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THE MIND BEYOND THE HEAD: TWO ARGUMENTS IN FAVOUR OF EMBEDDED COGNITION

ABSTRACT

In this paper I defend situated approaches of cognition, and the idea that mind, body and external world are inseparable. In the first section, I present some anti-Cartesian approaches of cognition and discuss the intuition they share that there is a constitutive interaction between mind, body and external environment. In the second section, I present the fallacy of the *Cartesian theater of the mind* and explain its theoretical premises. In the third section, I present a spatial argument against it, and argue that some case studies could give support to the idea of the mind stretching over the boundaries of the skull. In the fourth section, I present a temporal argument, and argue that even in this case the idea of an interaction between our cognitive life and the external world has *at least* a very strong intuitive palatability.

KEYWORDS

Extended
Cognition, Mind,
anti-Cartesianism,
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Embedded Cognition

1. Anti-Cartesian Approaches of Cognition

What is the relation between mind, body and external world? According to situated approaches of cognition¹, they are inseparable; knowledge is the achievement of the whole body in its relation with the environment. Instead of seeing learning as an accumulation of knowledge, this cognitive process is seen in terms of the increase of effective performances in different situations, co-determined by the brain and the environment. A strong Cartesian dualism, between mind and body, is rejected, in favor of an emphasis on the symbiosis of perceptions and actions; acting is in a certain sense thinking, and thinking is in a certain sense acting. This *certain sense* opens a spectrum of different possibilities²; in particular, mental processes could be described as ‘Embodied’ (depending on the entire physical state), ‘Embedded’ (with the accent put on the interaction between the agent and the world), ‘Enacted’ (with the accent put on the actions of the agent and their relevance for cognition),

1 See e.g. Greeno (1989) for a presentation of this topic, or Suchman 1987 for a research in cognitive science – where cognition is taken to be continuous with processes in the environment.

2 See Rowlands (2010): 51.

and ‘Extended’ (when external objects act as parts of our minds). In general, we can say that this spectrum of positions is ‘Anti–Cartesian’, in that it contrasts with the view that there is, in our heads, an independent and pure cognitive ‘control center’ of the body’s behavior, as if an homunculus lived there and used the body as his personal automatic puppet. The debate is complicated by the fact that the aspects listed above overlap (at least partly) in many theories, the fact that even more different positions could be distinguished and, finally, the fact that they are not always thoroughly distinguished by philosophers in this field. A taxonomy of all the different theories present in current literature falls beyond the scope of the present paper; however, it is important to sketch some features of at least the four possibilities listed above to point out the anti–Cartesian element they have in common, since the two original arguments I will present in this paper are related to it.

Embodied cognition refers to the idea that an agent’s cognition is shaped and determined by aspects of the entire body (e.g. hormonal states influence higher cognitive processes), that go beyond the brain itself. Cognition, then, depends upon having a body with a motor system and a perceptual system, and upon the fact that these systems interact constructively with the surrounding environment. The goal of successfully surviving in the external environment is thus seen as something which is constitutively built into the cognitive structure of the agent, and that modifies – and, in a sense, *build* – the reality that surrounds him/her³. As Varela et alii (1991: 172–173) put it,

By using the term embodied we mean to highlight two points: first that cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities, and second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological and cultural context.

This approach is then Anti–Cartesian in that it rejects the idea that perception and the motor systems are mere peripheral tools, like input and output devices; mind and body, on the contrary, as seen as acting as a bigger united entity, and the brain is on a par with the body and the external environment in explaining intelligent behaviors. Embedded cognition, while sharing a lot of features with Embodied cognition, refers however much more to the physical interaction between the agent and the external environment, and how this drives the behaviors of the subject and, ultimately, his cognitive life. Enacted cognition puts an accent on the actions and their relevance for cognition; organisms are seen as cognitive systems that have a central role, through interaction with the external world, in the generation of meaning – they *enact* a world⁴. Extended cognition, finally, claims that cognition extends beyond the boundaries of our heads, to include features of the external environment. When we use our fingers to count, our mind extends to our hands and the whole system produces a cognitive act; when we have to remember a number, we can store it in our middle–long term memory or write it down⁵ – in the latter case, the piece of paper becomes an extension of our mind; etc. Intuitively

