

## Removing the mind from the head. A Wittgensteinian perspective.

### Indicate the state of the art.

What is the mind? Some philosophers like to treat the mind as if it were a thing or object, such that the mind is identical with the brain. Not everyone is convinced, however. For example, philosophy of mind and cognitive science has recently seen the emergence of two paradigms that challenge mind/brain identity. The first, enactivism (Varela, Thompson and Rosch, 1991), contends that minds are “enacted”. That is, thinking and experiencing are bodily doings or activities. The second, extended mind (Clark and Chalmers, 1998), claims that, under certain circumstances, minds can be “extended”. That is, the states or processes that make up a mind can, on occasion, extend to include objects in the environment.

Given that both paradigms challenge what can be seen as the consensus view on the mind, then it is not surprising that both paradigms have come under attack. This has led to a heated back-and-forth with, on the one side, internalists, who claim the mind is an internal, brain-bound phenomenon, and on the other, externalists who counter that the mind is variously an enacted phenomenon (enactivism), or an internal-external phenomenon (extended mind). At present, the literature remains divided, with an apparent standoff between the two sides. All of which raises the question: can this internalist/externalist issue be resolved?

One way to approach this question is to consider a leading strategy employed by both internalists and externalists. This strategy involves appeal to ‘special mechanisms’, which are accompanying causal processes that are understood to be the material realisers or constituents of mentality. This strategy looks attractive to all concerned because it seems to offer a way to settle boundary issues about mentality. It attracts internalists because it can be used to show that such accompanying causal processes remain confined to the head and so internalism is true. It attracts externalists because it can also be used to show that such processes can extend into the environment and so externalism is true.

However, this arguably conflates two distinct questions (Loughlin and Zahidi, 2017). For we can ask: in virtue of what is a state or activity a cognitive or mental state or activity? Call this Q1. Yet, we can also ask: what, if anything, do the causal mechanisms that underpin or realise a given cognitive or mental state or activity have in common? Call this Q2. Both internalists and externalists assume that questions about what mentality is (Q1) can be answered by identifying the properties common to underlying causal mechanisms (Q2). This conflation of Q1 and Q2 can be illustrated in the following way.

The synchronous activation of neural populations in the brain is a well-recognized causal mechanism. Some have used this to defend an internalist position about consciousness. Clark (2009) has argued that conscious experience depends on high speed (or high bandwidth) information processing. Such processing, insists Clark, remains brain-bound because, first, it depends on the synchronicity of neural populations in the brain (Singer, 2003), and, second, the body acts as a low pass filter and so slows down the transfer of information (Eliasmith, 2008). However, others have appealed to the same mechanism to defend an externalist position about consciousness. Thompson and Varela (2001) have argued that the synchronous activation of neural populations is a self-organising, emergent feature of the brain, which ensures that neural, bodily and worldly elements can interact to produce emergent global organism-environment

processes. Conscious experience is thus external, in the sense that it “cut[s] across brain-body-world divisions” (ibid, pp421-424).

Hence, Clark, Thompson and Varela seem to agree that what makes a state or activity conscious (Q1) is a property common to the underlying causal mechanisms i.e., neural synchrony (Q2). That is, they agree that Q1 can be answered via Q2. Neural synchrony is thus a special mechanism. Yet whereas Clark takes this as demonstrating that the boundaries of consciousness are internal, Thompson and Varela take this as demonstrating that the boundaries of consciousness are external.

A popular development in philosophy of mind has been to insist that the brain has an internal model of the world, which issues predictions about the world. When input is received via the senses, this results in prediction error. This error is minimized either by adjusting internal predictions (perceptual inference) or by adjusting sensory input (active inference). Advocates of this view insist that prediction error minimization (PEM) is the mechanism by which we accurately perceive the world. PEM has been used to defend both internalist and externalist positions.

