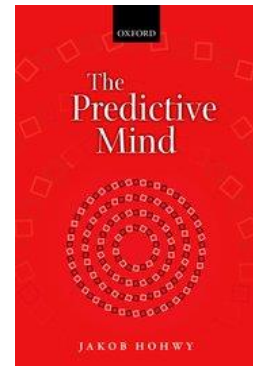


## On embodiment in predictions A book review of *The Predictive Mind*

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### Introduction

The debate regarding predictive coding has been going on for over a year now. The first philosophical traces of this debate are Andy Clark's (2013a) and Jakob Hohwy's works. The latter has recently published the first philosophical monograph on the subject of a predictive account of the mind.

### What can we find in Hohwy's book?

Hohwy's book consists of three parts: an introduction to predictive coding and a predictive account of interactions with the world and of the mind. In the first part, Hohwy discusses the foundations of causal inferences as a mechanism of perception (Ch1). Subsequently, he discusses prediction error minimalisation (Ch2) and the role of errors, context and the precision of prediction in this process (Ch3); at the end of the first part, he analyzes the particular role of acting (active inference) in predictive coding (Ch4). In the second part, which pertains to the world, Hohwy considers binding (Ch5), cognitive penetrability (Ch6), disorders of prediction (Ch7), as well as surprise and

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<sup>17</sup> language edition: Ewa Bodal.

misrepresentations<sup>18</sup> (Ch8). In the final, third part, he takes on the subject of attention and consciousness (Ch9 and Ch10), the unity of cognition and action (Ch10), the fragility of prediction (Ch11), and, at the end, the role of emotions and introspection in the predictive concept of mind (Ch 12).

In particular chapters, the author refers to research in the field of predictive coding, discussing both studies conducted by others (especially works by Karl Friston and colleagues), and his own (also empirical ones), pertaining to the illusion of rubber hand (Ch7 and Ch11), autism and delusions (Ch7), or binocular rivalisation (Ch1 and many others)<sup>19</sup>. As we can see, Hohwy's input into research on predictive coding does not consist only in philosophical work, although it is usually very interesting.

### **Some remarks on the contents of the book**

Although the book touches upon a very broad spectrum of issues, the impression might be that Hohwy focuses on three notions: attention, cognitive penetrability and consciousness (and, to a lesser degree, on the issue of illusions or delusions). Certainly, this is not a disadvantage, but, rather, a characteristic of Hohwy's inquiries. Moreover, such a development of the predictive concept makes it possible to place it in the centre of many current philosophical debates<sup>20</sup>. It also makes it possible to include into existing research many issues particularly connected with the predictive approach, such as the unifying perspective of explanatory strategies in cognitive science, and integrating many cognitive competences (e.g. Hohwy's framing of attention in terms of action). Additionally, Hohwy presents his interpretation of predictive coding as a concept which constitutes a particular theory of everything, which should explain both cognition and the most basic biological mechanisms, a concept, in which half-measures are impossible; if the theory fails at any problem, it will fail altogether (see; Hohwy 2015). This seems to be a weakness of Hohwy's approach; after all, it is possible that the predictive approach only has a limited application, e.g. only concerning cognitive problems. Should that be too little? Should that be the reason to reject such a concept?

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<sup>18</sup> Hohwy very interestingly argues for misrepresentation not being some kind of a failure in the functioning of the cognitive system, but, rather a default state—the system is constantly misrepresenting, and its main effort lies in trying to make errors as infrequently as possible.

<sup>19</sup> I suggest visiting Hohwy's website for the most recent news on his research:

<https://sites.google.com/site/jakobhohwy/>.

<sup>20</sup> Another interesting thread that appears in the book and that is not discussed in detail in the present review is the issue of normativity. The account suggested by Hohwy makes it possible to discover normativity in very basic processes—both cognitive and life.

