



New Ontological Foundations for Extended Minds: Causal Powers Realism

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Abstract

In this paper, we describe causal powers realism as a conjunction of four claims: causal powers are not reducible to counterfactuals; they are empirically-discoverable; they manifest effects in conjunction with partners; and their manifestations empower further manifestations. We describe four challenges to extended mind theory and for each show how an ontology of causal powers realism either avoids or dissolves the problem. We close by suggesting that causal powers realism isn't a competitor with extended mind theory but rather a new way to understand what it means for minds to be extended.

1 Introduction

Once upon a time, there was a man named Otto and a woman named Inga. Inga was fine, beyond the usual worries of climate change, terrorism both at home and abroad, and increasingly corrupt governments. Otto had a problem. He had Alzheimer's and couldn't remember things. To fix this, Otto would write down information he often

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needed, like directions to the Museum of Modern Art in New York.¹ With this trick, Otto could be up to Inga-levels of functioning.

Once upon another time, some philosophers — like Andy Clark, David Chalmers, John Sutton, Michael Wheeler, Zoe Drayson, and Richard Menary to name a few — found the Otto story compelling and argued that his notebook was a part of his mind. The nub of the matter, on one telling of Otto's story, was that the notebook was functionally equivalent to parts of Inga's brain. Therefore, to claim that the notebook wasn't part of his cognitive system implied that the relevant parts of Inga's brain weren't either. A patently absurd conclusion.²

Despite this, there were philosophers — like Jerry Fodor, Fred Adams, Ken Aizawa, Shannon Spalding, and Rob Rupert — who were convinced that Otto's notebook was not a part of his mind. Mounting all manner of argument, they held forth on an idea that's been well-received in philosophy since at least Locke and Hobbes but more likely Plato: thinking happens in the head using symbols whose meanings are intrinsic to them. To say that pencils and paper were part of a cognitive system would entail that thinking didn't happen in the head with intrinsically meaningful symbols. A patently absurd conclusion.³

For the better part of 25 years, philosophers have argued whether to consider external objects as part of thinkers' cognitive systems, and if they are part of thinkers' cognitive systems, what kind of parts they are. But what is it that's being argued over? It's a metaphysical issue with implications for the sciences of mind: the boundaries of cognition. Friends of extended mind theory hold that some entities and processes *outside* the head are properly cognitive. Opponents maintain that extra-cranial processes are not cognitive but only scaffolds or inputs to properly cognitive processes. The central insight of extended mind theory — the central point of contention — is that some of what's outside the head is literally part of the mind. Equivalently: some events and processes outside the head are on an ontological par with events and processes inside the head. Otto's notebook is as important a constituent of his mental processes as bits of his brains are.

Some of the original prophets have given up the ghost and moved on to other philosophical endeavors. Other philosophers spread the Good News of extended mind by developing newer and more sophisticated theories, often looking to developments outside analytic philosophy of mind in the last hundred-and-fifty-or-so years for resources. But few (if any) of the faithful have looked to ancient and medieval metaphysics in the West. That's precisely where we look. In what follows, we use resources from the Aristotelian tradition to develop a cognitive ontology that solves or dissolves a number of the issues confronting extended mind theorists. The upshot? Philosophers believing mind goes beyond the brain can stay true to the extended

¹ We think directions to the grocery store would be more useful but to each their own.

² Patently absurd because we have lots of evidence that the brain is an important part of any human cognitive system.

³ Superficially, this is a problem because Fodor et al. commit themselves to some version of the claim that thinking is the manipulation of intrinsically meaningful symbols and external props are not intrinsically meaningful symbols. A deeper problem discussed by Adams and Aizawa is that an infinite regress looms large if there aren't internal, intrinsically meaningful symbols by which extrinsically meaningful symbols inherit their meaning. See Adams and Aizawa (2008) for discussion.

mind's motivating intuitions while avoiding or solving several extant issues by adopting *causal powers realism*.

2 Causal Powers realism

Causal powers realism has been developed elsewhere (Vukov & Lassiter, 2020, [forthcoming](#); Lassiter & Vukov 2021). Here, we limit our discussion of it to the following four central claims:

First, according to causal powers realists, powers cannot be reduced to counterfactuals. For example, while a vase's fragility can be described counterfactually ('if you were to drop the vase, it would break'), causal powers realists deny that the vase's fragility is reducible to this (or any other) counterfactual.

Second, causal powers realists claim powers do causal work — they help account for how individuals behave. Here, causal powers realists are closely aligned with positions that endorse a so-called sparse conception of properties (see Lewis 1983: 345). According to sparse conceptions of properties, the only genuine properties are those that do causal work. Properties are what William Jaworski calls "causal enablers; they confer the powers that make causal interactions among individuals possible" (Jaworski, 2016: 29). Every genuine property can therefore pass the test proposed by the Eleatic Stranger of Plato's *Sophist*: "I suggest that anything has real being, that is so constituted as to possess any sort of power either to affect anything else or to be affected" (*Sophist* 247d-e). Oddie (1982) calls this *The Eleatic Principle*. Causal powers realists, in claiming that causal powers do causal work and account for how individuals behave, thus endorse the *Eleatic Principle* wholeheartedly. Their endorsement has important implications. First, for causal powers realists, causal processes must be understood at least partly in reference to the powers individuals have. When my vase shatters, we must understand this event at least partly in reference to the vase's fragility. The vase's powers, after all, are what account for its behavior. Second, according to causal powers realists, powers are discovered empirically. Since all powers do causal work, and since empirical sources provide our best resource for discovering the causal work individuals do, it follows that empirical sources offer our best resource for learning about the powers individuals have. According to causal powers realists, we therefore cannot carve up the world as we choose, as a bad butcher might carve an animal (*Phaedrus* 266a). It is the world, after all, not us, that determines what makes a causal difference. So just as the animal's joints determine how a butcher ought to carve it, so too the world's joints determine which causal powers there are.