For example, Clark argues that PEM reveals those “key aspects of neural functioning that makes structuring our worlds genuinely continuous with structuring our brains and sculpting our actions” (Clark, 2013, p194), that is, what we perceive determines what we do, which ensures that the world then provides the sort of stimulation that we, that is, the models in our brains, have previously predicted. PEM is thus “extension friendly” (ibid, p260). Indeed, Clark sees PEM as compatible with an externalist approach like extended mind (ibid, p258). By contrast, Hohwy (2013) highlights the fragility of prediction error minimization. PEM is fragile, claims Hohwy, because the sorts of “fine tuning” needed to maintain a balance between perceptual inference and active inference can easily break down (or be broken down, as in experimental settings like the rubber hand illusion (ibid, p151). We compensate for this fragility by structuring our environments and/or our engagements with those environments so as to render sensory input more precise and thereby improve our internal predictions. Hence, the boundaries between brain, body and environment are not malleable but rather “principled, indispensable, and epistemically critical” (ibid, p239). Hohwy thus views PEM as confirming that perceptual experience is internal.

Thus, Clark and Hohwy both seem to agree that what makes a state or activity perceptual (Q1) is a property common to the underlying causal mechanisms i.e., prediction error minimization (Q2). That is, they agree that Q1 can be answered via Q2. PEM is thus a special mechanism. Yet whereas Clark sees this as demonstrating that perceptual experience is external, Hohwy sees this as demonstrating that perceptual experience is internal.

Consequently, both internalist and externalist proponents of the special mechanisms strategy conflate Q1 and Q2. Yet might this conflation be problematic? And if so, what consequences would this have for the internalist/externalist debate? For example, is the mind an internal or external process? My project will answer these questions.

### **Describe the objectives of the research.**

My project will assess the internalist/externalist debate via an examination of later Wittgenstein. I will do this by considering the pyrrhonian and non-pyrrhonian themes evident in Wittgenstein (Stern, 2006). I will claim that Wittgenstein is pyrrhonian when he attempts to dispel the confusion that can arise when we misunderstand what we mean when we talk about mentality.

He is non-pyrrhonian when he gets us to think about mentality in ways that avoid such misunderstandings and so gain new, substantive insight into our cognitive or mental lives.

I intend to apply these Wittgensteinian themes to the internalist/externalist debate. My goal will be to show that the debate should be dissolved and replaced with an understanding of the mind that focuses on behaviour. I will claim that the mind is not a thing or object. Instead, understanding what we mean when we talk about the mind requires clarifying the role behaviour plays in realising our cognitive and mental lives.

As the special mechanisms strategy illustrates, both internalists and externalists assume that questions about what mentality is (Q1) can be answered by identifying the properties common to underlying causal mechanisms (Q2).

Wittgenstein clarifies why this assumption is problematic. Consider what it means to think. Thinking is a capacity, something we are able to do. Understood as a capacity, thinking is not a process, even in cases where it can have process-like characteristics e.g. when I recount to someone the steps I took to calculate a mathematical sum. According to Wittgenstein, psychological capacities, like thinking, cannot be equated with nor reduced to accompanying processes. This is because the criteria we use to determine whether or not someone is thinking e.g. they can give reasons for their actions, are not equivalent to the criteria we use to identify accompanying processes e.g. does it have spatial and temporal boundaries?

This is the Wittgensteinian pyrrhonian approach. Both internalists and externalists misunderstand mentality and so the debate should be dissolved. For the criteria involved in determining what mentality is (Q1) are separate and distinct from the criteria involved in determining the properties common to the causal mechanisms that underlie mentality (Q2). Q1 then cannot be answered via Q2 because to do so is to conflate these non-equivalent criteria. Once we are reminded of this fact, then it follows that even if neural synchrony or prediction error minimization are features of brain activity or features of extended brain, body and world systems, neither of these features are 'special mechanisms' and so neither demonstrates internalism or externalism about the mind. These features are instead simply properties common to underlying causal mechanisms.

Wittgenstein is neither an internalist nor an externalist (Glock and Preston, 1995). For Wittgenstein, it is the full range of human behaviours that reveals our mental lives. As he puts it: "only of a living human being and what resembles (behaves like) a living human being can one say: it has sensations; it sees; is blind; hears; is dead; is conscious or unconscious" (Wittgenstein, 1953/2001, 281). Here the term 'behaviour' does not just include bodily movement. Crucially, it also includes the non-mediative or internal link between our use of psychological concepts and behavioural criteria (Glock, 1996, p327).