3 N.B.: This passage will be crucial for the two original arguments developed in this paper.

4 Di Paolo et alii (2014): 33.

5 Or, as in McClelland et al. 1986, the use of pen and paper to perform long multiplication.

the idea, then, is that in certain conditions parts of the external world can substitute functions usually performed by (parts of) our brains. In *The Extended Mind* (1998), Andy Clark and David Chalmers famously defended this active externalism⁶ – arguing that the external world can participate in the birth of a cognitive act; there are cases in which external objects can perform just the same tasks performed by internal brain structures. As they put it:

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 recognizing as part of the cognitive process, then that part of the world is (so we claim) part of the cognitive process. [...] If we remove the external component the system's behavioural competence will drop, just as it would if we removed part of its brain. [...] The re-arrangement of tiles on the tray, while playing Scrabble, is not part of action; it is part of thought. (Clark & Chalmers 1998: 8–9–10 *passim*)

This view of an extended cognition may also be relevant to scientific investigation, in that the analysis of what have always been considered the result of inner processes may, if this idea is accepted, involve some external objects / events / factors in general. What will become relevant for the two arguments developed in the present paper, however, is another aspect that Clark and Chalmers highlight very well, when they claim that the brain has evolved “in ways which factor in the reliable presence of a manipulable external environment. It certainly seems that evolution has favoured onboard capacities which are especially geared to parasitizing the local environment so as to reduce memory load, and even to transform the nature of the computational problems themselves” (1998: 11). Our visual system, for example, has been shown⁷ to rely on the external environment, exploiting contingent facts about the structure of natural scenes.

Many of the problems in the field of philosophy of mind arose from addressing some of the basic assumptions of Cartesianism, such as the dualism between mind and body. In the present paper, I will describe (in the next section) the fallacy of the *Cartesian theater of the mind* and present two arguments against it, one from a spatial point of view and another one from a temporal point of view. Intuitively, what these arguments will show is that there are cases in which the coupled system “brain–environment” is essential to understand how our brain works (in the spatial case) and why do we have a certain phenomenology (in the temporal case). These arguments are meant to show that the Cartesian theater of the mind is indeed a fallacy, and that the idea of the mind that stretches over the boundaries of the skull has *at least* a very strong intuitive palatability. Extended Mind and Extended Cognition are two conceptually closely related hypotheses, and I take it that they can both benefit from the two arguments here presented.

6 “Some accept the boundaries of skin and skull, and say that what is outside the body is outside the mind. Others are impressed by arguments suggesting that the meaning of our words ‘just ain’t in the head’, and hold that this externalism about meaning carries over into an externalism about mind. We propose to pursue a third position. We advocate a very different sort of externalism: an active externalism, based on the active role of the environment in driving cognitive processes.” (Clark & Chalmers 1998: 7) Their active externalism is opposed to a ‘passive externalism’ as, for example, in Putnam (1975) or Burge (1979).

7 See e.g. Ullman and Richards 1984.

2. The Cartesian Theatre of the Mind

Daniel Dennett (1991) argued that, in some cases at least, there is no sharp dividing line between memory and experience, and the project of trying to ascertain the temporal microstructure of consciousness is misconceived. If two visual stimuli are presented in rapid succession, for example, most subjects will be able to identify the second stimulus far more reliably than the first. The standard interpretation of this sort of experiment, according to Dennett, is that in such cases the subject do not experience the first stimulus; they have no visual experience of it, since the occurrence of the second stimulus somehow interferes with the normal perceptual process. However, there is a second possible interpretation of the subject's responses. Perhaps the subjects do experience the first stimulus, but something interferes with their memory of this experience, and so when subsequently queried they deny having seen it⁸. Dennett maintains that in the case described (and others like it) neither interpretation is correct; there is simply no fact of the matter as to whether or not the subject's experiences the first stimulus: "the boundary between perception and memory [...] is not perfectly sharp" (Dennett & Kinsbourne 1992: 192). The assumption that there must be a determinate answer is grounded, in his opinion, in a sort of Cartesian conception of experience; according to such a conception, the question 'what is currently appearing on the stage of your consciousness?' always has a fully precise answer, an answer determined by the experiential contents present in the relevant subject's consciousness. Dennett's arguments, it has been claimed⁹, have a 'verificationist slant', relying as they do on the principle that if there isn't evidence that P obtains or not, there is not fact of the matter as to whether or not P obtains. In my opinion, however, the argument is – more radically – that there simply is not a point at which external data become a conscious experience, or a conscious experience becomes a memory; it is not only difficult to discover – there is not such a region in our brain.

