

Virtue Epistemology and Extended Cognition

J. Adam Carter

University of Edinburgh

j.adam.carter@ed.ac.uk

ABSTRACT: Virtue epistemology—no less than mainstream epistemology more generally—has by and large taken for granted the traditional intracranial picture of the mind, according to which the skull and skin mark the bounds of human cognizing. It is only natural then that intellectual virtues themselves have typically been understood as seated firmly within the biological agent. Recent work in the philosophy of mind and cognitive science (e.g., Clark 2008; Clark and Chalmers 1998), however, challenges this traditional account of the mind by suggesting that cognitive processes can criss-cross the boundaries of brain, body and world, so as to include certain parts of the world which we regularly interact with. But if cognition can extend in such a way that physical, extra-organismic artifacts (e.g., iPhones, smartwatches, tactile-visual substitution systems, etc.) can feature in cognitive processes such as memory, perception and the like, what does this mean for virtue *epistemology*? The aim here will be to attempt to answer this broad question in two parts. First I outline how the extended cognition thesis interfaces with the *virtue reliabilist* (e.g., Greco 2010; 2012; Sosa 2009; 2015) and *virtue responsibilist* (e.g., Baehr 2011; Battaly 2015; Montmarquet 1993) programmes in contemporary virtue epistemology, respectively. Next, I propose and briefly develop what I take to be four of the most important new research questions which arise for virtue epistemologists who welcome aboard the possibility of ‘extended’ intellectual virtues—viz., (i) the *parity problem*, (ii) the *achievement problem*, (iii) the *cognitive integration problem*, and (iv) the *autonomy problem*.

§1. Introduction: virtue epistemology and extended cognition

This article connects two research areas: *virtue epistemology*, an area of epistemology which gives epistemic virtues a central theoretical role, and *extended cognition*, a research programme in the philosophy of mind and cognitive science that contests received boundaries between mind and world¹.

¹For some overviews of the recent literature at the intersection of these two areas, see Carter, Kallestrup, Palermos and Pritchard (2014) and Carter and Palermos (2015).

Virtue epistemology, in short, is marked by an epistemological shift in focus from properties of beliefs to properties of agents. Beliefs still have an important place within virtue epistemology, but when they have positive epistemic status, this is ultimately in virtue of the agents who form them having certain properties. And it's the properties of these agents—their intellectual virtues—which are of primary theoretical interest.

Virtue epistemology was first introduced as a potential way to bridge the gap between traditional epistemological impasses, such as between foundationalism and coherentism², and epistemic internalism and epistemic externalism³. Nowadays, the virtue-theoretic approach is mainstream. It offers for one thing a new research area: that of articulating what makes certain traits good ones to have, from an epistemic point of view. However, virtue epistemology also offers an increasingly popular means of approaching traditional questions about the nature of knowledge. The crux of the virtue-theoretic line is that (propositional) knowledge is—fundamentally—a kind of *success through ability*—viz., *S* knows that *p* if, and only if, that *S*'s belief that *p* is correct is *because of* one's exercise of intellectual virtue⁴. Proponents of this style of account have pointed to many advantages it has, including new inroads for addressing the Gettier problem⁵, and unique resources for vindicating the epistemic value of knowledge in comparison with mere true opinion that falls short of it⁶.

Virtue epistemologists, perhaps rightly, have typically left traditional questions about the metaphysical nature of cognition to the philosophers of mind and cognitive science. And this has

²See, for example, Sosa (1980), wherein virtue epistemology was first articulated and introduced to the epistemological mainstream. For a helpful overview of the early rise of virtue epistemology in the 1980s and 1990s, see Axtell (2000: Introduction). Cf., Greco and Turri (2015 §§1-2).

³This is a key claimed advantage of virtue epistemology, as claimed by Linda Zagzebski (1996).