Third, causal powers realism is committed to the idea that powers are manifested in conjunction with what we'll call manifestation partners. Consider salt's power of solubility. According to causal powers realists, salt does not manifest this power on its own but only when it is conjoined with a manifestation partner—for example, water's power to dissolve salt. A corollary is that partners necessarily make a mani-

festation the kind of manifestation it is. The difference between fearing a clown and fearing a snake is that the former requires a clown and the latter a snake.⁴

Finally, causal powers realists are committed to the idea that powers are directed towards potential manifestations: flammable things are directed towards igniting, soluble ones are directed towards dissolving, and so on. According to causal powers realists, the manifestation of every power is itself empowering.

Causal powers realism has most typically been discussed in the context of chemical or physical powers such as a vase's power of fragility (e.g. Prior et al., 1982, Johnston, 1992). And we agree that's a good way to begin understanding the claims causal powers realists make. However, causal powers realists can also understand distinctively psychological phenomena in terms of powers. Hope, fear, belief, desire: according to causal powers realists, all these are *mental* powers, and are therefore subject to the causal powers framework.

We'll wade into details below by applying the causal powers realists framework to psychological phenomena. For a working example, take a token mental state of fear. At the most basic, causal powers realists understand a tokening of fear as a power an individual has, much as salt has the power of solubility. Indeed, for the causal powers realist, fear is most accurately thought of as something fearful people can *do* rather than a state that fearful people are *in*.⁵

Consider, then, how this understanding meshes with the causal powers framework. First, just as any power cannot be reduced to a counterfactual, any token occurrence of fear cannot be counterfactually reduced. That's not to say that fear cannot be described counterfactually. Of course it can. It's just that according to causal powers realists, fear is no *mere* counterfactual — causal powers realists are decidedly not behaviorists. Second, causal powers realists are committed to saying that fear does real causal work; causal powers realists are also decidedly not epiphenomenalists. Fear can therefore be understood in reference to its causal profile, and is best discovered and studied empirically: neuroscience, psychology, sociology, and anthropology provide a story about fear's causal profile. Third, causal powers realists are committed to saying that fear is manifested in conjunction with partners. Which partners? Most obviously, fear is manifested with proximal stimuli in the environment. For example, my fearing a snake is manifested in conjunction with the snake's power to induce fear in humans. But causal powers realists aren't committed to fear (or any mental state) being manifested in conjunction with proximal stimuli only. Fear might be manifested with distal stimuli, like sabre-rattling from nations with nuclear arsenals. And finally, causal powers realists are committed to saying that fear, in being a

⁴ An interesting ontological question lingers near the surface here: in articulating the concept of manifestation partners, do causal powers realists take a relational view of objects and properties (see, e.g., Manzotti 2019, 63–75). In a word: no. Yet in two words: it's complicated. Why 'no'? According to causal powers realists, causal powers are intrinsic properties of objects, and therefore not relational. But why is it 'complicated'? Because powers are individuated in terms of their past and potential manifestation partners (see footnote 6). So while powers are intrinsic, they are individuated relationally. The precise ontology here is worth exploring further. Thanks to an anonymous reviewer for bringing this to our attention.

⁵ There's a related question about how to individuate causal powers. One view that we find appealing is that powers are individuated by their potential future manifestations (cf. Heil, 2003 and Jaworski 2016), though we believe that this point is made more powerful by the insight that potential future manifestations are the result of previous manifestations, mentioned briefly in Lassiter and Vukov (2021).

power, is itself empowering. According to the causal powers realist, my fearing is not merely some inert state I find myself in, but rather empowers me to interact with my environment in ways I wouldn't have were I unafraid, like running away or shrieking in fright.

That's not a complete picture of causal powers realism.⁶ And we'll continue to describe the framework in greater detail in what follows. But we have enough of a description to see how causal powers realism captures the central insight of extended mind theory. For causal powers realism, some of what's outside the head is as important a contributor to mental processes as events and processes inside the head. Causal powers realism holds the same thing: some environmental, social, and cultural powers are as important a contributor to some bit of behavior as biological powers. And while there's plenty more to say about causal powers realism, we've laid enough of a foundation to consider how causal powers realism can help solve or dissolve problems facing extended mind theory.

3 Problems for extended mind

In this section, we will consider a few of the more well-discussed objections to extended mind theory. This is not an exhaustive review.⁷ Rather, we introduce central objections about which we believe extended mind theorists must say *something*. When appropriate, we gesture towards responses that have been made, but we will not critically discuss them. Our aim is to show that causal power realism either (1) avoids the objections altogether or (2) has a ready response. We are not arguing that our position is able to handle the objections more effectively than the responses that have been offered by classic extended mind views.⁸ Our more modest aim is to show that causal powers realism provides the resources to deal with the objections, which is enough to make it a viable ontology for those faithful to extended mind intuitions.

3.1 Cognitive bloat

Adams & Aizawa (2001, 2008, 2009, 2010) worry that if extended mind theory is right, then what counts as properly cognitive will grow appreciably. Consider again the famous Otto (Clark & Chalmers, 1998). Otto's notebook counts as part of his

⁶ Elsewhere (Vukov & Lassiter, 2020, forthcoming; Lassiter & Vukov 2021) we show some of the assets of causal powers realism, including an intuitive way to bring causal pluralism on board, a way to accommodate the role of culture in cognition, and an ontology that's a powerful rival to representationalist accounts of cognition. There are other extensions to the theory developed in Jaworski (2011, 2016). As with any story about Nature's furniture, there are plot holes. For instance, much of the work of identifying and individuating powers gets passed to the sciences, so causal powers realism is of necessity open-ended without a final answer to the question of how to parse out X's. That's all to say, causal powers realism doesn't pin down mechanisms in the way that, say, connectionism or representationalism does. But that's ok. Given the sum total of assets and liabilities, we still think causal powers realism is one of the better theories about the metaphysics of mind out there.

