that best candidates for ExCog actual cases do not satisfy appropriate functional roles, they are just too fine-grained. These examples could be found in Adams and Aizawa (2001: 54–56, 2008: 135–141), Rupert (2004, 2009), Sutton (2010: 196–198), and others.

II Single realisation argument

This kind of argument is offered by Shapiro (2004: 172–175) and it also threatens PP and functionalist traits of ExCog, but not ExCog itself if we find a way to argue for it independently of PP.

³ Arguments presented are “freely reshaped” for the purposes of this paper.

- 4) ExCog is a kind of embodied cognition thesis (EmCog).
- 5) EmCog implies that cognitive processes deeply depend on bodily and environmental realisers. (Cognitive processes are what they are because of their realisers.)
- 6) Embodied processes (nor extended) cannot be multiply realisable.
- 7) Multiple realisability cannot be used in support of ExCog.
- 8) PP cannot be used in support of ExCog.

Shapiro sees the disembodiment of the mind, assumed by functionalism, as a reason enough for ExCognitivist to abandon “mind as a program” functionalist view as the last remain of the dogma of the ghost in the machine. Cognitive processes are not specifiable independently from their physical properties, and should not, therefore, be functionally defined.⁴

III Triviality arguments

This kind of argumentation is described or used by Wheeler (2008), Sprevak (2009), and Walter (2010). Contrary to Rupert’s argument which shows that ExCog cannot be entailed by functionalism nor PP, they notice that even if ExCog could be supported by it and consequently by PP, ExCog would become trivial.

- 9) If (any known version of) functionalism entails ExCog, then ExCog is philosophically uninteresting and it is probably “just a footnote to Putnam” (Wheeler’s expression 2008).
- 10) If (PP and “there is a partly external process that functions as an internal cognitive process”), then ExCog.
- 11) PP is just a form of functionalism (plus parity considerations which do not have true argumentative value; see Walter 2010).
- 12) If (functionalism and “there is an extended process that functions as an internal cognitive process”), then ExCog.
- 13) ExCog is trivial.

Walter also argues that in order to determine functional roles which are coarse-grained enough to be satisfied by both internal and extended processes we already have to know what is “the mark of the cognitive”⁵,

⁴“The claim that minds are multiply realizable suggests that there are no particular physical properties necessary for minds. The claim that minds and bodies are independent, that the properties of the mind can be investigated in isolation from those of the body, suggests that the mind is like the occupant of a house.” (Shapiro 2004: 227)

⁵Adams & Aizawa’s basic argument against ExCog asks for the “mark of the cognitive” (2001, 2008). They claim that in order to identify any process as cognitive we have to

which makes PP completely inefficient because if we knew what makes a cognitive process cognitive we could argue for or against ExCog directly. So, either is ExCog trivial, or is entailed by functionalism which employs a specific notion of cognition which makes PP argument redundant. In any case, it is not PP which gives the true support to ExCog.

IV Absurdity arguments

Sprevak (2009) formulated an argument that caused a lot of attention. He went another step further in the debate against ExCog and argued that functionalism which could entail ExCog would be so radical that it would make ExCog and itself completely absurd. The form of the argument rests on simple transitivity:

- 14) If there is a version of functionalism that entails ExCog it must support Martian intuition.
- 15) If functionalism supports Martian intuition it will turn out to be too radical.
- 16) Functionalism that supports ExCog is too radical (absurd) as well as ExCog itself.

In order to show that 15) is true Sprevak uses a controversial Mayan calendar example.

It looks that we are in an indefensible position if we want to keep PP as an effective argument for ExCog. While the first two types of arguments show that we cannot use functionalism (nor PP) in order to justify or effectively argue in favor of ExCog, the third and fourth kinds of argument are trying to prove that assuming functionalism (or PP) has catastrophic consequences for ExCog as an independent and plausible position. So, both affirming and denying that ExCog is entailed by functionalism reflects adversely on ExCog. It looks like there is no way out: if the functional roles are defined too finely as in type I argument then we cannot find a suitable candidate of an extended realiser, if they are defined too coarsely as in type IV argument then ExCog is absurd, and if the appropriate roles are just fine as in type III argument then ExCog is simply trivial.⁶

It is tempting to abandon PP and affirm ExCog in a non-functionalist way. This would enable us to avoid the four aforementioned arguments altogether. But this is neither the only way nor the route to follow, because the parity argument is one of the best argument offered to support ExCog.

know what is the mark of the cognitive, and their suggestion is that it is the “non-derived content” which is absent from extended processes.