⁴The matter of how to unpack the 'because of' is among the most important research questions for contemporary virtue epistemologists. Unsurprisingly, another point of dispute is how to characterise intellectual virtues themselves, a dispute which maps on to the distinction between virtue reliabilism and virtue responsibilism. Virtue reliabilists think of intellectual virtues along the lines of reliable faculties. Virtue responsibilists think of the intellectual virtues as character traits which involve characteristic epistemically oriented motivations. This distinction between virtue reliabilism and virtue responsibilism is an important one and, as I'll suggest in §§2-3, extended cognition interfaces with these approaches in subtly different ways.

⁵See, for example, Turri (2011) and Carter (2016). Cf., Pritchard (2012) for criticism.

⁶The line, in short, is that, just as achievements—viz., successes because of ability—have a final value lacked by successes that are not primarily explained by ability, so does knowledge—*qua* cognitive achievement—have a value not shared by cognitive successes that are not primarily because of ability. For discussion, see for example Haddock, Millar, and Pritchard (2010); Pritchard (2009). Cf., Navarro (2015) for a critique of prevailing models of cognitive achievement. See also Pritchard and Turri (2014) for an overview of the value problems for knowledge, more generally.

been by and large unproblematic⁷. After all, at least for the theoretical purposes of virtue epistemology, very little is being taken for granted, other than the seemingly innocuous assumption that the life of the mind—viz., that which virtue epistemologists are in the business of evaluating—plays out inside the head, and not elsewhere.

Enter now *extended cognition* (e.g., Clark and Chalmers 1998)—a view which, if correct, means that the life of the mind does *not* transpire exclusively inside the head, but that it (literally) extends so as to include at least some of the physical extra-organismic artifacts that we interact with.

In order to sharpen this idea, consider briefly Clark & Chalmers' classic case of 'Otto', an Alzheimer's patient:

OTTO: Otto suffers from Alzheimer's disease, and like many Alzheimer patients, he relies on information in the environment to help structure his life. Otto carries a notebook around with him everywhere he goes. When he learns new information, he writes it down. When he needs some old information, he looks it up. For Otto, his notebook plays the role usually played by a biological memory.

It seems uncontroversial that Otto is using his notebook to do the very kind of things (i.e., storing and retrieving information) which people ordinarily rely on their biological brains to do. Yet, conventional wisdom says that, despite these functional similarities, Otto does not count as consulting his *memory* when consulting the notebook. If pressed for an explanation, the standard rejoinder is (perhaps obviously) that the notebook is something *external* to Otto. It is something which he is interacting with, part of the *world*, not his mind⁸.

But such an explanation invites a deeper question. What kinds of considerations should actually *matter* for deciding whether something is a (literal) part of a cognitive process? Clark and Chalmers' (1998) key insight is that received thinking about the bounds of cognition is objectionably *bioprejudiced*. Traditional thinking gives factors such as material constitution and physical location undue importance. As Clark and Chalmers see it, our theorising about the

⁷Perhaps the most significant issue concerning the nature of human cognition that has influenced thinking in virtue epistemology recently owes not to the philosophy of mind, per se, but to recent work in moral psychology. In particular, over the past several years, the situationist critique of virtue ethics (e.g., Doris (2002); Harman (2000)) has been redeployed as an objection to virtue epistemology (e.g., Alfano 2012; 2013; 2014).

⁸ For the most notable traditionalist line of reply to proponents of extended cognition, see Adams and Aizawa (2001; 2008). Cf., Rupert (2004).

mental should be more egalitarian, and guided by a rule of thumb which they label the *parity principle*:

PARITY PRINCIPLE: If, as we confront some task, a part of the world functions as a process which, were it to go on in the head, we would have no hesitation in accepting as part of the cognitive process, then that part of the world is part of the cognitive process (Clark and Chalmers 1998, 8).

With reference to the parity principle, if an ordinary agent relies on her biological memory (in normal circumstances) in recalling that the Museum of Modern Art is on 53rd street, and we are prepared to count her biological memory as an element of the cognitive process she employs in retrieving this belief, then we must no less count Otto's extra-organismic notebook as a (literal) part of the cognitive process that *he* employs when retrieving from his notebook the information that the Museum of Modern Art is on 53rd street—and thus as a kind of 'extended memory'. Furthermore, we should be prepared to make analogous judgments in more 'high-tech' cases, involving iPhones, laptops, smartphones and other gadgets.