⁷ For objections and replies, see (among others) Shapiro (2011), Menary (2010), Clark (2010, 2011), Rowlands (2010), and Gallagher (2018).

⁸ Even if we think it does.

cognitive system because it is doing something that, were it located in his head, would count as properly cognitive. Even if notebooks aren't intrinsically cognitive, we can imagine similar-looking cases that might reasonably raise an eyebrow. Otto might be able to reliably access the Internet via his smartphone and the processes involved in that mode of information retrieval might function just like bits of his internal machinery.⁹ But it would be odd to say that Wikipedia is part of Otto's extended mind, since it would ascribe to him potentially contradictory or false beliefs or beliefs whose contents he doesn't understand (e.g. the Wikipedia entry on forcing in set theory).¹⁰

We can capture worries about bloat as an interpretive dilemma. What requires interpretation is an abundance of empirical cases in which the causal mechanisms for some cognitive process appear to be outside the body.¹¹ Faced with these cases, theorists may choose to embrace either of the following:

(1) **Outer**: mental process at least sometimes includes the extra-bodily environment; processes "loop" outside the body.

(2) **Inner**: mental process never include the extra-bodily environment; processes take place only within the body (and paradigmatically the brain).

Those who accept **Outer** take cases where cognitive processes seem to loop outside the head at face value, which we believe is a virtue for theory development. Clark (2010), paraphrasing Dennett, reminds us: cognition is as cognition does. But the other edge of this sword threatens bloat. Introduce the possibility that mental events include the extra-bodily environment, and the boundaries of mind become hard to catch sight of. Those who accept **Inner**, by contrast, describe case studies in which cognitive processes appear to loop outside the skull as deceptive.¹² Proponents of **Inner** thus lose the theoretical virtue that comes with accepting a set of cases at face value, but in doing so, mitigate the threat of bloat.

In endorsing causal powers realism, we side with those who accept **Outer**: a manifestation partner makes the token manifestation the kind of manifestation it is. Just as token salt's dissolving necessitates the presence of a solvent, we manifest mental powers in conjunction with partners, and at least some of these partners ostensibly include extra-bodily conditions. This is a commitment of causal powers realism. So when I am afraid because I see a snake, my power to be afraid in this token instance necessarily requires powers of the snake to be perceived. I wouldn't be afraid of the

⁹ See Smart (2017) for an overview of discussion on extended mind theory and the Internet.

¹⁰ This isn't quite how Adams & Aizawa (2010) put their worries about cognitive bloat. They worry that extended mind theory ascribes cognitive functioning to some of the props of cognition. They quip, "Question: Why did the pencil think that $2+2=4$?, Clark's Answer: Because it was coupled to the mathematician." Put this way, the objection is a strawman because no extended mind theorist has ever said that the props of cognition think on their own. A more plausible worry is that objects that have no business being part of a mature cognitive science are embraced as mechanisms of the mind.

¹¹ For one example, consider Wegner's research on transactive memory systems (Wegner et al., 1991): pairs of people in which one is able to remember more details about a past event because of the promptings of the other person.

¹² **Inner** is the clear choice for the sorts of ontologies of mind endorsed by Fodor (1987), Marr (1982), and Stich (1983), among others.

snake if there were no snake to be afraid of. Like extended mind theorists, causal powers realists face the risk of bloat.

We'd like to suggest, however, that for those accepting **Outer** and facing the threat of bloat, there's another dilemma. In particular, one can embrace bloat either *apologetically* or *unapologetically*. Clark, Rowlands, and Menary, among others, grab the apologetic horn, typically arguing that cognitive extension isn't bloat. Generally, to endorse bloat apologetically is to admit bloat as an objection and thereby face the task of surmounting it. The commonest way to do this is to offer a set of conditions satisfying intuitions about what could be — and what definitely isn't — a proper part of the cognitive system. Clark's (2010) attitude of "trust and glue" is an exemplar.

We approach bloat differently. We deny that cognitive bloat is an objectionable implication of **Outer**, and thereby take bloat on board unapologetically. This strategy is no hubristic rhetorical flourish. Rather, the unapologetic embrace of bloat is an implication of causal powers realism. Consider Darley and Batson (1973), who found that people are more likely to help someone in need if they have the time to do so. Causal powers realism understands this finding — and others like it — as identifying external forces that interact with agential powers to manifest behaviors. Instead of separating environmental and organismic powers, causal powers realism embraces that powers distributed across the fleshy divide interact to produce mental activity. Put simply: bloat is an essential feature of the causal powers framework, not an embarrassing implication of it. So not only are appeals to bloat impotent in the face of continued discovery of interacting forces throughout the world, they are question-begging when used as leverage against a causal powers framework. In this way, causal powers realists have a ready response to worries of bloat that proponents of extended mind do not. By unapologetically embracing bloat, causal powers realists deny that bloat is an objection at all, and therefore eliminate any need to mount a response to it.