⁶There should be a third way too and that is denying that PP gets its strength through functionalism, but we are not going to follow that line of argumentation.

A way out for the parity principle driven ExCognitivist can be in explicitly formulating a variety of functionalism which will both support ExCog and be sufficiently different from all typical forms of functionalism which lead to triviality claims. A newly defined kind of functionalism should secure that ExCog follows from it and not from its common kinds. Clark's defence of ExCog (2008) against I and II in terms of the notion of "extended functionalism" is part of this strategy. This strategy needs to be carefully laid out in order to show how precisely it functions and applies to III and IV types of anti-ExCog arguments too. But first we have to clarify what is claimed by PP and common kinds of functionalism.

3. Otto, Inga, and playing Tetris

Let us turn to the original examples Clark & Chalmers offered as a support of the premise (b) of the parity argument ("A case of an external (or partly external) process which functions as a process which were it done in the head we would not hesitate to call it a cognitive process", see section 1). That way we shall see what kind of functional roles are those believed to entitle us to non-trivial claims about cognitive extension. Clark & Chalmers have two kinds of extension in mind, one being dubbed cognitive, the other the extension of the mind. The difference between the two is illustrated by way of examples. The extended mind example utilises a paradigmatic mental *state* (in particular dispositional belief), meaning a state which has either conscious or intentional property, while the ExCog illustration utilises an example of a cognitive *process*. Interestingly, the ongoing debates tend to focus on the cognitive extension, rather than on the mental extension. The reason for dropping the latter is probably due to its implying that conscious states could be extended too, which is a controversial matter. So, nowadays "ExCog" is usually used to cover all cases of mental and cognitive extension without being committed to including conscious states as well.

In defence of the *cognitive* extension view Clark and Chalmers construct a scenario aimed to show what kind of processes involved in human problem-solving should count as cognitive according to the PP. The scenario describes different ways of Tetris playing:

- (1) A person sits in front of a computer ... and is asked to answer questions concerning the potential fit of such shapes into depicted "sockets". To assess fit, the person must mentally rotate the shapes to align them with the sockets.
- (2) A person ... can choose either to physically rotate the image on the screen, by pressing a rotate button, or to mentally rotate the image as before ...

- (3) Sometime in the cyberpunk future, a person ... has the benefit of a neural implant which can perform the rotation operation as fast as the computer in the previous example. The agent must still choose which internal resource to use ... (Clark & Chalmers, 1998: 220–221)

After being introduced to these three different types of solutions of the same problem, namely, image rotation, we are invited to notice a couple of similarity relations between them. It is said that “case (3) with the neural implant seems clearly to be on a par with case (1). And case (2) with the rotation button displays the same sort of computational structure as case (3)” (Clark & Chalmers 1998: 221). By applying the PP to the second case, or the case involving parts of the environment—button pressing, this extended process should be considered cognitive because it “functions as” the first case.

On the other hand, Clark and Chalmers write about the extended mind using the Otto-Inga case which relies on external objects as realisers of dispositional beliefs. The main actors in the scenario are Inga, a healthy subject, and Otto who suffers from Alzheimer’s disease and constantly carries with him a notebook in which he writes down every piece of information worth remembering. They are both living in New York and they both enjoy contemporary art. One day Inga and Otto are told, independently, that a new exhibition in MoMA is opened and, in accordance with their artistic preferences, they wish to visit it. In order to fulfil this wish they need to consult their memories to retrieve the information about the MoMA’s address. Whereas Inga as a healthy cognitive subject uses her biological memory to access her old beliefs, Otto, being affected by Alzheimer’s disease, has to consult his notebook for retrieving similar information. The scenario then directly employs the parity principle: “for in relevant respects the cases are entirely analogous: the notebook plays for Otto the same role that memory plays for Inga” (Clark & Chalmers 1998: 227). There is no *a priori* reason to reject the hypothesis that information stored in Otto’s notebook are instances of Otto’s dispositional beliefs. “We are happy to explain Inga’s action in terms of her occurrent desire to go to the museum and her standing belief that the museum is on the 53rd street, and we should be happy to explain Otto’s action in the same way” (ibid.).