The basic idea underlying the parity principle is *commonsense functionalism* about the material realisers of cognition, though it is important for proponents of extended cognition to put forward this functionalist thinking in a way that is not too inclusive. For example, while consulting the notebook is automatic for Otto (like consulting biological memory is for us), we wouldn't want to say that the notebook plays the kind of functional role played by biological memory if Otto (for example) scrutinised the notebook carefully each time he consulted it, or carried it with him merely more often than not.

As Clark (2008) has suggested, the parity principle can be paired with what he calls 'glue and trust' conditions, which would need to be satisfied for Otto's notebook to count as integrated in such a way that it is plausibly on a functional par (*vis-à-vis* information storage and retrieval) with biological memory. These conditions are:

1. *Availability*: The information in the notebook must be reliably available and regularly consulted.
2. *Accessibility*: The information in the notebook must be easy to access.
3. *Automaticity*: The information retrieved from the notebook should be automatically endorsed and should not normally be subject to critical scrutiny.

4. *Past Endorsement*: The information in the notebook must have been previously endorsed by Otto and be there as a consequence of this endorsement.

If Otto's notebook were to fail any of these conditions, it would be less plausible to suppose that the notebook really is playing for him the same role with respect to information storage and retrieval as biological memory plays in the default case.

Against this background, let's put these two ideas—virtue epistemology and extended cognition—together. Suppose cognition really does extend beyond the organism and into the world. What ramifications would this have for how we should think about intellectual *virtues*, both in their own right and in the service of explaining what makes a given belief qualify as knowledge⁹?

Here is the plan. §§2-3 offers an overview of some ways in which contemporary epistemologists have envisioned extended cognition fitting with *virtue reliabilist* and *virtue responsibilist* approaches in virtue epistemology, respectively. Then, in §4, I propose and briefly develop what I take to be four of the most important new research questions which arise for virtue epistemologists who welcome aboard the possibility of 'extended' intellectual virtues—viz., (i) the *parity problem*, (ii) the *credit problem*, (iii) the *cognitive integration problem* and (iv) the *autonomy problem*.

§2. Virtue reliabilism and extended cognition

According to *virtue reliabilists*, intellectual virtues are, as John Greco (2002) puts it, “innate faculties or acquired habits that enable a person to arrive at truth and avoid error in some relevant field” and paradigmatic examples include “perception, reliable memory, and various kinds of good reasoning¹⁰.”

When knowledge is explained in terms of intellectual virtue, for virtue reliabilists like Ernest Sosa and John Greco, the principal idea is that *S* knows that *p* if, and only if, that *S*'s belief that *p* is correct is *because of* one's exercise of one's intellectual virtues, unpacked along

⁹This question of course presupposes that there are ramifications. I think this presupposition is correct (and will defend this claim in the ensuing sections). For some criticism of the idea that extended cognition has interesting import in epistemology, see Aizawa (2012) and Jarvis (2015).

¹⁰See Greco (2002: 287). Cf., Baehr (2004: §2).

virtue reliabilist lines. Whilst ‘robust’ virtue epistemologists (Sosa and Greco being examples) are happy to embrace the full biconditional, some epistemologists with virtue-theoretic sympathies, (e.g., Kallestrup and Pritchard 2012; 2013a; 2013b; Kelp 2013), regard the satisfaction of a virtue reliabilist condition as merely necessary but not sufficient for knowing¹¹.

One straightforward advantage which virtue reliabilists can claim over standard process reliabilists is that the latter seem subject to meta-incoherence-style counterexamples¹², where there is some kind of mismatch between the source of the reliability and agent’s beliefs about this source. Take for example the notorious True Temp case¹³. As the example goes, True Temp—unbeknownst to him—has a temperature-detecting device implanted in his head which is responsible for generating true beliefs (auto-endorsed) by True Temp about True Temp’s ambient temperature. Intuitively, True Temp lacks knowledge in these circumstances (he has after all no clue what is causing his beliefs). Yet, the process that issues his beliefs about the temperature is perfectly reliable. Thus, a problem for the idea that knowledge is reliably produced true belief.