But there is a lingering worry. In any given manifestation of a mental power, there are many interacting forces: manifesting my power to complete a logic proof depends on states of my brain, personal and cultural lineages, and what's in my immediate environment. But surely, the worry runs, we wouldn't say that the manifestation of my power to complete a logic proof depends on (say) the sun's shining. There's bloat, and then there's *bloat*. Even if the former is not embarrassing, the latter definitely is. The problem for causal powers realists, then, is that the ability to complete a logic proof undeniably depends (albeit in a distal way) on the sun shining: for example, the sun's shining enabled farmers to grow food which enabled logicians to write logic texts. So causal powers realism would seem to entail that solar activity is part of doing logic. And that would seem to be an instance of the embarrassing kind of bloat.

There are two points to consider in response. First, some of the most interesting and important scientific discoveries are precisely those that detect previously-unsuspected powers at work in explaining some phenomenon — those that would be cast as "bloat" for the relevant phenomena. Consider Semmelweis's discovery. He noticed that women were more likely to die in childbirth in the First Clinic of a Viennese hospital as opposed to the Second Clinic (10% mortality rate vs. 4%). Through astute observation, he figured out that "cadaverous particles" were the cause: hospital staff were assisting in child-births after having been to the morgue without cleaning

their hands in between. Semmelweis ordered doctors to wash up after autopsies using a solution of calcium hypochlorite. Rates of infection dropped up to 90%. Semmelweis's contemporaries, however, offered explanations in terms of bodily humors, for example women exhaling and then re-inhaling putrid air. No one else had considered that the physicians *themselves* were communicating the disease from cadavers to mothers. Semmelweis alone had the right insight: that infection was the result of contamination from the cadavers, not miasmatic air.¹³ Had Semmelweis listened to the medical mainstream, he would have written off his suspicion that there was some causal force from the cadavers, instead wondering perhaps how putrid air collects at certain spots. Generally, Semmelweis's discovery suggests that dismissing a priori some set of causal factors on a given phenomenon can be hasty and actually impede scientific progress. So just because causal powers realism may imply what seems an embarrassingly bloated account of cognition, this alone shouldn't lead us to reject the theory.

The second point concerns a practical worry about bloat: if the powers contributing to mental manifestations may include all kinds of things, then scientists interested in some phenomenon have a vast array to choose from. If we're interested in improving student test scores, how do we choose the intervention if there are untold many powers contributing to a student's performance on a test? In response, since there *are* so many powers contributing to a student's performance on a test, the factors different groups of scientists will consider will be interest-relative. Consider a few (non-test-related) examples:

- A city's elevation from sea level isn't of interest to someone making pasta in Chicago. But if that same person is preparing a lasagna in Denver and puzzling over the water's unexpected boiling point, elevation becomes precisely the most interesting causal contributor. Air pressure contributes causally in both cases, but is only of interest in the latter.
- How the density of objects curves spacetime was not of interest for those early engineers putting men on the moon: Americans got to the moon with a Newtonian theory of space. (Turns out that computational errors were a much bigger worry than relativistic effects.) But in making your GPS give accurate readings, the relativity of spacetime is crucial. Going to the moon in the 1960s? You needn't care much about the curvature of spacetime. Designing a new GPS? Different story (Ashby 2003).¹⁴
- Massive solar flares aren't common, but they can affect electrical grids. Electrical grids are therefore now being designed to handle them. The lesson? While solar flares are uninteresting (at least as causal contributors) in nearly every set of circumstances, they nevertheless *become* interesting when you start your job at the local electric company.

¹³ Sort of. Semmelweis actually thought infection was the result of the vapors coming from the hands of the doctors. The calcium hypochlorite effectively got rid of the cadaverous smell *but also* killed harmful bacteria. The germ theory of disease was still many years away from widespread acceptance and Semmelweis described the causes using the conceptual resources available at the time.

¹⁴ Thanks to Ben Shuman for feedback on this example.

- Oxygen is needed for cognition in one very obvious way — you can't think if you're dead. But studies of hypoxia show that oxygen deprivation has surprising consequences on thought (Fowler, Banner, and Pogue 1993). It affects performance in perceptual and recognition tasks as well as both short-term and long-term memory formation. Even though the capacity of oxygen to affect memory in this way is not typically of interest to us, it must be accounted for in some circumstances, such as when fighter pilots must make perceptual judgments and their oxygen-supply equipment has malfunctioned.

All these examples suggest that the powers which are relevant for understanding a phenomenon are often relative to investigators' interests (cf. Anscombe 1957/2001, § 46) and also the commonplace that science is a division of cognitive labor (Kitcher, 1990; Weisberg & Muldoon, 2009). Causal powers that in most circumstances appear distal and unnoteworthy may become the most crucial to an explanation in other circumstances. So even though the sun's shining is typically but a distal and unnoteworthy causal influence on our ability to complete a logic proof, from the perspective of (say) the astrobiologist, the far-reaching causal nexus of the sun's powers stand out as essential to understanding our cognitive abilities. Causal powers realism, in unapologetically embracing cognitive bloat, can countenance what our investigation of causes suggests: that understanding the causes of any phenomenon, cognitive or otherwise, will inevitably involve looking to causes in unexpected places.

The theoretical implication of causal powers realism underpinning our devil-may-care attitude towards bloat is that the boundary between the cognitive and non-cognitive is fuzzy. More carefully, causal powers realism does not necessitate distinct mental and physical vocabularies. Why? There are all manner of powers that contribute to manifestations of human behavior: What causes someone to be afraid will be a mix of biological, environmental, social, and cultural powers. "Where do the non-cognitive components of the response end and the cognitive begin?" is an ill-formed question for causal powers realists. There are powers and their manifestations; how working researchers divide up investigating them is a matter of disciplinary expertise. And for causal powers realism, appointing some powers 'properly cognitive' and others 'non-cognitive but a causal contributor' is an unhelpful exercise in categorization. The question instead is: what powers contribute to this particular manifestation? So while a difference between mental and physical vocabularies could be imposed on causal powers realism, there's nothing in the metaphysics to necessitate it.