One way to answer the functionalist arguments against ExCog listed earlier is to point to the distinction just introduced—the distinction between the extended cognition and the extended mind. Functionalism is a theory of the mind and not a theory of cognition, so it should be applicable only to the latter. Cognitive processes as studied by cognitive science are mechanisms underlying mental phenomena recognised by folk psychology, and not necessarily these phenomena themselves. They are described

by cognitive psychologist as information processing activities. Accepting the difference that mental phenomena are most usually conceptualised as mental *states*, and cognitive phenomena as cognitive *processes* there is yet another difference between the constituents of the mind and the constituents of cognition. The difference between mental states and information states that cognitive processes operate on is that states which are part of cognitive processes do not have to be consciously accessible nor conceptually structured, unlike genuine mental states. Thus, cognitive is taken to be a broader notion than the mental, including many isolated states and operations which would not be recognised by commonsense as mental, like Chomsky's grammar or low level perceptual processes. As Drayson (2010) rightly notices not many authors in the debate about ExCog make a distinction between the cognitive and mental extension. This insight can be broadened to also include a distinction between processes and states which is often overlooked. But instead of completely discarding the arguments against ExCog based on its presupposed connection with functionalism as non-starters we will read functionalism as liberally as possible to include not only traditionally recognised mental states but also processes such as remembering or mental rotation. Also, we will not exclude the Otto-Inga case as an example of cognitive extension, and we shall conceive it as a special case of ExCog which can also function as an example of the extended mind. We shall conceive it as a case of extended remembering which as its extended part has a dispositional belief. What makes the Otto-Inga case an example of mental extension too is that it involves a genuine mental state as a part of a cognitive process. We shall treat examples of cognitive and mental extension as presupposing the same notion of function, and we should examine now to what kind of functions functionalism is committed to and if there are some contradicting assumptions that ExCog and functionalism employ respectively.

4. Different kinds of functionalism

Functionalism about the mental arose from different insights and in opposition to the mind-brain identity theory which identified types of mental states with types of physical states. The identity theory was facing the distinct properties objection⁷ and it was also incompatible with an assumption that creatures different from humans can have the same mental states as them, because these states would be physically distinct from

⁷ The distinct properties argument claims that expression of the identity of mental state with a physical state utilising mental and physical terms introduces substantially distinct properties by which we identify this one and the same state.

those in humans. Putnam's and Fodor's insight that the mind could be seen as a kind of a Turing machine and that mental states could be defined by the functional roles they play opened a way for the much needed topic-neutral analysis of mental terms (Armstrong, Lewis) which would enable an answer compatible with physicalism to the distinct properties argument and facilitate a coherent account of multiple realizability of the mental.⁸

Functionalism is applicable to both experiential and intentional states, but we are going to focus on the latter because we have already narrowed ExCog's domain to non-conscious states and processes. So, if we ask ourselves what beliefs are, for instance, they are states that are caused by appropriate perceptions or other beliefs by inference, and which conjoined with appropriate desires cause certain sorts of behaviour (see Levin 2009). The functional roles are defined using the ordinary commonsense or scientific practice for recognising mental states, meaning that they are conceived at the macro observational level. The functions in question are not some hidden functions at the neural level, they are functions that connect human perception to action or sensory stimulus to behaviour together with other mental states just like, it seems, functions in the examples of ExCog.⁹ But now we should determine do ExCog and functionalism use functions for the same purpose in their accounts.

As a matter of fact we can roughly distinguish the two broadest kinds of functionalism:

- c) metaphysical – concerned with *what are* mental states such as pains or beliefs, and
- d) analytic – aiming only at the semantic analysis of the language using mental terms.

⁸ Instead simply claiming, for instance—C-fibres are being stimulated = being in pain—and thus opening a problem of how to account for the distinctness of the phenomenal property by which we identify the state of being in pain which is clearly deeply different from the purely objective physical property of being a stimulated C-fiber by which we identify the same state, the functionalist says that whatever state satisfies the appropriate functional role is the mental state in question without any reference to specifically mental terms. The initial idea was, accordingly, to identify that one type of physical state which plays a certain role in our psychological life without making reference to specifically mental properties which we attend to from the first person perspective.