The virtue reliabilist, by contrast, avoids this unwanted result by insisting that kinds of reliable faculties which qualify as intellectual virtues must themselves be (unlike True Temp’s thermometer) appropriately *integrated* in the agent’s cognitive character. And so even if Temp’s belief is issued by a reliable process, it is not issued by a reliable intellectual virtue.

Interestingly, True Temp is also plausibly not a case of extended *cognition*, also for reasons to do with cognitive integration. As the case is described, True Temp can be understood as compulsively forming the ambient temperature beliefs the forms, beliefs which are not

¹¹The standard style of objection on this score is that the biconditional, at least if interpreted as Greco and Sosa interpret it—viz., where the ‘because’ is read strongly so as to demand that the correctness of the target belief be primarily due to ability or virtue—fails in both directions. The necessity direction of the biconditional is claimed to fail because of simple testimony cases in friendly environments, such as those raised against the view by Jennifer Lackey (2007). The claim that cognitive success primarily because of ability is sufficient for knowledge has been called into question by appealing to barn-facade style cases which intuitively involve cognitive achievements in the presence of knowledge-undermining epistemic luck (see, for example, Pritchard (2012)). Accordingly, as will be noted later in this section, some epistemologists with virtue-epistemological sympathies opt for a virtue-theoretic necessary condition on knowledge which reads the ‘because of’ more weakly than do Sosa and Greco, so that the extent to which the correctness of the target belief be attributable to ability or competence in cases of knowledge must only be to some degree significantly attributable, though not *primarily* attributable.

¹²See also Laurence Bonjour’s (1980) case of Norman the clairvoyant. Cf., Goldman (2011: §3).

¹³For the classic presentation of this case, see Lehrer (1990: 187).

calibrated against his other beliefs, given the manner in which True Temp is interacting with the thermometer. There is a kind of one-way asymmetrical causation between the thermometer and Temp, such that the thermometer would continue issuing what it does, affecting Temp's doxastic states, regardless of whatever else Temp thinks or believes.

As Orestis Palermos (2014a; 2014b) has argued, a necessary condition for an artifact to be integrated within individual's cognitive architecture, is that the causation between the individual and the artifact must be continuous and reciprocal (i.e., two-way), so as to generate 'feedback loops'¹⁴. In the original case of Otto, the causation between Otto and his notebook is not just one directional (as it is in the case of True Temp's thermometer which asymmetrically influences Temp) but very much reciprocal as Otto continually updates the notebook, which in turn shapes his beliefs and actions and thus his further updates, etc¹⁵.

Let's now take a step back. We've seen that with reference to cognitive integration, we have a negative verdict both for why (i) True Temp fails to know, by the lights of virtue reliabilism; and why (ii) True Temp's thermometer is not part of an extended cognitive process, by the lights of extended cognition.

Duncan Pritchard's (2010) has argued, in the first paper explicitly connecting extended cognition and virtue epistemology, that satisfying the kinds of integration conditions needed for extended cognition might well also suffice to satisfy at least one plausible (albeit weaker than Greco or Sosa's) version of virtue reliabilism. The details of Pritchard's view will be discussed in more detail in §4.3. For now, the relevant point is that, to the extent that this kind of line is defensible, then there's a case for thinking that in at least some circumstances, knowledge will be—by the lights of virtue reliabilism—the product of extended intellectual virtues.

§3. Virtue responsibilism and extended cognition

¹⁴ On Palermos's view, feedback loops are also sufficient for cognitive extension, as well as necessary. His position is that satisfying the conditions for continual reciprocal causation with reference to dynamical systems theory will entail that one satisfies any plausible construal of Clark's (2008) 'glue and trust' conditions. See for example, Palermos (2011; 2014a; 2015b). Cf., Menary (2007) for another notable approach to cognitive integration.