3.2 Motley Crew

Another central objection to theories of extended mind, due to Adams & Aizawa (2001, 2010) is the "Motley Crew" problem. Suppose that extended mind theory is right and that cognition is constituted by all manner of internal and external resources. That is, a developed cognitive science not only quantifies over brains and representations, but also notebooks, iPads, and maybe even architecture. On this view, the sorts of things analyzed and theorized about by cognitive scientists would be an *open-ended disjunction*: the furniture of the mind includes (to name just a few) neural structures, representations, computations, modules, notebooks, iPads, calculators,

pencils, paper, church architecture, utterances, and knotted rope. But open-ended disjunctions fail to carve nature at its joints (cf. *Phaedrus* 265d-266a). The motleys don't constitute a natural kind and thus are not deserving of scientific scrutiny: motleys won't give way to scientific generalizations. We might as well have a science of men named 'Harold' and their aging iguanas: you *could* make a go of it but you wouldn't get any interesting generalizations about the world. And certainly, it would be misleading to call your area of specialty a 'science'. Similarly, the objection runs, extended mind theory, in being committed to a motley cognitive architecture, is too open-ended in its ontology to admit of any interesting generalizations. A mature extended cognitive science would have to cover a "motley of processes, not just a multiplicity of processes" (Adams & Aizawa, 2010, 76).

It should be clear by now that the Motley Crew objection can be run against causal powers just as readily as it can be run against theories of extended mind. Because causal powers realists unapologetically embrace bloat, the kind of things that count as cognitive will be motley indeed. We've seen, for example, that causal powers realists are unapologetic in embracing the idea that the sun's shining is causally relevant to understanding our ability to complete a logic proof. According to causal powers realists, cognition is causally expansive, and often finds its basis in unexpected contributors.

Causal powers realists, however, can respond to the Motley Crew objection in much the same way as they respond to the cognitive bloat objection: own the implication unapologetically, deflating its status as an objection. Less metaphorically, causal powers realists *expect* motleys when studying the manifestation of any power, cognitive or otherwise. Why? As we've seen, manifestations of powers are, according to causal powers realists, the result of many different and interacting powers. From the perspective of causal powers realism, manifestations of powers are *always* manifestations of the motley. And that's not merely an implication of causal powers realism—it captures the central commitment of the position. To reject causal powers realism because it countenances motleys is thus thoroughly question-begging.¹⁵

Moreover, as with bloat, we have good empirical reason to embrace motleys when it comes to understanding our cognitive powers. In fact, there are many ways in which the sciences of mind are *already* working with motleys. Here we discuss just three:

First, neuroscientists agree that there is a connection between what's in our digestive systems and how our brains work (e.g. Carabotti et al., 2015). For example, there is evidence that lactobacillus — a strain of bacteria found in yogurt — when present in sufficiently large quantities in the gut are capable of affecting mood. Liang et al., (2015; Liang et al. 2018) have found that consumption of lactobacillus in rats improves behavioral and cognitive behaviors under stressful conditions. Sarkar et al., (2016) reviews existing findings arriving at similar conclusions about humans, suggesting the need for "psychobiotics" as a way of harnessing the gut-brain axis to

¹⁵ Our position meshes well with Manzotti's mind-object identity theory — namely, that our experiences of objects just are the objects themselves. The motley in this case is the object and the experiencing agent. Exactly what the motleys are that underpin consciousness will require sustained work by both scientists and philosophers. Thanks to an anonymous reviewer for pointing out this connection to us.

improve mood and mental functioning. This idea of the “gut-brain axis”: how brains work depends in part on what’s in our digestive systems. But surely such an axis counts as a motley — we wouldn’t have expected the connection between brains and bowls to be a joint of nature. In addition to formulating principles describing mood in terms of brain states and neurotransmitters, neuroscientists and gastroenterologists suggest thinking about mood in terms of neurotransmitters *and* gut microbes.

Consider a second example of empirical work leading towards motleys. This one comes from research showing that cultures and genes co-evolve and interact with one another in interesting ways. The gene of interest here is the short allele version of 5-HTTLPR, a region of the serotonin transporter gene. Serotonin transporters have been found to be associated with alcoholism, obsessive-compulsive disorder, and generalized social anxiety. The allele has been demonstrated to be associated with increased negative emotions, including depression, as well as increased attention to negative information. Now, Chiao and Blizinsky (2010) report that 5-HTTLPR S occurs in East Asia at twice the rate of occurrences in Western Europe and North America. However, the kinds of moods and affective states associated with the gene occur at *half* the rate in East Asia relative to Western Europe and North America. That is, the gene found to be associated with depression occurs much more frequently in East Asia but people there experience depression much less frequently. Chiao and Blizinsky appeal to culture-gene coevolution (Richerson & Boyd, 2005; Boyd and Richerson 1985): cultural norms play an important role in selecting for 5-HTTLPR S and that selection of the gene also reinforces the relevant cultural norms. East Asian cultures tend to be collectivist, valuing the aims of the group over the aims of the individual (Heine, 2015). This kind of “group first” mentality values group cohesion and reduces the kinds of chronic stressors that cause (in part) depression in people with 5-HTTLPR S, like interpersonal conflict. The takeaway? Understanding global variability in attitudes and their genetic causes requires appeal to motleys of coevolving cultures and genes.