⁹ If you are wondering if it is possible to give a functionalist account of dispositional belief as in the Otto-Inga case, because we cannot determine a specific immediate cause of such a belief, there are accounts that limit the functional description only to effects of a particular state. In the case of dispositional beliefs we could define them as "Believing that performing action *A* would lead to event or state of affairs *E*, conjoined with a desire for *E* and no overriding contrary desire, will typically cause an intention to do *A*" (Schwitzgebel 2011).

Only (c) can be meaningfully connected to ExCog, so we will set (d) aside (Wittgenstein). We shall focus on a functional theory set to answer the question *what is* pain or a belief, and not what “pain” or “belief” *means*, because ExCog is interested in the question what *constitutes* cognition and not what specific cognitive term means. To the question “What is belief?” there are two typical functionalist answers. According to one of them a particular belief, for instance, is whatever entity which satisfies the functional role in question, and according to the other belief is the higher-order property defined by an appropriate functional role.¹⁰

The first type of the functional theories of the mind are at the same time its earliest versions which we can find in early Lewis (1966), and Armstrong (1968), but also in Smart’s and Shoemaker’s work. It is usually called specification or filler functionalism and its main trait is that it rejects multiple realizability and identifies mental states with physical states which satisfy appropriate functional roles without invoking true mental properties in the process of identification. Functional specification theorists shared the ontology with psycho-physical identity theorists and although they were able to answer the distinct properties argument they were confronted with the same type of objection as an identity theorist—shouldn’t we accept that creatures with different physical make-up from ours have same types of mental states if those states play the same functional role in their behaviour? The filler functionalist as McLaughlin calls him (McLaughlin 2006), thus, precludes the fulfillment of so-called Martian intuition—intuition that silicone based Martians could also feel pain if they would be disposed to wince and moan after being pricked or poked, or have a belief about museum’s location if they are disposed to go in its direction after hearing that their favourite artist’s exhibition is open.

5. Neural chauvinism

Block (1996) calls functional specification theory “chauvinistic” because it is limited to only one type of realisers, which is already at first glance arbitrary. But filler functionalist was not so unaware of this objection as it could be thought, but he was mainly concerned not to allow having many strange and awkward physical states which would perhaps satisfy too liberally defined functional roles. Affraid that functionalism could open a door to mental states of whole groups, strange animal’s or even stranger

¹⁰ For these two distinctive kinds of F we find different terminological distinctions, on the one hand we find “realizer functionalism”, “functional specification theory” or “filler functionalism”, and on the other we encounter “role functionalism”, “psychofunctionalism” or “functional state identity theory”.

Martian mental states, his motivation was to identify exactly those mental states which are found in humans. His plan was inherited from natural sciences—begin with the theory and infer theoretical entities from their functional roles. Unfortunately, as it turned out, the psychological theory was not sufficient to bring us to the uniquely functionally described neural states, and it needed support from the physiological theory of the human mind. This is the path that Lycan (1987) proposed, but this route again violates an important intuition that most of us share—that we *should* credit many different, “non-awkward” biological creatures with mental states.

An interesting coincidence is that Clark and Chalmers call the standard opinion in cognitive science “chauvinistic”, too, and propose ExCog as a remedy. The chauvinism of filler, specification or realiser functionalism and that of neuroscientist seems to be of the same kind. They both focus on the specific matter, on the specific realisers of certain descriptions. They start with the assumption that mental states or cognitive processes are instantiated in the head, give functional or computational descriptions in order to avoid referring to specific mental or cognitive properties and then tune these descriptions so they fit only intracranially realised states and processes. While filler functionalism is mostly abandoned decades ago, the view that cognition takes place in the neural body alone persisted much longer. It seems that standard cognitive science is still caught in the picture where only neurons have the ability to carry out the work that is functionally and computationally defined. On the other hand we should look at ExCog as more interested, in the same manner as role functionalism, in higher-order properties, and various, specifically external, realisers of these higher-order properties. Sometimes these realisers are made out of neural stuff, sometimes they contain wheels and cogs, and sometimes they are silicone based. This is why ExCog should serve the purpose of steering standard cognitive scientist in his thoughts and broadening his views about realisation. Even if the functional and explanatory theory of cognition was inspired by concrete realisers, namely, human brain and its functions, the cognitive scientist should look back and understand that those defined roles could be satisfied by various different realisers, some of them even extended beyond the boundaries of human skull and skin.