¹⁵ See also Palermos (2015; forthcoming) for some further developments of virtue reliabilism in connection with active externalist approaches to cognition.

Virtue responsibilists (e.g., Baehr 2011; Battaly 2015; 2016; Code 1987; Montmarquet 1993; Zagzebski 1996) think of intellectual virtues along the lines of character *traits* as opposed to faculties (e.g., conscientiousness, intellectual humility, open-mindedness) the possession of which requires certain dispositions of epistemic motivation, and for which we are at least partly responsible for acquiring¹⁶.

Initially, the thought of ‘extended’ responsibilist virtues might seem perplexing, more so than extended reliabilist virtues. However, Heather Battaly (2016) and Mark Alfano & Gus Skorborg (Forthcoming) have in recent work indicated how at least some responsibilist virtues might be extended.

Battaly (2016: §4.2) has suggested *open-mindedness* as a candidate for a potentially extended responsibilist virtue, where open-mindedness is understood as (roughly) the disposition to generate and consider appropriate alternatives¹⁷. In considering how openmindedness might potentially be extended, she proposes a thought experiment.

IVAN AND OLGA: Ivan and Olga are open-minded policy-wonks who work for the current government. They each reliably succeed in generating and considering appropriate alternatives to current policies. But, Ivan does this entirely in his head; while Olga does not. Whenever Ivan is in a context that calls for open-mindedness about policy, he generates and weighs appropriate alternatives internally. Granted, Ivan is not an island—he is well-read and well-informed; but he does all of the actual generation and weighing of appropriate alternatives entirely inside his head. Olga is equally well-read and well-informed. But, when she is in a context that calls for open-mindedness about policy, she generates and weighs appropriate alternatives through writing. Olga learned in school to generate and consider alternatives by writing them out in a “circle of viewpoints.” She has continued this practice, and regularly uses it to work out alternatives to current policies—she thinks up, revises, and weighs appropriate alternatives through mapping them out. This practice helps her generate viable alternatives that otherwise wouldn’t have occurred to her (2016: 22).

Battaly suggests that the policies and problems are simple, we may be able to, like Ivan, generate entirely in our heads the kind of appropriate alternatives characteristic of open-mindedness. However, when the policies and problems are more complex—as is often the case

¹⁶For discussion, see Battaly (2015).

¹⁷For some other recent discussions of the nature of open-mindedness, see Baehr (2011), Carter and Gordon (2014), and Riggs (2010).

in normal situations that require careful brainstorming—Ivan’s in-the-head generation of appropriate alternatives seems nearly superhuman; the norm for generating appropriate alternatives in more complex cases is much more in line with the kind of method (involving external artifacts) embraced by Olga. As Battaly (2016: 23) puts it, “it tells us that Virtue-Responsibilists may want to re-think individualism. Some of the most plausible cases of open-mindedness seem to be ones in which the virtue should be attributed to a system, rather than an individual; i.e., to the system that has Olga and her computer as parts.”

A similar receptivity to the thought that character virtues might be extended in certain circumstances has been put forward in recent work by Alfano and Skorburg (Forthcoming), who defend what they call the *extended character hypothesis*¹⁸, viz., that “the vehicles of [...] normatively-evaluable agentic dispositions are sometimes located partially beyond the confines of the agent’s skin.” Alfano and Skorburg make the argument by taking as a case study a friendship¹⁹ between two individuals—Ashley and Azim—who automatically consult the “inner voice” of one another when evaluating their own actions and planning behavior. As they describe the highly interdependent dynamic between Ashley and Azim:

ASHLEY AND AZIM: In their deliberations, each of them weighs reasons like the rest of us, but they have also internalized each other’s voices. Ashley consults her internal-Azim: What would he tell her to do? How would he feel about her plans? How would he react to her behavior? What emotion would his face register if he were watching right now? Likewise, Azim consults his internal-Ashley: How will he feel if and when he tells her about what he just did? How will she react when he tells her how he feels right now? [...] Ashley’s internalized Azim gets updated every time she gets actual feedback from him. If internal-Azim tells her to do one thing but actual-Azim says the opposite, she updates internal-Azim. Likewise, Azim’s internalized Ashley gets updated every time he gets actual feedback from her. If internal-Ashley reacts with approbation but actual-Ashley reacts with shock, he updates internal-Ashley.