Inspired by Dennett's argument, Simon Prosser (2016) argued that the differences between the models of our temporal experience seem to concern the point at which external data become conscious¹⁰ – where to put the line between memory and present consciousness. If, for example, it is a temporal extension of 500ms that, all together, is presented by our ocular nerves to our brain – let me say consciousness – so that we get to know the motion happened in front of us in the last 500ms, we have a direct experience of a temporal extended atom – and Extensionalists and Retentionalists are right; if, on the other hand, what happens is that different atoms – say, snapshots taken every 30ms – are presented in succession to our brain, we have a direct experience of a snapshot taken in the last 30ms by our eyes, and a short-term memory of the preceding snapshots – and Cinematists are

8 He calls the first mechanism *Stalinesque*, in that the experiences our perceptual systems produce do not accurately reflect the objective facts – in a manner reminiscent of Stalin's show-trials, and the second mechanism *Orwellian*, in that a false version of recent events is being rewritten, in a manner reminiscent of Orwell's dystopian societies.

9 See for example Dainton (2017).

10 This is Dennett's position, not mine: I think that the debate between the different models is genuine; simply, there are many ways to formulate it. I present Dennett's objection, however, because it gives an interesting insight in what I have to say in the following.

right. Such a debate, Prosser claims, seems to presuppose the fallacy of the Cartesian Theatre of the mind: the idea that there is a place and a moment in which the mere perceptual external data become conscious experience – as if a consciousness homunculus lived inside our head and watched the data presented to him. Besides reasonable worries of an infinite regress, the point is that our conscious experience is much more diversified and complex than this and, most of all, there isn't a finish line – a modern pineal gland, so to speak.

I agree on this with Dennett and Prosser: there isn't any fully conceptualised experience, happening at a definite time, as opposed to the process of obtaining it; it is the process itself that constitutes our experience in its different degrees of consciousness. Our cognition of the external world begins in the eye, in the ears, in the fingers; there is a process of rising consciousness, of course, but it would be vane to look for a precise locus where *we* come to meet an external phenomenon. It is pointless to try to distinguish between the real consciousness, the real person, the one that knows and understands, and the mere senses and nerves that, like tools and wires, bring information to the person, and to ask ourselves when the real self come to know something, when it is directly perceiving it or only remembering. If the difference between the models, then, consist simply in where the finish line should be placed, the non-existence of a finish line should deflate the whole debate. There is, of course, a phenomenal character associated to our processing of the external input, but – as Prosser (2016: 154) puts it – “we need not think that there is an answer to the question: ‘*when* is it like that for the subject?’ [...] finer-grained questions about what the subject was experiencing at some specific time simply have no good answers”.

At this point, one could start doubting that there is a genuine debate between the models of our temporal phenomenology. How is our phenomenological introspection supposed to give support to one or the other model if every model have the same capability to distinguish between different kind of experiences – simply, with different names? I agree with Prosser (2016: 136): “it is not really clear that we must choose between a theory that combines instantaneous contents with a short-term memory and a theory according to which there is a short-lived Specious Present”. Will we be ever able to understand if our visual experience of a car going at 50mph results either from a comparison between the last snapshot and the preceding snapshots (short-term memory), or from an extended experience, or from a retention of the past experiences? But even more radically: is there a difference at all? It seems that all the models tell the same story about information processing; some preceding data must be combined with the last acquired data in order to produce our experience of motion. Of course, every model has a specific line of defense, but it doesn't seem that any of them contain elements capable of explaining phenomenological features that the other models can't; maybe they simply tell the same story with different names. If this is the case, the Specious Present would merely be another name to convey an idea, but nothing specific, nothing that we would be able to clearly individuate in our phenomenology.

A real, human experience takes time to be formed. Within this extension of time, it is not clear at all what is a direct perception and what a short-term memory; it is not even clear if there is, or should be, such a distinction. At which moment a

conscious experience ends and become a memory? The mathematical description of the present as a point on the temporal line should not be confused with our phenomenological present, which consists in a cognitive blend of the last apprehended data and – fact that is often underestimated – an anticipation of the future; our understanding of external environment is almost totally focused on our capability to intervene on it, or escape from it – everything, in our spatial and temporal basic observation of the world, is centred on our possibility to act.