This is the Wittgensteinian non-pyrrhonian approach. Recall the previous example of thinking. Suppose I interrupted you while you were performing a task and asked you to explain to me what you were doing. If you could provide me with reasons for your actions, then I may justifiably call what you are doing "thoughtful". Yet, says Wittgenstein, "we cannot separate.. 'thinking' from..activity. For the thinking is not an accompaniment of the [activity]" (Wittgenstein, 1967/2007, s101). What this means is that my characterisation of your actions as "thoughtful" is based on you fulfilling certain criteria, like being able to give reasons. There is thus a non-mediative or internal link between my use of a concept like thinking and such behavioural criteria. Indeed, Wittgenstein reminds us that if different criteria were used to identify thinking, then this

would result in us identifying an entirely different psychological capacity (or no psychological capacity at all).

This non-pyrrhonian approach thus rejects the idea that mentality is constituted by either an internal or external process. Instead, the non-mediative or internal link between our use of psychological concepts and behavioural criteria ensures that our psychological capacities are manifested or displayed in what we do. And while our behaviours obviously have locations (in the trivial sense that everything is located somewhere), such behaviours are not bounded entities that can be viewed in either internal or external terms. In this sense, a Wittgensteinian non-pyrrhonian approach removes the mind from the head, not in order to locate it in the environment, but rather to not locate it at all. For the mind is not a thing or object. Rather, our capacities to think and experience are revealed in what we do.

To recap, I have, first, dissolved the internalist/externalist debate (the pyrrhonian approach), and second, clarified how the non-mediative or internal link between our use of psychological concepts and behavioural criteria moves us beyond this debate (the non-pyrrhonian approach). This Wittgensteinian perspective fits themes current in philosophy of mind. It also casts fresh light on what human mentality is.

First, Hutto (2013), Moyal-Sharrock (2013), Boncompagni (2013), and Hutto, Kirchoff and Myin (2014) have all identified how later Wittgenstein and enactivist approaches share important affinities. In my own work, I have also pursued this theme (Loughlin, 2014). A Wittgenstein/enactivist approach can be understood to be “extensive” (Hutto and Myin, 2013). For once it is recognised that our psychological concepts are linked to behavioural criteria, then we can move beyond boundary disputes about the extent of the mind. Second, as the non-pyrrhonian approach highlights, developing our understanding of mentality requires developing our understanding of human behaviour. For example, it requires recognising that our behaviours are cognitive or mental because of their normative status.

Consider what happens when I teach a child the addition rule (+2) and then order the child to add 2 to 1000. The child follows the rule, not simply when he or she answers ‘1002’, but rather when he or she grasps that ‘1002’ is the *only* behavioural criterion that fulfils the order (Wittgenstein, 1953/2001, 458; Glock, 1996, p326). Importantly, there is no reason as to why the child will grasp in this way. According to Wittgenstein, it is simply a contingent fact about us that we tend to react the same to the same things. Nonetheless, this contingent fact ensures that our behaviours, whenever performed within our language-games, can manifest or display the psychological concepts ‘obeying rules’ or ‘going against rules’. As such, we are not only trained to play language-games. We are also trained to play these games well or badly, rightly or wrongly. Indeed, the distinctive ways in which we can get things right or wrong are what it means to have acquired a human mind (Williams, 1999, p6). Set against the backdrop of the internalist/externalist debate, this Wittgensteinian perspective remains an innovative way to think of human mentality.

### **Describe the methodology of your research.**

My project will aim to do two things. First, it will show that the internalist/externalist debate has not been resolved. Second, it will show that the debate should consequently be dissolved and replaced with a Wittgensteinian perspective, according to which understanding what we mean when we talk about the mind requires clarifying the role behaviour plays in realising our cognitive and mental lives.

The project will have two parts. Each part will have four steps. There will be four intermediate goals.

Part 1: I will examine the main strategy adopted by internalists and externalists e.g. the special mechanisms strategy. My aim will be to show that this strategy has failed to lead to a resolution of the internalist/externalist debate. This will involve analysis of the relevant literature.

Part 1, step 1: I will examine claims about the boundaries of the mind that are based on appealing to brain mechanisms like neural synchrony. This will follow the state of the art.

Part 1, step 2: I will analyse such claims in order to show that they conflate two questions (Q1 and Q2). This analysis will also examine why such a conflation is attractive to proponents of this strategy. This will be a novel development in the literature.