Finally, consider the role culture and social class play in judgment. Cultural psychologists have developed continua along which to analyze cultures. One fruitful continuum thinks about cultures as *tight* versus *loose*.¹⁶ Tight cultures are cultures where conformity and order reign. Singapore is a paradigm example. The streets are immaculate and crime is low because behavioral norms are strictly imposed with severe punishments for violations. Tight cultures are clean and orderly but the trade-off is that they encourage closed-mindedness and tend to be moved by cultural inertia: the people do X because that’s what’s always been done. Loose cultures, like New Zealand, are creative and adaptive. Violations of norms are less severely sanctioned. But the trade-off is that social disorder is much more common and coordination failures are common when wide-scale collaboration is required. The tight-loose continuum is also found in subcultures. Within the United States, for example, so-called ‘blue-collar’ cultures tend to be tight while ‘white-collar’ cultures tend to

¹⁶ Historically, cultural psychologists have thought about cultures along the lines of collectivism-individualism. But further research suggests that there are some important features that collectivist and individualist cultures share that one would predict they wouldn’t, and important features they don’t share that one would predict they would. Cf. Gelfand (2018).

be loose. Interviews with both high and low SES individuals found that the latter preferred tighter societies with more severe punishments for norm violations (cf. Gelfand, 2018). By contrast, more privileged people reported that wider ranges of behavior were permissible and norm violations needn't be as severely punished as their working-class counterparts thought. Understanding why people make the judgments they do necessitates looking to a motley network of causal contributors: not only biological and genetic factors, but also cultural and historical ones.

We'll end our discussion of motleys here. Our aim in these examples is not to provide an exhaustive account of ways in which the sciences look to motleys in providing explanations for cognitive phenomena. It is rather to show that motleys are *already* a part of the sciences of the mind. Causal powers realism, in wholeheartedly embracing motleys, acknowledges that reality. Those who take Motley Crew to be an *objection* to a theory of the mind, by contrast, must contend with the empirical data that would seem to lead us to a philosophical theory that countenances motleys.

3.3 Mark of the Cognitive

In the context of objecting to theories of extended mind, Adams and Aizawa have argued that these theories ignore the fact that there is some property, some feature, of cognitive items and events that distinguishes them from non-cognitive items and events. This they call the 'mark of the cognitive' (Adams & Aizawa, 2001, 2008, 2010). The mark of the cognitive is *underived content*. While words on a page have content, their content comes from elsewhere. The words you're reading have meaning in virtue of some process by which minds and cultures invest meaning into words. But clearly there can't be an infinite regress; not all content has an origin story outside itself. The end of the regress, Adams and Aizawa argue, is in the mind of human agents: internal representations are the Unmoved Movers of semantic content. What then distinguishes the cognitive from the non-cognitive are representations with underived content. Since Otto's notebook has derived content, it cannot be part of the cognitive system. Likewise, any theory that countenances Otto's notebook as part of a cognitive system—theories of extended mind and causal powers realism included—loses the opportunity to use underived content to distinguish the cognitive from the non-cognitive. Or so the objection runs.

Adams and Aizawa's discussion here is compelling, but not historically innocent. The idea that there is a special mark of the cognitive can be traced to the more general (and distinctively modern) idea that there is a special mark of the mental. According to most accounts — see Searle (1983) for a fairly standard treatment — contemporary philosophy owes a debt to Brentano for identifying *intentionality* as that which makes mental phenomena mental.¹⁷ On Brentano's account, mental phenomena have as a distinguishing mark "intentional...inexistence of an object, and what we could call...the reference to a content, a direction upon an object, ... or an immanent objec-

¹⁷ Intentionality as the mark of the mental is not without its objectors. As Searle points out, there are some mental phenomena that are non-intentional, like general anxiety. And just what is meant by "intentional inexistence" is up for interpretation (cf. Crane, 1998). Be that as it may, we follow the lead of philosophers like Searle and Fodor (cf. 1987) in understanding 'intentionality' as the *aboutness* of thoughts.

tivity. Each one includes something as object within itself...” (1960/1874, p. 50). Brentano himself credits Medieval philosophers with the insight. In a footnote, he identifies Philo, Aristotle, Augustine, and Aquinas as major thinkers in this regard.

The mark of the cognitive à la Adams and Aizawa is clearly parasitic on Brentano’s mark of the mental. Underived content cannot function as the mark of the cognitive unless there is mental content to begin with. And mental content in the modern sense draws from Brentano’s claims about intentionality: that thoughts have an “intentional inexistence” of an object that refers to something outside itself.¹⁸

One implication of this dependence is that Adams’s and Aizawa’s claims about the mark of the cognitive rest on the assumption that Brentano-intentionality is a good characterization of the apparent ‘aboutness’ of thoughts. The literature that has arisen in response to their objection seems to confirm this. For example, Clark (2008) offers a sustained response to Adams and Aizawa’s objection to extended mind theory. The response is instructive. Clark argues, first, that the concept of ‘underived content’ is murky at best: where does it come from; where does it get its semantic properties? Next, Clark points out that even if there were answers to these questions, external resources (like Otto’s omnipresent notebook) are noncognitive only if conventional, derived content has no place in a cognitive system. While Clark goes on to offer arguments that this condition is too strong, at no point does he question whether the received notion of content is the only one on the market. He rather argues *within* the framework offered by Brentano-intentionality. Accepting Brentano’s thesis about intentionality, it would seem, is a necessary condition in the current debates over the mark of the cognitive.