This line of thought, however, sheds a new light on the debate about the Specious Present. If the dispute is merely about the point at which a visual information become a conscious experience and then become a memory, there isn't much hope. But if we intended it, instead, as a debate about the experiential 'here-now' – much nearer to our phenomenological and practical life – there is the possibility of a new dawn for it. In this case, the debate would be a genuine dispute about the best model to account for a certain phenomenal intuition, which has even a definite physiological counterpart, as I am going to show.

3. A Spatial Argument

Think of *what* are our senses, and *why* we have them; animals are the structured organisms that can move. The evolutionary reason of the functional and integrated role of our eyes, our ears, our nervous system, is to permit us to move in, intervene on or escape from the external environment or other animals. Our cognition of space and time is not unrelated to this logic; it would be an error to think of us as organisms with such and such characteristics, such and such temporal and spatial phenomenology, which are then lowered in a particular world, as Adam and Eve, shaped in Eden and then fallen on Earth. It is the world itself that shaped us and our evolution in it – our understanding of it, and the possibility to act, to move, is a central part of the project.

The mechanism that underlies our capability to grab objects is a perfect example of that. Before the discovery of brain neurons, it was natural to think that when we have an object in front of us – 20 centimetres or 2 metres away – we can decide to take it or not; if we decide to take it, our brain tells our arm to move and take it – or, if it is too far, tells our body to walk there and our arm to take it. Nowadays, however, we know that what really happens is much more complex¹¹; there are motor neurons firing for every object in our proximity, and an inhibitory mechanism blocking the communication between them and the nerves; the motor neurons firing are not only continuously repeating to the arm *how to* coordinate to grab the object, they are literally telling it to take it; it is only thanks to the inhibiting role of the motor cortex – region of the cerebral cortex in the frontal lobe – that we don't actually take every object within our reach. Experiments¹² with the fMRI demonstrated how, if we move the object out of our possibility of reach, the motor neurons stop firing; of course we can still see the object and think 'I want to take it', but it is a completely different cognitive action. The curious fact is that,

11 See Rizzolatti et al. (1996), Rizzolatti et al. (2000), Sinigaglia (2008), Sinigaglia (2008 B).

12 See for example Bear et al. (1996).

if we give the person doing the experiment a stick (with which she could reach the object) the neurons start to fire again.

The moral of the story is that our possibility to directly and immediately intervene on the external environment is something that makes a great difference for us, it is the way we are built; we have senses *for* that reason. The ‘here–now’, related to our particular possibilities (how long are our arms, if we carry a stick or not, etc.), is central to our way to experience the world. At first glance, we could have thought that there isn’t a clear sense in which an object is ‘here’; whether it is 20 centimetres or 2 metres far, it is always ‘here’ in some sense. A debate regarding the exact point at which an object is ‘spatially present’ for us would have been meaningless; there is not a point at which the object changes its status and becomes present, we could have argued. But we are not Adam and Eve, the ‘spatial here’ – intended as ‘what I can directly and immediately act on’, ‘what I can reach’ – makes a great difference for us, both from a neurophysiological and a phenomenological point of view. There is an extended spatial ‘here’ clearly distinguished and individuated, and the debate regarding different models trying to describe the situation would be meaningful. I think that a similar point could be made in the temporal case; before turning to the temporal version of this reasoning, however, let me push the argument a little further.

Think of the famous *phi phenomenon* (the phenomenon of apparent motion). If two immobile spots of light on a screen are turned on and off at certain moments (generally the interstimulus interval must be around 30 frames per second), we see – instead of the two dots – one dot moving; Dainton’s comment is that “evidently our brains are more than happy to supply us with experiences of motion at the least opportunity” (Dainton 2017 B, 1); but why? Again, I think that the reason is that we have been built by nature; if we see, in the sky or in a field, a black dot disappearing and very briefly another black dot appearing 30 centimetres at its left, the best explanation of that is that something is moving – and not that the first dot simply vanished in the sky, while another one miraculously came into existence; as Hoerl (2013: 162) puts it, “temporal features of reality can enter into the content of perception in the light of the immediate implications they possess for actions”; a similar point is also made by Morgan (2003: 61): “we are not normally conscious of a blur in moving objects: nor do we see them frozen in space–time. Instead, we see recognisable objects in motion”. For the same reason, we see the leaves of the trees of the same green in the morning and in the evening – while, in reality, the two perceived colours are totally different, and mostly *not* green. All our conscious perceptions contribute to a successful and homogeneous experience of the world we live in; our brain continuously tries to connect every perception to familiar experiences, experiences that it knows how to react to, and this is why it is so easy to artificially create perceptual illusions in a laboratory using vanishing and appearing objects. My point, then, is that we can’t think of our experiences without thinking of the way we are built; I agree with Hoerl (2013: 168) when he claims that “in perception [...] features of reality are represented in the light of their immediate relevance for the subject’s actions”.