Intermediate goal 1: To show that appeals to special mechanisms fail to resolve the internalist/externalist debate in favour of the internalist. The import of this goal is as follows. Defending internalism via appeal to brain mechanisms confronts a dynamical objection. The dynamicist will object that brain, body and environment can constitute a non-decomposable, dynamical system and so any changes in the brain will lead to changes throughout the system. It thus no longer makes sense to think there is a bandwidth boundary between brain, body and world. All information transfer must be, by definition, high bandwidth within the system. The only bandwidth boundary that will exist will be between the dynamical brain-body-environment system and the rest of the world. Such a dynamical view is compatible with claims about neural synchrony. If so, then internalist boundary claims about mentality cannot be settled via appeal to brain mechanisms like neural synchrony.

Part 1, step 3: I will examine claims about the boundaries of the mind that are based on appealing to prediction error minimization (PEM). This will follow the state of the art.

Part 1, step 4: I will analyse such claims in order to show that they conflate two questions (Q1 and Q2). This analysis will also examine why such a conflation is attractive to proponents of this strategy. This will be a novel development in the literature.

Intermediate goal 2: To show that appeals to special mechanisms fail to resolve the internalist/externalist debate in favour of the externalist. The import of this goal is as follows. Defending externalism via appeal to prediction error minimisation confronts a coupling-constitution objection. The objection is that causal coupling between an agent and their environment, no matter how detailed or involved, is not sufficient to substantiate the further claim that such coupling is thereby constitutive of the agent's mind. Instead, what constitutes the agent's mind is internal to the agent. This objection is compatible with appealing to prediction error minimization, since such minimization can be understood be only a feature of brain activity. If so, then externalist boundary claims about perceptual experience cannot be settled via appeal to prediction error minimization.

Intermediate goal 1 clarifies how externalists can challenge internalist claims. Intermediate goal 2 clarifies how internalists can challenge externalist claims. Fulfillment of goals 1 and 2 indicate why there has been no resolution of this debate. This would be a novel development in the literature.

Part 2: I will challenge the internalist/externalist debate using Wittgensteinian considerations. This will involve developing the pyrrhonian and non-pyrrhonian themes evident in later Wittgenstein. I will utilise such themes to (a) show why the correct response to internalist/externalist debate is dissolution, not resolution, and (b) replace that debate with a Wittgensteinian perspective. This will require analysis of key texts of later Wittgenstein and the issues raised by the secondary literature on Wittgenstein. It will also require applying such analyses to themes within contemporary philosophy of mind.

Part 2, step 1: I will examine why the criteria we use to determine whether or not someone has some psychological capacity are not equivalent to the criteria we use to identify accompanying processes. This will follow the primary and secondary literature on Wittgenstein.

Part 2, step 2: This is the Wittgensteinian pyrrhonian approach. I will examine why the non-equivalent criteria identified in part 2, step 1 renders it problematic to conflate questions about what mentality is (Q1) with questions about the properties common to underlying causal mechanisms (Q2). I will then show how this problematic conflation undercuts both internalist and externalist boundary claims. This would be a novel development in the literature.

Intermediate goal 3: To show that both internalists and externalists misunderstand mentality and so the internalist/externalist debate should be dissolved. The import of this goal is as follows. Both internalists and externalists have previously viewed the task in philosophy of mind to be explaining how a physically interior and/or exterior process that accompanies some behaviour could constitute mind and experience. If intermediate goal 3 is achieved, then this favours rejecting this explanandum.

Part 2, step 3: I will examine the non-mediative or internal link between our use of psychological concepts and behavioural criteria in order to show that our psychological capacities are manifested or displayed in what we do. This will follow the primary and secondary literature on Wittgenstein.

Part 2, step 4: This is the Wittgensteinian non-pyrrhonian approach. I will analyse how this non-mediative or internal link clarifies that the mind is not a thing or object and so can be removed from the head. I will then examine how the connection between Wittgenstein and enactivist proposals can be developed using this non-mediative or internal link. I will also examine how this link clarifies the way in which behaviour is cognitive or mental because of its normative status. This would be a novel development in the literature.

Intermediate goal 4: To show that developing our understanding of mentality requires developing our understanding of behaviour. The import of this goal is as follows. The explanatory task for philosophy of mind is now to detail all the diverse ways in which our psychological capacities are manifested or displayed in what we do. And this task is noticeably distinct from the empirical task of examining the causal mechanisms that underpin some psychological capacity. Hence, if intermediate goal 4 is achieved, then broader philosophical questions about what cognition or mentality is can be separated from narrower empirical questions about the role of causal mechanisms.