In this circumstance, Azim’s and Ashley’s expectations for themselves, their respective self-knowledge, appreciation of which actions are available, their deliberative strategies, etc., are

¹⁸A predecessor to this idea was put forward, without reference to the extended cognition literature, in Alfano (2013: 185). In that work, Alfano suggested in his discussion of factitious character virtues, that they inhere “in the interstices between the person and her world. The object that possesses the virtue [is] a functionally and physically extended complex comprising the agent, her social setting, and her asocial environment.”

¹⁹The philosophical approach to friendship which Alfano and Skorburg connect with extended cognition draws from a previous account of friendship articulated in Alfano (2016).

influenced in a systematic and ongoing way by one another. As Alfano and Skorburg suggest, for both Ashley and Azim, these ongoing feedback loops indicate how friendship can be modeled as a balanced symmetric coupled system, with reference to dynamical systems theory²⁰ (e.g., Palermos 2014a; 2014b; Beer 1995).

Though Alfano and Skorburg's model concerns primarily moral character, an adaptation of this case indicates how intellectual character might be modeled likewise as extended, *via* an analogous rationale. Suppose, for example, that Ashley and Azim's friendship is centred around intellectual pursuits (suppose, they are members of a closely knit scientific research team) and that they have internalized each other's voices, concerning (for instance) various ways of approaching epistemic objectives. For example, Ashley consults (and continuously updates) her internal-Azim: What intellectual aims, in a given situation, would he think she should have? How would he feel about the way she intends to pursue them? How would he react to her behavior and reasoning? What emotion would he have if observing the kinds of epistemic reasons she is giving weight to? Likewise, Azim consults (and continually updates) his internal-Ashley: How will he feel if and when he tells her about his willingness to consider alternatives? How will she react when he tells her his intellectual attitudes right now?, etc.

In sum, both Battaly and Alfano and Skorburg indicate how intellectual character might extend beyond familiar biological boundaries, in Battaly's case, to involve objects we interact with, and in Alfano and Skorburg's, other individuals with whom we are heavily interdependent.

§4. New philosophical problems

Virtue epistemology, paired with extended cognition, generates some interesting new philosophical problems which lie dormant when cognition is thought of along traditionalist lines. In particular, there a range of new epistemological problems, several of which are connected to knowledge and its connection to virtue an virtue-epistemic lines, surface once intellectual virtues are conceived of as (in some cases) extended. In this section, I will outline four such problems and—though I won't purport to answer them here—will gesture toward some potential strategies

²⁰ As Alfano and Skorburg observe, some of Ashley's parameters are functions of Azim's states and some of Azim's states are functions of Ashley's parameters.

for addressing them: (i) the *parity problem*, (ii) the *achievement problem*, (iii) the *cognitive integration problem*, and (iv) the *autonomy problem*.

4.1 THE PARITY PROBLEM

Recall again Clark and Chalmers' parity principle, which is meant to guide our judgments about what should be included as part of a cognitive process.

PARITY PRINCIPLE: If, as we confront some task, a part of the world functions as a process which, were it to go on in the head, we would have no hesitation in accepting as part of the cognitive process, then that part of the world is part of the cognitive process. (Clark & Chalmers 1998: 8)

By embracing the parity principle, one is committed to counting as cognitive processes the *extracranial analogues* of whatever intracranial cognitive processes they already recognize. Let's say that, for some intracranial cognitive process C , C^* is C 's extracranial analogue just in case, with reference to Clark and Chalmers' original parity principle, C^* is a cognitive process if C is a cognitive process. Even if abiding this principle safeguards against *metaphysical bioprejudice*—viz., bioprejudice in our thinking about the metaphysical nature of a cognitive process—it leaves open the possibility of *epistemic bioprejudice*—viz., bioprejudice in our epistemic evaluations.