My argument, then, is that the possibility to act on particular objects or events is something that makes a great difference for our experience of the external world;

just as in the spatial case there is a distinct sense in which the present is the ‘reachable here’, I believe there are good arguments to claim that in the temporal case ‘the present’ is the extension of time in which we can react to what’s happening without the sensation that it is already ‘too late’.

4. A Temporal Argument

I am proposing here an argument according to which it is possible to avoid the ‘Cartesian theatre of the mind’ fallacy in the temporal context; therefore, an intuition that could help Extended approaches to cognition to reject the strict Cartesian dualism, while establishing a definite meaning for the ‘phenomenological immediacy’ behind the notion of Specious Present. Prosser (2017: 154) claims that there is not any sensible difference between a sequence of two very close visual or auditory stimuli and two which are, on the contrary, separated by many seconds, above and beyond the platitude that one sequence takes more time. Are we able to say that there do really is a difference there?

Imagine, this time, that the the subject is asked to express a preference, an aesthetic judgement for example, between the colours showed in a visual display. In the case of the two colours separated by many seconds, the subject has the time to consider how much she likes the first colour, and some seconds later she sees the other colour and considers it, in turn. When she sees the second colour, she has already aesthetically judged the first one, which then *feel past*. From a phenomenological point of view, there is a clear, distinct sense in which the first visual experience is past – the subject already experienced it. In the second case, vice versa, the subject has not the physiological or phenomenological temporal space to experience the first colour and then the second; she knows that one preceded the other, but in a clear sense she is presented with two colours, she has one experience, and she has to pick her favourite colour out of that only experience. It is legitimate to have different intuitions on that, but it seems there is a strong case to argue that, at least in some specific cases, there is a very definite sense in which the two visual stimuli showed in a fraction of a second *feel equally present* and in which the two separated by many seconds don’t. I take it to be a promising approach to understand what the Specious Present is. It is always possible, strictly speaking, to break down an experience and arrive at an atomic snapshot, but this is not what we have in mind when we think of an analysis of our temporal experience; we look for a model that is capable to translate phenomenological differences, instead of merely chronometric. The question of whether our temporal experience has a temporally extended content should be rejected, rather than answered, only if we think of it as the search of a definite moment at which information ‘enters’ or ‘leaves’ consciousness, or at which conscious experience starts and ends; if we, instead, consider the temporal content of our experience as the now with which we have a particular interactive role, just as the spatial here that our motor neurons are so good at individuating, then the question becomes interesting again. This is why I think that the interaction between mind, body and external environment should be a factor in our cognitive models. We could ask which is the extension of our present temporal experience just as we can ask which is the extension of our reachable here; in this case, some

sort of Specious Present seems an indispensable element of our temporal phenomenology. It is only *after* such a philosophical analysis that a neurophysiologist can define the nature of the Specious Present and measure its duration.

Finally, it is possible to see another link between our cognitive acts and the external world when we consider the role of anticipation in our experiential lives. The anticipation of the near-to-come future has an important role in the definition of our temporal present window; let me make an example, before turning to some experimental data. It is exactly talking of action and reaction that the role of anticipation came to the surface in such a strong way: not only, in fact, we react to something that we have seen, or touched, or smelled – that is gone, happened, in the past –, but we also act according to what we want to do in the future. It is only keeping in mind the combination of these two elements, past and future, reaction and action, that we can understand the window of the present, and not only because they always coexist in that window, but even and more significantly because one influence the other, as some very interesting experimental results confirm. One that I find significant, in this context, and that stresses the role of anticipation in our temporal experience of the present, is the phenomenon described by psychologists as backward masking: when, for example, we listen to music, the phenomenal character of our experience of a note is affected by the properties of the notes immediately prior to that note and after that note. Laurie Paul (2014: 186) comments:

How can we ‘see into the future’ in this way? What is the basis for this experience of foreshadowing? There is debate about the mechanism involved in the cognitive processing of these temporally clustered events. Some have argued that it is a predictive effect [...]. Others have argued that it is what is called a ‘postdictive effect’ [...]. What matters here is that these foreshadowing and filling-in psychological effects are empirically well-documented, even if their source is not fully understood.