Intermediate goals 3 and 4 both develop the literature in novel ways. Intermediate goal 3 changes the explanatory task for philosophy of mind. Intermediate goal 4 reveals that the task is to clarify the role behaviour plays mentality and thereby distinguish philosophical questions about mentality from empirical questions about causal mechanisms.

**Provide a work plan, i.e. the different work packages and a detailed timetable.**

Work package 1 and work package 2 will span approximately 6 months apiece. This is because the debate addressed by intermediate goal 1 and the debate addressed by intermediate goal 2 are already well structured and the positions within these debates clearly laid out. This should ensure that intermediate goals 1 and 2 could be realised in a straightforward fashion.

Work packages 3 and 4 will each span approximately a year. The reason for this is the complexity of both packages.

Work package 3 will require detailed analyses of the primary and secondary literature on Wittgenstein. Work package 3 (part 2, step 1) will take approximately 4 to 6 months to complete. Work package 3 (part 2, step 2) will also take approximately 4 to 6 months to complete. This time is needed if intermediate goal 3 is to be achieved, that is, the internalist/externalist debate is to be dissolved and so the previous explanandum of philosophy of mind rejected.

Work package 4 will also require detailed analyses of the primary and secondary literature on Wittgenstein. Work package 4 (part 2, step 3) will take approximately 4 to 6 months to complete. Work package 4 (part 2, step 4) will also take approximately 4 to 6 months to complete. This time is needed if intermediate goal 4 is to be achieved, that is, philosophical questions about what cognition or mentality is are shown to be separate from empirical questions about the role of causal mechanisms.

**Enumerate the bibliographical references that are relevant for your research proposal.**

Boncompagni, A. (2013). Enactivism and the 'Explanatory Trap. A Wittgensteinian Perspective. *Methodes*, pp27-49.

Clark, A (2009). Spreading the joy: Why the machinery of consciousness is still probably inside your head. *Mind*, Vol. 118, 472, pp963-993.

Clark, A. (2013). Whatever next? Predictive brains, situated agents and the future of cognitive science. *Behavioural and Brain Sciences*, 36 (3), 181-204.

Clark, A. (2016). *Surfing Uncertainty*. Oxford University Press.

Clark, A. & Chalmers, D. (1998). The extended mind. *Analysis*, 58, pp. 7-19.

Eliasmith, C (2008): Dynamics, Control and Cognition. In Robbins and Aydede (Eds.), *The Cambridge Handbook of Situated Cognition* (pp134-154). Cambridge University Press.

Glock, H, Preston, J (1995). Externalism and first person authority. *The Monist*, vol 78, number 4, pp515-34.

Glock, H (1996). *A Wittgenstein Dictionary*. Blackwell Publishers.

Hohwy, J (2013). *The Predictive Mind*. Oxford University Press.

Hutto, D. (2013). Enactivism, from a Wittgensteinian Point of View. *American Philosophical Quarterly*, vol 50, no. 3, pp281-302.

Hutto, D, Kirchhoff, M, Myin, E (2014). Extensive Enactivism: why keep it all in? *Frontiers in Human Neuroscience*, vol 8, article 706.

Hutto, D, Myin, E (2013). *Radicalising Enactivism: Basic Minds without Content*. Cambridge, MA: MIT Press.

Loughlin, V. (2014). Radical Enactivism, Wittgenstein and the cognitive gap. *Adaptive Behaviour*. Vol: 22, no: 5, pp350-359.

Loughlin, V & Zahidi, K (2017). What is left of the Active Externalism debate? *European Journal of Philosophy*, DOI: 10.1111/ejop.12249

Moyal-Sharrock, D (2013). Wittgenstein's razor: The Cutting Edge of Enactivism. *American Philosophical Quarterly*, Volume 50, number 3, pp263-279.

Singer, W (2003): Synchronisation, binding and expectancy. In Arbib, M A (Ed), *The Handbook of Brain Theory and Neural Networks*, 2<sup>nd</sup> edition, (pp1136-1143). Cambridge MA: The MIT Press.

Stern, D (2006). How many Wittgensteins? In A Pichler, S Saatela (eds): *Wittgenstein: The Philosopher and his Works* (pp205-229). Frankfurt a:M.

Thompson, E, Varela, F, J, (2001). Radical Embodiment: neural dynamics and consciousness. *Trends in Cognitive Sciences*, Vol. 5 (10), 418-425.