Consider that, plausibly, a proponent of extended cognition will want to insist that—in our epistemological theorising—we should accept as cases of knowledge/justified belief, etc. the *extracranial epistemic analogue cases* of whatever intracranial cases of cognition we count as knowledge/justified belief, etc.²¹. For two cases of cognition, A and A^* which are otherwise epistemically symmetrical, let's say that A^* is an extracranial epistemic analogue (hereafter, extracranial analogue) of A just in case, A and A^* differ just in that the process employed in A^* is, by reference to the (original) parity principle, the extracranial analogue of the cognitive process employed in A ²². Thus, as this idea goes, the epistemologist who embraces extended cognition should be prepared to evaluate Otto's epistemic standings *vis-à-vis* his notebook as on an *epistemic par* with Inga's epistemic standings, *vis-à-vis* her biological brain.

²¹ For a discussion of this point, see for example Carter (2013), Carter and Pritchard (Forthcoming) and Carter et. al (2014).

²² This terminology is introduced in Carter (2013).

Safeguarding against *epistemic bioprejudice* is easier said than done. This is because it's unclear what kind of epistemic parity principle or principles the epistemologist (who embraces the egalitarian spirit of extended cognition) should endorse. To appreciate this point, consider that the virtue reliabilist, who wants to respect epistemic parity, will need to embrace something like the following 'credit parity' principle:

CREDIT-PARITY: For agent *S* and belief *p*, if *S* comes to believe *p* by a process which, were it to go on in the head, we would have no hesitation in ascribing *S*'s belief that *p* as attributable/creditable to *S*'s intellectual virtue, then *S*'s belief that *p* is attributable/creditable to *S*'s intellectual virtue.

It would seem unprincipled for a virtue epistemologist to, on the one hand, embrace extended cognition, and thus the parity principle, while on the other hand, reject CREDIT PARITY in the course of issuing *epistemic* assessments. This would appear tantamount to rejecting metaphysical bioprejudice while at the same time permitting (at least one kind of) epistemic bioprejudice. *However*, by the same token, it's not all obvious that CREDIT PARITY is ultimately defensible (and this is so, even if the core insights driving virtue epistemology and extended cognition are granted).

One initial problem with CREDIT PARITY is, in sum, there are cognitive processes such that, were they to be partially outsourced to our devices and gadgets, such outsourcing would eliminate certain cognitive obstacles the presence of which are essential to why certain virtues were ever manifested in the first place. Put another way: the cognitive *difficulty* of a task, and so what the cognitive task demands of an individual intellectually, can vary substantially when we move from intracranial cases of cognition to their extracranial analogue cases. This is a problem for the plausibility of CREDIT PARITY because, sometimes, we're inclined to attribute or credit the correctness of beliefs to various kinds of intellectual virtues (e.g., intellectual tenacity, on the responsibilist's model) specifically *because* the individual copes well or is in the position to demonstrate some kind of skill or resilience in the face of obstacles.

Take for example, the process of working out a long division problem. For example, consider the task of dividing 23576 by 13. The answer is 1813. For most normally competent individuals, this simply cannot be done in the head, at least not, very easily. If one *did* do this in the head, it would require extraordinary patience, and plausibly also the exercise of intellectual tenacity (to work through each of the steps while concentrating intensely), intellectual

perseverance (to re-work the problem several times, in the likely instance that one loses one's focus one or more times) and intellectual diligence, as needed for tracking one's intermediate results throughout the cumulative steps of the problem. With reference to the PARITY PRINCIPLE, proponents of extended cognition will be inclined to include (for example) the automatic consultation of the calculator app on one's phone for the purposes of long division as part of an extended cognitive process—at least, provided the calculator is plausibly cognitively integrated by reference to (for example) Clark's trust and glue conditions or Palermos's feedback loop condition.