So far we can see that functional roles of functionalism broadly defined through input-output relations could be identified with “function as” of PP. Cognitive process of assessing a fit of a block in image rotation task lies between the apprehension of the task and a completion action. In order to complete a task image has to be rotated, and a cognitive agent can solve this problem either by mentally rotating an image or by rotating an image on the screen. Both cases are cases of cognitive processing, structured in the same manner only in a different medium. This is even clearer in Otto-

Inga case, where Otto's notebook and Inga's biological memory seem to play the same remembering roles. Also, Otto seems to have a dispositional belief stored in his notebook that performing an action *A* would lead to event or state of affairs *E*, because if it is conjoined with a desire for *E* and no overriding contrary desire, it will typically cause an intention to do *A* (see Schwitzgebel 2011). But, on our way we have discarded couple of kinds of functionalisms which see the role of functional isomorphisms differently than ExCog. Analytic functionalism and filler functionalism were characterised as unsuitable candidates for arguments against ExCog's plausibility, and role functionalism was identified as the most suitable candidate for supporting PP.

6. Possible objection—if cognition is embodied it has a single physical realisation

In a way, it might be strange to think about ExCog, a thesis about vehicles or realisers of cognition, as closer to role than to filler functionalism which is similarly concerned with the physical realisers of higher order functional properties. In the end, ExCog is the claim that "Cognitive processes ain't (all) in the head!" (Clark & Chalmers 1998/2008: 222). If we take another perspective on ExCog and focus on the claims about embodiment and embeddedness of cognition we can come to a different conclusion about its relation to functionalism, like Lawrence Shapiro did. Namely, in his book *The Mind Incarnate* and in his "Embodied Cognition Research Programme"¹¹ Shapiro takes the thesis of embodied cognition and consequently ExCog to be in an opposition to functionalism and standard cognitive science. Their view that cognitive processes can be abstractly defined as functional roles or algorithmic computations done over representations clash with the view that cognition is deeply "incarnated". Because cognition is so dependent on bodily and environmental factors it cannot be independent from its typical realisation. His argumentation can be summarised as the following modus tollendo tollens:

- 17) If cognitive processes are multiply realisable then they are separable from their specific realisations and abstractly definable.
- 18) Cognitive processes deeply depend on the body in which they are incarnated, and are unseparable from it.
- 19) In conclusion, cognitive processes are not multiply realisable.

¹¹ Shapiro takes Embodied Cognition to be a higher category of which Extended Cognition is an instance. See *Embodied Cognition*, especially Chapter 3 "Conceptions of Embodiment".

As we have seen 19) together with basic assumptions about PP make PP ineffective as an argument in support for ExCog. PP assumes that one process can be internally and externally realised, thus presupposing multiple realisability. This kind of argumentation we dubbed as a type II argument against ExCog or “single realisation argument”. In order to substantiate the claim about the embodiment (premise 18) Shapiro uses many examples of mind-body-environmental dependencies. For example, he argues that vision is not only enhanced or aided by bodily movements but that it is constituted by particular bodily movements (Noë 2004); other examples include Ballard’s research on deictic coding and using environment as its best model (for famous block copying experiment see Ballard, D. et al. 1997: 731; Ballard, D. et al. 1995), Lakoff and Johnson’s embodied view on metaphors (Lakoff & Johnson 1999), etc. On the role of the body in auditory perception in particular Shapiro writes:

Generally, larger distances between ears provide greater auditory acuity. But also important is the density of the matter between the ears because sounds of varying frequencies will behave differently when traveling through a given medium. The auditory system incorporates facts about ear distance and head density in its processing, but not in a way that requires their symbolic representation. There is no need to represent the distance between ears because it is the distance itself—not its representation—that creates the opportunity for greater auditory acuity. (Shapiro 2007:340)