Varela, F J, Thompson, E, Rosch, E (1991). *The Embodied Mind: Cognitive Science and Human Experience*. The MIT Press.

Williams, M. (1999). *Wittgenstein, Mind and Meaning: Toward a Social Conception of Mind*. Routledge.

Wittgenstein, L. (1967/2007). *Zettel*. University of California Press.

Wittgenstein, L. (1953/2001). *Philosophical Investigations* (3<sup>rd</sup> ed.). Blackwell Publishers.

**Indicate below whether you think the results of the proposed research will be suitable to be communicated to a non-expert audience and how you would undertake such communication.**

The results of my project would be suitable to be communicated to a non-expert audience.

Many take it as simply given that you-are-your-brain. This idea has no doubt been encouraged by the rise of neuroscience and the recent emergence of non-invasive brain technologies, like functional magnetic resonance imaging (fMRI). It is also supported by the now widely acknowledged fact that a healthy brain is a key ingredient to bodily health. Brains clearly matter. But are they the whole story? My project denies that they are.

Imagine you are sitting on a beach, feeling the sun warm your body. If my project is correct, then your imagined thought is not a property of your brain. Instead, imagining, like thinking or experiencing, are capacities that you reveal in what you do. Contrary to the you-are-your-brain idea, when we talk about our mental lives, we are talking about our behaviours, which are in turn shaped by the games we play with language. In comparison to the neuro-reductionism that pervades Western culture, my project thus offers a fresh and innovative approach to human mentality. It also has implications beyond philosophy. For example, it facilitates separating philosophical questions about what mentality is from empirical questions about the causal



mechanisms that underpin mentality. Take the case of remembering. My remembering what I did yesterday (I went to the park, for example) is an act of remembering, not because some mechanism has been activated inside my head, but rather because my action fits wider behavioural criteria. This is compatible with acknowledging the crucial role that brain mechanisms can play in enabling remembering.

My project thus challenges the you-are-your-brain idea. In doing so, it attacks an idea central to contemporary discussions about human mentality, which makes the results of this project suitable to be communicated to a non-expert audience. Combined with the fact that Wittgenstein is widely recognised as among the most significant intellectual figures of the 20<sup>th</sup> century, then a project that argues for a Wittgensteinian perspective is likely to be of interest to those outside the academy.

My background in journalism means that I understand how research can be packaged so as to appeal to non-experts. As part of my fellowship, I have disseminated my research in a number of different ways. Along with the usual avenues of journals, conferences and seminars, I have also made extensive use of social media, such as Facebook and Twitter, as well as academia.edu (<https://antwerp.academia.edu/VictorKingstonLoughlin>). I also maintain my own website ([victorloughlin.com](http://victorloughlin.com)), where I run a blog. Topics covered on my blog include why many think that the mind must be internal and why there are reasons to doubt that aspects of your environment are 'parts' of your mind. These blog posts are principally for non-experts and so are written in such a way as to be accessible to readers outside the academy. Going forward, I would seek to continue to write for non-experts, both on my blog and in other non-academic forums, such as popular philosophy magazines, like Philosophy Now.

**Please provide full bibliographic details of your five main publications and update all your scientific publications through the E-portal.**

A1.1.

Loughlin, V (2013). Sketch this: extended mind and consciousness extension. *Phenomenology and the Cognitive Sciences*. Vol: 12, no: (1), pp41-50. 2012. Peer reviewed.

Loughlin, V. (2014). Radical Enactivism, Wittgenstein and the cognitive gap. *Adaptive Behaviour*. Vol: 22, no: 5, pp350-359. Impact factor: 1.098. Peer reviewed.

Loughlin, V (2017). Sensorimotor theory, cognitive access and the 'absolute' explanatory gap. *Phenomenology and the Cognitive Sciences*, DOI 10.1007/s11097001709542-x. Peer reviewed.

Loughlin, V & Zahidi, K (2017). What is left of the Active Externalism debate? *European Journal of Philosophy*, DOI: 10.1111/ejop.12249. Peer reviewed.

B2.

Myin, E, Loughlin, V (2018). Sensorimotor and Enactive Approaches to Consciousness. In: R. J. Gennaro (ed.), *Routledge Handbook of Consciousness*, pages 202-215. Peer reviewed.