Who tailors the blanket?

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Abstract

The gap between the Markov blanket and ontological boundaries arises from the former's inability to capture the dynamic process through which biological and cognitive agents actively generate their own boundaries with the environment. Active inference in the FEP framework presupposes the existence of a Markov blanket, but it is not a process that actively generates the latter.

Main Text

We endorse the authors' claim that there is a gap between the Markov blanket qua statistical tool and biological and cognitive boundaries qua ontological structures in the world. We will offer an explanation for the gap's existence: it arises from the Markov blanket's inability to capture the dynamic process through which biological and cognitive agents create their own boundaries with the environment over time. Active inference presupposes the existence of a Markov blanket, but it is not envisioned as a process that actively generates the latter.

Biological systems actively produce their boundaries with the environment through autopoietic processes (Varela 1979). Autopoiesis refers to a network of processes that continually regenerates its components and constructs their own physical boundaries, which Varela and Maturana proposed as the essence of life and its autonomy (Varela 1979; Varela et al. 1974). For instance, a biological cell maintains its own identity distinct from the environmental medium with a membrane system constructed by a network of metabolic processes. Moreover, living beings maintain their bounded identity not only by exchanging energy and material through metabolism, but by actively interacting with the environment over space and time. A good illustration is that of a single cell in a nutrient-poor environment that climbs up a glucose gradient to maintain its physical boundary with the environment, keeping its internal states within viable ranges (Ikegami & Suzuki 2008; Suzuki & Ikegami 2009; Egbert & Di Paolo 2009). A biological boundary, then, is not a given, but is actively defined by the system itself. The same principle applies across a wide variety of living

systems, from single cell creatures to more complex, multicellular animals, which live sensorimotor lives (Thompson 2007).

Cognitive systems likewise actively produce their boundaries through their interaction with the environment. We can see this in the case of extended cognition and mind (Clark & Chalmers 1998; Clark 2008), where cognitive boundaries extend beyond the biological body by incorporating environmental items as their constitutive parts. Cognitive extension is not a state upon which we stumble by chance; rather, it is a process we actively bring about, or “enact”, based on skills and habits cultivated over time (Miyahara & Robertson 2021; Miyahara, Ransom, & Gallagher 2020). To illustrate, consider Otto from Clark & Chalmers’ (1998) famous thought experiment. Otto suffers a mild case of Alzheimer’s disease and uses a notebook to compensate for his memory deficit. According to Clark (2010), Otto and his notebook exhibit a tight functional coupling with each other to constitute a unified cognitive system (Miyazono 2017) to the extent that they satisfy the following “trust and glue” conditions: (1) the resource (viz., the notebook) is reliably available and typically invoked; (2) any information thus retrieved is more or less automatically endorsed; (3) information contained in the resource is easily accessible as and when required. Obviously, Otto will not meet these conditions merely by developing a memory problem. Rather, he would have to learn to use notebooks to complement his compromised cognitive capacities and continue to do so repeatedly until it became a habit for him to always carry around a notebook and use it for constant notetaking. The functional coupling is a product of Otto’s active engagement with the notebook and his development of relevant skills and habits over time (which is why Otto’s Markov blanket is malleable [Clark 2017] or negotiable [Kirchhoff & Kiverstein 2021]).

The main shortcoming of the Friston blanket approach concerns the relationship between action (i.e., active inference) and identity (i.e., the Markov blanket). In this approach, active inference depends upon the Markov blanket, but not the other way round. Biological and cognitive systems are defined by Markov blankets as boundaries with the external environment. These systems perform active inferences through looping interactions between sensory states, internal states, and active states defined by the Markov Blanket to keep their internal parameters within viable bounds (Friston 2013). On the other hand, as we saw above, both biological and cognitive systems actively create and maintain their bounded identity by interacting with the environment. As Clark puts it: “Creatures like us [...] are Nature’s experts at knitting their own Markov blankets” (Clark 2017, 14). To accommodate this within the free energy principle framework, we must conceive of active inference as playing an essential role in autopoiesis, that is, in creating and maintaining the system’s bounded identity (c.f. Kirchhoff 2018). In fact, Friston (2010) describes living systems as performing active inference to reduce sensory surprisal and consequently maintain its

homeostasis. Nevertheless, on the free energy principle, active inference does not explicitly participate in the autopoietic formation of the boundary between the system and its environment, which defines the identity of living beings, i.e. the Markov blanket. That is, the dynamic relationship between action and identity is missing in the Friston blanket approach that depicts Markov blankets not as a product, but only as a precondition of active inference (Friston 2013).

In short, the Friston blanket approach fails to identify the tailor who creates the boundaries. At most, Markov blankets coincide with the outcome of the boundary-making processes carried out by biological and cognitive agents. Markov blankets are tailored by statistical patterns but living agents do not outsource boundary-making: we actively weave our own boundaries with the world.

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