Exactly these kinds of examples motivated the formulation of the hypothesis of ExCog in the first place. Many environmental and bodily factors seem not only to aid cognition but to partially constitute it. So, did we already forget that bodily realisation is crucial for the emergence of cognition as we know it? Did we completely disregard the view that “bodiless mind” is a non-sensical term? Mind is not just a software that can be implemented on various hardware. Mind cannot be so abstracted and defined without its specific realisers. Functional explanations leave out the important part—specific machine which moulds the processes it runs. But, can we really conclude from the mind-body-environmental dependencies that we cannot abstract cognitive processes in any form? Andy Clark thinks that this conclusion is wrong and warns us not to regard “functional, computational, and information-processing approaches to mind as flesh-eating demons” (Clark 2008: 202). We should take a look at larger organisational wholes as appropriate for abstraction. Premise 18) is correct in claiming that cognitive processes depend on their realisers, but from this proposition we cannot conclude that the same type of process, computationally defined, has to be realised in the same matter always. The same computational structure can be realised with different bodies in different environments and support same cognitive processes with regard

to their computational structure. Dependence of cognitive processes on matter is not sufficient to entitle us to conclude that *specific* matter must be connected with the same type of cognitive processes. Clark offers a strategy he recognises in Ballard's work and calls it "distributed functional decomposition" (DFD) which presents a way of "understanding the capacities of supersized mechanisms ... in terms of the flow and transformation of energy, information, control, and where applicable, representations" (Clark 2008: 14). So, for instance, in a case of information retrieval from the environment we can have different roles of brain memory, eye movements, and head movements, they are all mixed together in a flexible way (see Clark 2008: 201; Ballard et al. 1997: 732). "Incarnation" of the mind is not sufficient to grant a conclusion about single realisation, in the same way as a particular physical realisation of mental states is not sufficient to argue against functionalism. It is not only that there is always a level at which we can abstractly describe some process or mechanism, but the level of DFD seems to be an informative level of description. Functionalism and multiple realisability should not be treated as incompatible with EmCog nor ExCog.

7. Can ExCog be entailed by functionalism?

Let us turn now to remaining arguments against ExCog. Rupert (2004, 2009) sees PP as invoking a recognisable functionalist strain in argumentation. But, he concludes that PP would be ineffective as a functionalist argument to support ExCog (Rupert 2004: 422–426; 2009: 90–96), we named this kind of argumentation "anti-functionalist argument". Unlike Shapiro he does not see functionalism as endangering ExCog as an embodiment thesis, but he argues that there is no functionalist theory that would capture externalised processes as mental or cognitive processes. In his view we should turn to other kinds of arguments, like Shapiro's positive line of argumentation, if we wish to protect ExCog, and leave PP behind. Similarly, Sutton (2010) notices that arguing for ExCog by *complementarity principle* instead by PP avoids objections raised against *first wave* ExCog or PP driven ExCog (see footnote 2). To get to this sort of negative conclusions, Rupert examines "commonsense" and "scientific" kinds of metaphysical role functionalism. On the one hand commonsense functionalism tries to Ramsify ordinary language sentences about the mental and to identify functional roles by identifying commonsense concepts of mental states. On the other hand, psychofunctionalism starts from scientific rather than folk psychology in determining the functional roles of the states and processes in question. On Rupert's view none of them would capture states or processes which are partly externally realised, simply

because they are not commonly nor scientifically recognised as mental nor cognitive! Adams and Aizawa similarly notice that extended processes do not satisfy many roles of that common cognitive processes play. Biological memory plays many roles that Otto's notebook ignores. Biological memory is primed, subject to recency effects, it cannot store more than a number of items at a time, etc., while Otto's "memory" does not suffer from any of these shortcomings. All we can conclude from these insights is that functional roles of "ordinary functionalism" and those needed for vindication of ExCog need to be sufficiently different.

For now, we can grant that functional roles of "ordinary functionalism" are too fine-grained to be satisfied by extended processes. But what if we find a suitable level of abstraction for functional roles so that internal and extended processes share those functional roles? Maybe we are being too chauvinistic when functionally describing mental and cognitive processes. Well, then we will be faced with at least two counterarguments: "triviality argument" and "absurdity argument" (type III and IV arguments). It will be claimed that ExCog is neither nothing more than functionalism or functionalism which entails it will be so permissive that it will become absurd. Also it could be argued (Walter 2010) that fixing the grain of the appropriate functional roles has to be dependent on the previous assumption about what is important or essential for a cognitive processes to be counted as such, which brings us back to the A&A's request that we have to know what is the "mark of the cognitive" or *what* is cognition in order to ask *where* is cognition (Adams & Aizawa 2008; Walter & Kästner 2012). We will look into "absurdity argument" (Sprevak 2009) first and then turn back to the "triviality argument" at the end of the paper.