In what follows, we therefore depart from typical responses to Adams and Aizawa’s objection by rejecting the assumption on which it is predicated. More specifically, we call Brentano-intentionality into question and reject the idea that there must be a special mark of the cognitive to begin with. And if there is no special mark of the cognitive, it is not problematic that views such as causal powers realism are unable to distinguish the cognitive from the non-cognitive. The argument we gloss is historical—we suggest that Brentano-intentionality was not historically inevitable, given the Medieval sources from which it is drawn. For if Medieval philosophers had an alternative understanding of the intentionality concept, then *a fortiori* Brentano’s intentionality is not the only one available on the market and we need not inevitably take intentionality to be the mark of the mental. And if we need not take intentionality to be the mark of the mental, we can avoid the idea that the cognitive is distinguished by mental content, thereby avoiding Adams and Aizawa’s warming-over of the mark of the mental as the mark of the cognitive.

Consider, for example, the Medieval philosopher John Buridan. Buridan makes use of the concept of intentionality (and its reified correlate ‘intention’) throughout his work. Zupko (2015) identifies not merely one, but five distinct uses for ‘*intentiones*’ :

¹⁸ Brentano’s student Husserl adopted the former’s notion of intentionality but developed it in a different direction than analytic philosophy of mind: cf. Moran, 2012, Smith and McIntyre (1982). Here, when we use ‘Brentano-intentionality’ we mean it to refer to its characterization in Searle (1983), among other places.

1. Intentions as meanings: what the author of a work intends the words to signify.
2. Intentions as mental qualities: ‘intention’ as synonymous with ‘concept’ and ‘reason’. Zupko (p. 260) notes that this use of ‘intention’ is as wide ranging as the Greek ‘*logos*’.
3. Intentions as classifications: intentions used to distinguish terms that refer to singular objects and terms that refer to other terms; also, a way of construing other concepts.
4. Nonhuman animal intentions: intentions as part of perceptual judgments by non-human animals.
5. Nonpsychological intentionality: the dispositions of a particular body as a function of its elemental parts; e.g. a “fiery body is naturally disposed to heat whatever is placed next to it” (p. 267).

Much could be said about the significance of (1–5). What do the manifold uses of ‘intention’ in Buridan mean for us? It suggests that there are worked-out philosophical frameworks in which intentionality, interpreted as Brentano-intentionality, is *not* taken as the mark of the mental. Intentionality, for Buridan, is neither necessary nor sufficient for a phenomenon to count as mental. Intentionality is a philosophically interesting property, to be sure, but not because it marks off the mental from the non-mental: non-mental entities on Buridan’s account exhibit intentionality. The concept of ‘intentionality’ that we’ve argued is implicit in Adams’ and Aizawa’s critique is therefore just one way of thinking about intentionality. Sans Brentano-intentionality, the need to demarcate the cognitive and non-cognitive thus becomes less pressing. Reject that account of intentionality, and Adams’ and Aizawa’s critique loses its sting.

The reason this is salient for us is that there is nothing about causal powers realism that commits it to mental contents or intentionality as it has been developed in philosophy of mind since the 19th century. Why? Consider again the central claims of causal powers realism discussed above: powers cannot be reduced to counterfactuals; powers do causal work; powers are manifested in conjunction with manifestation partners; and powers are directed towards potential future manifestations. Nothing in this characterization is committed to positing mental contents or Brentano-intentionality. By the same token, nothing in a causal powers framework prohibits taking Brentano-intentionality on board and adopting the kinds of responses offered by extended mind theorists. Because causal powers realism remains agnostic in regards to Brentano-intentionality, the worries posed by Adams and Aizawa about the mark of the cognitive don’t have any bite for the theory. To be clear: we are not arguing here that Brentano-intentionality should be rejected as a viable account of intentionality. We are rather pointing out that Adams and Aizawa’s objection only holds for those who are committed to Brentano-intentionality, and that proponents of causal powers realism need not take this commitment on board.

This reply, moreover, isn’t available to classic extended mind theory; the varieties available on the market — with the exception perhaps of Rowlands’s (2010) Sartre-inspired version — still at least implicitly subscribe to Brentano-intentionality. Unlike classical theories of extended mind, causal powers realism is simply more ecumenical when it comes to theories of intentionality. It explicitly embraces a metaphysic independent of commitments to Brentano-intentionality, and in this ecu-

menicisms, avoids the worries raised by Adams and Aizawa in a way that classical extended mind theories do not.

3.4 Deadlock of extended and embedded cognition¹⁹

There is another worry about extended cognition in the neighborhood of the mark-of-the-mental objection. This worry turns on one way of distinguishing extended mind theories from those that argue that cognition is embedded in the environment. In particular, extended mind theorists claim that the world outside the skull is, at least sometimes, a part of the cognitive system. By contrast, embedded cognitivists argue that the world outside the skull causally affects but is constitutionally distinct from the cognitive system. The empirical data is unable to settle the issue, for any data that can be marshaled by the extended mind theorist can be reinterpreted by the embedded cognivist. The extended mind theorist analyzes Otto's notebook as part of the cognitive system; the embedded cognivist casts the notebook as a causal input to the system, a scaffold instead of a part.²⁰ The issue of what constitutes cognitive systems is thus one for the metaphysician, and any theory incorporating environmental factors into cognitive systems—our own theory included—must weigh in.

The objection has been around for some time, but recently it's taken on a new and more helpful structure. Instead of asking whether minds are extended or merely embedded, some philosophers put the concern in terms of the "mark of constitution": A piece of the world is part of a cognitive system if it bears the mark of constitution (Krickel, 2020; Palermos 2014).

There are at least three general strategies for responding: optimism, pessimism, and indifference. Sprevak (2010) is an optimist, adopting the position that further work on our concept of the mental will help settle the issue. He writes that there are "wider concerns relevant to a theory of mentality that have the potential to break a deadlock" (p. 361). These "wider concerns" might be scientific or conceptual, but the debate is a settle-able one: there is, in fact, a mark of constitution. Generally, optimists claims that scaffolding/parthood debate can eventually be settled, if we only work a little harder.²¹ Block (2005) is also an optimist but in the direction most extended mind theorists don't care for: there is sufficient data and theory to show that mind is *not* extended, even if it is embedded. For Block, our evolutionary history is a part of the story about mental content, but it is a scaffold and not a part of the cognitive machinery.