What I find particularly meaningful, in this context, is that this backward masking effect obtains only when the stimuli are close to one another; I see it as an experimental confirmation of the fact that there is indeed a phenomenological difference in the two sequences of notes ‘do-re’ beyond the mere fact that one sequence takes less time. When two notes are experienced in the same Specious Present, we have one reaction to two sounds – the second sound could even affect the phenomenal character of the first one, while the same thing does not happen when two sounds are more temporally separated. A similar reasoning can be extended to the other senses¹³.

At this point, however, it is very easy to see a possible counterargument. If we don’t specify the length of the specious present, it can be argued, we haven’t actually brought about any kind of improvement to the debate. A stronger version of this argument could be that if we don’t specify the length of the specious present, we don’t even have arguments to maintain its existence, not even from a phenomenological point of view; *affirmanti incumbit probatio*, it could be said. If we are interested in maintaining the importance of the specious present, we should be prepared to answer the very reasonable worries about its extension. If the specious

13 See for example Saccuzzo et al. (1996), Herzog et al. (2013) for the studies of visual backward masking in schizophrenic patients.

present is our phenomenological window of presentness, how extended is that window? Is it something that should be decided by a phenomenological investigation, or is it the field of neurophysiological studies? I see the difficulty here, but I do not think it actually is a counterargument to what I am proposing, which is merely a change of perspective. A lot of experimental work should be done on this topic, and something more precise about the extendedness of that window could be said. My point, however, was that the important thing to understand here is that the experiments should not be conducted in the belief that we are going to discover the border between present consciousness and memory; instead of focusing on what particular cognitive acts are going on in our mind, the experimenters should focus on our possibility to act and react. My intuition is that the results (the extendedness of the specious present) will vary depending on the particular task set by the experimenters, but I don't see it as a problem. It is quite natural to think that the window of our phenomenal presence has a different extension depending on what we are doing or trying to do. The important point, in my opinion, is that once we have absorbed this change of perspective there is a definite way to decide if a Specious Present is part of our temporal phenomenology, to understand what it is, to measure what is its duration in a particular situation, and to decide which models of our temporal understanding are more apt to describe our phenomenal temporality.

Conclusions

In the first section, I have presented anti-Cartesian approaches of cognition, and the intuition they share that there is a constitutive interaction between mind, body and external environment. In the second section, I have presented the fallacy of the *Cartesian theater of the mind* and explained its theoretical premises. In the third section, I have presented a spatial argument against it, and argued that some case studies could give support to the idea of the mind stretching over the boundaries of the skull. In the fourth section, I have presented a temporal argument, and argued that even in this case the idea of an interaction between our cognitive life and the external world has *at least* a very strong intuitive palatability.

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Andrea Rozeli

Duh izvan glave: dva argumenta u prilog uronjene kognicije

Apstrakt

U ovom radu branim situirane pristupe kogniciji i ideju da su duh, telo i spoljašnji svet nerazdvojni. U prvom odeljku predstavljam nekoliko anti-kartezijanskih pristupa razumevanju kognicije i ispitujem deljenu intuiciju da postoji konstitutivna interakcija između duha, tela i spoljašnje sredine. U drugom odeljku predstavljam logičku grešku kartezijanskog teatra i objašnjavam njene teorijske pretpostavke. U trećem odeljku predstavljam prostorni argument protiv kartezijanskog teatra i pokazujem da neke studije slučajeva mogu da daju potporu ideji da se duh proteže izvan granica lobanje. U četvrtom odeljku predstavljam vremenski argument i pokazujem da čak i u ovom slučaju ideja o interakciji između našeg kognitivnog života i spoljašnjeg sveta ima barem veoma snažnu intuitivnu prihvatljivost.

Ključne reči: proširena kognicija, duh, anti-kartezijanizam, situirana kognicija, uronjena kognicija