8. Is ExCog really absurd?

Sprevak's argument is addressed in detail in Wheeler (2010) and Drayson (2010), but we will briefly consider it because it raises a question whether accepting the Martian intuition, which justifies multiple realisability, leads to too liberal ExCog. Sprevak was aware of different kinds of functionalisms and his main argument is aimed at those versions that safeguard the Martian intuition, namely, role functionalism. Functional roles have to be defined wide enough to include Martian and human psychology even if they are to *some degree different*. In his view, if we wish to preserve such a Martian intuition, ExCog will simply be entailed by functionalism because grain level of functional roles will be coarse-grained enough to include cases of cognitive extension. If we are not bothered with finer differences, for instance, between Martian memory and Earthlings memory, and if we are to consider, for example, Martian memory which does not suffer from

negative transfer, limited short term memory, etc., as an instantiation of a memory system, then we should count Otto-notebook system in a similar vein. Sprevak goes even further and tries to show, by invoking several Martian scenarios every time describing “stranger” Martians, that functionalism which preserves Martian intuition yields an implausible version of ExCog, so radical that hardly anyone would wish to defend it.

In a final scenario, which is intended to have devastating consequences, Sprevak invites us to:

imagine that my desktop computer contains a program that calculates the dates of the Mayan calendar 5,000 years into the future. As a matter of fact, I never run this program ... However, if I wanted to know the Mayan calendar and explored the resources of my computer, the program would allow me to find the answer quickly. According to the functionalist argument above, I possess a mental process that calculates the dates of the Mayan calendar. The justification: one could imagine a Martian with an internal cognitive process that calculates the dates of the Mayan calendar using the same algorithm. ... The Martian may never happen to use this cognitive process; it may even be unaware that it has this cognitive process. (Sprevak 2009: 517)

In Sprevak’s view if we are prepared to accept Martians as having mental states then we should also be prepared to accept extended cognitive processes, and not only some special kind of processes of tightly coupled brain-body-environment systems but all processes which could be imagined inside Martian’s head, like using of a program on our computer which we barely know exists. If such a consequence is following from the satisfaction of the Martian intuition, than both functionalism and ExCog are too radical to be considered as plausible theories of mind and cognition, and we have to deprive Martians of mental states because their psychology is different than ours.

Wheeler writes that Sprevak asks us that “on the strength of the parity principle” (2010: 20) we should count the distributed man-computer system as cognitive, and that from there he draws anti-ExCog conclusions. “It’s compelling stuff. So what has gone wrong?” (ibid). What went wrong is that Sprevak grants a cognitive status to a process just on the account that it could be imagined as done in the head of a Martian, which is far away from the original Martian intuition. Sprevak reformulates Martian intuition in such a way that it accounts for cognitiveness of the process in question just on the basis of “in-the-headness” as Wheeler calls it, and “in-the-headness” does not and should not suffice to call a process cognitive or mental. There are many processes done in the head we would not call cognitive, for instance processes which maintain bodily mechanisms such as blood circulation or oxygen transport. Thus, only if we are prepared to endorse such a liberal kind of functionalism we can draw anti-functi-

onalist and anti-ExCog conclusions. Sprevak's claim is that if something is done externally, and *were it done in the Martian head* in functionally isomorphic way, we would call it cognitive, then it is cognitive.

It is clear that Sprevak's functionalism combines traits of both functionalism and ExCog, but adds an importantly distinct condition, namely, non-existing Martian psychology. We can also distinguish the modal strength of functionalism and ExCog, where functionalism rests on the theory of the mental as it is given to us, ExCog is prepared to count yet undescribed processes as cognitive. Functionalism is dependent on the psychological theory of actual human mental states, while ExCog refers to what *could* be described as cognitive were it done in the head but does not have to be actually realised in it. ExCog must be independent from fine-grained functionalism that is based on human psychology if we accept Rupert's conclusions, and its strength cannot rely on "in-the-headness" of quite coarsely defined functional roles.