¹⁹ thanks in particular to Marcin Milkowski for suggesting we address this issue

²⁰ This debate is related to debates about the coupling-constitution fallacy. See Clark (2008), Adams and Aizawa (2008), Menary (2010), Sterelny (2010), and Kagan & Lassiter (2013) for discussion.

²¹ Extended mind theorists recruiting resources from the New Mechanists are also optimists. Kaplan (2012) argues that there is a necessary condition by which an extra-cranial resource counts as a part of a cognitive system: mutual manipulability. The heart of the mutual manipulability account, which Craver (2007) argues is in line with actual neuroscientific practice, is that each component takes on a particular value in an intervention that depends on the values produced by the other component. Regardless of the efficacy of this strategy (see Krickel 2020 for criticism and amendment), it's clear that extended mind theory plus New Mechanism is an optimistic outlook.

Pessimists disagree. They claim that settling the deadlock isn't so simple, and in fact, can't be done. No amount of empirical research, no amount of philosophical theorizing, no amount of any kind of work will be able to settle the matter. The debate is in principle irresolvable. There may or may not be a mark of constitution; either way, we'll never know. This vaguely postmodern approach maintains that there are no facts or arguments that would settle which theory is right. The pessimist's stance will thus not be an attractive one for extended mind theorists, since it construes any work on the problem as quixotic. Nevertheless, the pessimist's approach is a logically available one, even as it remains an orphan.

The final response to the problem, indifference, avoids the assured IOU of the optimist and the disappointing postmodernism of the pessimist. According to the indifferentist, the scaffolding/parthood deadlock simply doesn't matter. Among indifferentists, we can distinguish two responses. One is a principled indifference. Andy Clark typifies this attitude. He notes that the oscillations between extended and embedded theorizing are good for cognitive science because they help practicing scientists understand phenomena anew. Since the back-and-forth is good for science, settling the issue by appeal to facts or theories of mentality doesn't matter.²²

There is, however, a second kind of indifferentist response, one which follows from causal powers realism. According to this response, the scaffolding/parthood deadlock doesn't matter because it's a pseudo-problem. For causal powers realism, many different sorts of powers contribute to token manifestations; behavioral manifestations are the result of many manifestation partners working in concert. Some of these contributors will be naturally described using psychological language and others won't: I might be able to solve a math problem in virtue of my working memory but also because I've made some notes on a piece of paper. So are the contributions of these latter powers *part of cognition*? That's the question at the heart of the scaffolding/parthood debate. But causal powers realists don't find this question particularly interesting. We've already seen the reason—they question the idea that there is a special mark of the cognitive to begin with. From the perspective of causal powers realism, the question of whether the piece of paper counts as a scaffold or a part of my cognitive system is therefore a red herring. After all, if there is no strict delineation between the cognitive and non-cognitive to begin with, there's not much ontologically at stake in asking whether the paper is a part of a cognitive system or not. From the perspective of the causal powers realist, the important matter is what empowers my tokening of a given power: in this case, that the capacities of my working memory and ability to interpret inscribed symbols along together with the power of the paper to be inscribed with notes (and a host of other powers) enable me to solve the problem. Causal powers realism requires that we look to powers outside the body to explain token manifestation of psychological powers. But nothing in causal powers realism requires philosophers or scientists to settle whether powers outside the body scaffold or constitute agential powers. Whether there's a mark of constitution or not

²² Though, it should be noted, Clark does say that embedded cognition can obscure facts about cognition that are revealed by extended mind theory and hence extended mind is the better theory because it produces better science. So perhaps it is better to say that the stance of principled indifference is Clark-inspired, if not actually advocated by Clark.

doesn't matter. What matters is identifying powers of explanatory interest. Because causal powers realists deflate the importance of delineating distinctively cognitive systems, they deflate the importance of the scaffolding/parthood debate.

4 Conclusions

Let us conclude. We set out in this paper to show that causal powers realism provides the resources to avoid several problems faced by contemporary extended mind theories while retaining the spirit of the theory. For extended mind theory and causal powers realism, processes beyond-the-brain are as important as causal contributors as what's within-the-skin. Careful readers will note some omissions. We didn't talk about differences and similarities between a powers-based extended mind and a functionalist-based extended mind. Nor did we talk about other issues of concern to a scientifically-oriented metaphysics of mind, like the individuation of mental powers or their development. Nor did we address how causal powers realism compares to the ontology purveyed by the New Mechanism (e.g. Krickel 2020). These issues are important too. Our goal in this paper is narrow: to show how a powers metaphysic for extended mind theory has the resources to rebut or avoid otherwise recalcitrant objections and to do so while retaining its spirit.

Causal powers realism isn't an extension of extended mind theory. Rather, we have suggested that the ancient ontology of causal powers fits naturally with the commitments of contemporary extended mind theories, and that it offers novel ways of responding to well-rehearsed objections to these theories. Our hope, then, is not that extended mind theorists see causal powers realism as a direct rival. Rather, we present causal powers realism as an ecumenical ontological framework that not only entails the central commitments of most extended mind theories, but is also up to the task of solving many of the problems these theories face.²³

Declarations

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²³ We're grateful for feedback on this draft from Marcin Milkowski, Michael Kirchoff, Abram Capone, and anonymous reviewers. Special thanks to Julia Taylor for research assistance and talking through examples.

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