### On embodiment—predictively

The book constitutes an approach to mind that is very interesting, original, strongly internalist (and perhaps also idealist) (also: Hohwy 2014), explicitly polemic towards the externalist (and realist) approach to predictive coding as presented by Clark (2013a, b, see also Kirchoff 2014). One of the signposts in Hohwy's book also consists in a sceptical attitude towards the concept of embodied cognition as a notion alternative to the predictive approach. Although Hohwy does not reject the possibility of integrating these concepts, he believes it to be an unnecessary, or even erroneous, step (in turn, he criticizes Clark [Hohwy 2015], claiming that by making concessions to embodied approaches, Clark makes his position insufficiently predictive). And this particular issue is the one I would like to discuss in the following part of the present review, arguing against Hohwy's approach, although not necessarily in support of Clark's.

Although radical approaches to embodiment, in which representative concepts of the mind are rejected and the research on internal and neuronal mechanisms of cognition are almost completely rejected, are possible (and very popular), they are not the only such approaches. Less radical accounts have also been suggested (Shapiro 2004, Goldman 2012); as it seems, one may try to integrate these with predictive coding. Let us, however, begin with what Hohwy writes in his book:

*It seems to me that it is better to accept the indirectness implications of the prediction error minimization framework than trying to force it into an embodied and externalist shape. It is better, that is, to live with the risk of radical scepticism than to **believe the core idea that perception and action are both inferences on the statistical properties of the sensory input.*** (Hohwy 2013, 221, my emphasis)

Hohwy seems to suggest that the entire embodied approach to cognition can be reduced to the fact that statistical properties of a sensory information are central to cognition<sup>21</sup>. But this is not so. It is definitely not so in the aforementioned moderate concepts of embodiment. Indeed, concepts of embodied cognition take into account both the statistical properties of sensual information, and the influence of action and the physical structure of the body on these properties, but cognition is not reduced to them. It is one thing to claim, following, e.g., Wilson and Foglia (2011), that the body distribute, controls and constrains cognitive processes, and another—to say that cognition is reduced to these functions or causal roles. What, precisely, would be limited, controlled and distributed? Although there is no space to solve this issue in this review, I would like to point to one potential answer.

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<sup>21</sup> It would be possible to similarly trivialize the predictive account and claim that cognition cannot be reduced to comparing two signals.

Several years ago, Borg (2007) published an article entitled, interestingly, “If mirror neurons are the answer, what was the question?”. Using this phrase, one could ask “If predictive coding is the answer, what was the question?”. I am convinced that in the context of cognitive studies, this question lies in the body, physical body, which embodies cognition. Human and inhuman body. A body which is not endowed with sophisticated cognitive abilities and which works in a very simple manner might not need to ask about predictive coding, but what about complex bodies and bodies which cognize in such a complex manner as people do?<sup>22</sup> I believe that predictive coding is that answer. And if I am not mistaken, it is not as Hohwy believes, but it is also not as Clark writes, trying to integrate situated accounts with the predictive ones. This integration was present from the very beginning and it does not derive from predictive coding, but from embodiment.

Obviously, what is presented here are not arguments for the integration of predictive and embodied approaches, but, rather, a certain impression. However, although the thesis proposed herein does not simply support Clark’s research, many of Clark’s arguments can support it (Clark 2013a), and, thus, support the view that by integrating an embodied approach and predictive coding, we do not need to make concessions, because these approaches are very closely connected<sup>23</sup>.

## Conclusion

*Predictive mind* is an extremely interesting publications, which (together with works by Clark 2013a) begins philosophical research on predictive coding. It constitutes a mandatory reading for everyone interested both in predictive coding and in research on attention, consciousness or cognitive penetrability, but also illusions, delusions or self-knowledge.

However, the most important point to make about this book is that when Hohwy presents his, at times controversial, opinions in such an expressive manner, he frequently forces us to reconsider many issues. What more can one want from a book?

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<sup>22</sup> I am aware that predictive concepts explain very basic processes (e.g. Friston et al. 2015); however, if we connect physical and physiological properties of cells and organisms, in the case of the human we can reach a conclusion similar to the one mentioned in this review. Predictive coding is a reply to a question posed by our body as an organism of a particular biological and physical composition.

<sup>23</sup> Let us note that embodied cognition does not involve settling whether cognition is direct or indirect. It cannot be precluded that embodied cognition is indirect in some aspects, e.g. it is based on bodily representations.

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