In the end, what ExCog has to assume are differently defined functional roles which are strongly connected with information processing structures and not to behavioural or macro causal roles. All functionalist aforementioned arguments against ExCog assume that "function as" of PP has to be "function as" of role functionalism, which we also identified as the most suitable for accommodating ExCog, but then conclude that this identification reflects negatively on ExCog. Our claim is that the "function as" of PP is of a different *kind* than that of ordinary functionalism. But sometimes this underlying "informational" functional isomorphism can give rise to something that looks like ordinary functional isomorphism of the processes in question, like in Otto-Inga case, which can then be confused for a main motivator of ExCog. ExCog should not be concerned with functional similarities of particular mental states or finely defined cognitive processes but with "coarse *systemic* roles" (Clark 2008: 96, see also chapter 5 and 6.3). "It is the way that information is poised to guide reasoning ... and behaviour that counts" (ibid.).

What makes an Otto case a case of extended remembering is that information from his notebook plays the same role in Otto's cognitive and overt behaviour as information stored in biological memory. Image rotation on the screen plays the same role as mental rotation in providing valuable information for assessment of the block fit. Maybe the best description of how these roles should be defined is provided in the original Clark and Chalmers paper when they consider constraints on cognitive extension, i.e., why not to count Google engine as part of my memory just like we count Otto's notebook as a part of his memory. They say that there is no standardised answer but that in Otto's case we should consider that:

First, the notebook is a constant in Otto's life—in cases where the information in the notebook would be relevant, he will rarely take action without consulting it. Second, the information in the notebook is directly available without difficulty. Third, upon retrieving information from the notebook he automatically endorses it... (Clark & Chalmers 1998: 231)

“Function as” should be sought on the level of description of information-processing roles and not on the level of functional similarities of particular processes which is sought by common functionalism. This is why Rupert's and triviality arguments do not hit the target. On the fine grain level Otto's notebook and the information stored in it do not satisfy appropriate functional roles which biological memory plays; in commonsense view, for instance, they are not accessed introspectively but perceptually, and when it comes to scientifically defined functional roles Otto's extended memory does not manifest, for example, recency effect. On the other hand, solution is not in making ordinary functional roles recognised by commonsense and science general or coarse enough like it is requested by triviality argument. Again, too coarsely defined functional roles enable unintuitive cases of cognitive extension such as the case of the “human-computer-Mayan calendar system”. The solution is in focusing on the roles that information plays in its transfer and transformations in a cognitive system which we intuitively count as important for counting a process cognitive.

Conclusions

When we say that Otto's notebook “functions as” biological memory we can claim that:

- a) it plays same causal roles in Otto's actions as biological beliefs in healthy subject's actions. If Otto wishes to attend an exhibition he will consult his notebook in order to retrieve the information about the address and act accordingly. Or that
- b) information is constantly available, directly available, automatically endorsed upon retrieval, and it was consciously endorsed at one point (see Clark & Chalmers 1998: 231, Clark 2008: 79).

We claim that by insisting on type b) functional roles we can avoid all of the arguments which threatened Parity based ExCog. On this account the ExCog hypothesis is not trivial, absurd, nor unjustified as a functionalist thesis. Unfortunately, defending such a position introduces several new problems:

1. We do not have a complete theory of *what are the appropriate functional roles*, which would not be the case if we accepted functionalism as our theory of “function as”.

2. This means that Parity argument cannot be an argument *for* ExCog, but only an argument against strong mark of the cognitive. To argue for ExCog it needs a supporting premise of what exact functions are cognitive functions. Or in other words, we need a theory of the cognitive.
3. For now we only have vaguely defined functional roles of the “type b” which can be subject to *similar counterarguments* as “type a” functional roles.

These problems are certainly severe, but we do not think they are fatal. Especially problematic is the fact that the Parity argument is dethroned as the best argument *in favour* of ExCog. By introduction of Parity argument we cannot determine for any process if it is cognitive or not if we do not introduce a theory of cognition at the same time. It seems that this renders PP and Parity argument as superfluous and redundant. But contrary to this we want to consider PP as informing us with two important facts: cognitive is best described by relational properties or by functions that satisfies (and not by intrinsic properties of parts of the brain), in that sense Parity argument should be reconsidered as an argument for a proper (functional) kind of the theory of cognition, and because it is not some neural property that determines a process as cognitive they are multiply realisable and it can extend into the environment under suitable conditions. ExCog got to survive yet another day but only at the cost of weakening its main argument.

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