But this creates a puzzle for the would-be proponent of CREDIT PARITY. After all, by if someone—call her Menty—comes to believe that 23576 divided by 13 equals 1813 that by a process which takes place entirely in her head and we credit her cognitive success to her manifestation of (for instance) intellectual tenacity, perseverance and diligence (without which, suppose, she couldn't have gotten the answer correct), it doesn't follow that we should also credit to Menty the manifestation of these virtues in her coming to believe that 23576 divided by 13 equals 1813 should Menty have instead employed her calculator app, for which intellectual tenacity, perseverance and diligence are not salient difference makers in the service of her attaining the right answer.

The parity problem, for the virtue epistemologist who embraces extended cognition, is that at least some kind of epistemic parity principle in the general neighbourhood of CREDIT PARITY seems needed in order to rule out the kind of epistemic bioprejudice²³ that a proponent of extended cognition will wish to avoid. The puzzle is that it's not clear just how to formulate such

²³ Carter (2013) proposes a general epistemic parity principle, framed simply in terms of knowledge-assessments. According to this principle, for agent *S* and belief *p*, if *S* comes to believe *p* by a process which, were it to go on in the head, we would have no hesitation in ascribing knowledge of *p* to *S*, then *S* knows *p*. Carter and Pritchard (2016) have since offered a revised epistemic parity principle which avoids problems which they note face the original formulation. The revised epistemic parity principle they put forward is framed in terms of defeasible warrant: for any agent *S* and true proposition *p*, if *S* comes to believe that *p* by a process which, were it to go on in the head, we would have no hesitation in ascribing defeasible warrant to *S*'s belief that *p*, then *S* has defeasible warrant for her belief that *p*. While a virtue epistemologist is welcome to embrace a parity principle about defeasible warrant, it remains that the virtue epistemologist—particularly those who attempt to give an account of knowledge in terms of intellectual virtue—will want to (in so far as she accepts the extended cognition thesis) preserve epistemic parity across, specifically, the kind of attributions to intellectual virtue which are relevant for knowledge. The problem raised in this section to CREDIT PARITY represents how defending this kind of principle will be challenging.

a principle that will withstand scrutiny by both the lights of extended cognition and virtue epistemology. Furthermore, if no such principle can be defended, then some explanation would be needed for why bioprejudice is permissible in the case of this kind of epistemic assessment but not in the case of metaphysical assessments of what counts as a cognitive process.

4.2 THE ACHIEVEMENT PROBLEM

A problem, closely connected with the PARITY PROBLEM, is the ACHIEVEMENT PROBLEM. This is a problem that arises, specifically, for *robust* virtue epistemologists such as Sosa (2009; 2015) and Greco (2010; 2012), for whom knowledge is identified as a kind of cognitive achievement, or a cognitive success that is primarily creditable to the exercise of intellectual virtue.

Even if the robust virtue epistemologist's biconditional claimed to hold between (propositional) knowledge and cognitive achievement could be defended in both directions successfully in all traditional (i.e., intracranial) cases of cognition²⁴, it's not at all clear how the left-to-right reading of the biconditional could be upheld once the extended cognition thesis is in play²⁵.

Take, for example, a high-tech extended memory case, where the target belief is a friend's birthday which one stores and retrieves from Facebook's online calendar integration feature, and its intracranial analogue—viz., storing and then retrieving the friend's birthday in biological memory. With a modest epistemic parity principle (see §4.1) in play, the robust virtue epistemologist who embraces extended cognition will want to insist that extended memory can generate knowledge provided biological memory can.

It is, however, not at all clear that retrieving a friend's birthday via Facebook calendar is an achievement along the lines of retrieving a friend's birthday by appreciating it as the case via the deliverance of biomemory. One way to flesh out this intuition is in terms of value. Robust virtue epistemologists insist that achievements, as such, have a special value that mere successes not because of ability lack, and that this explains why knowledge (i.e., cognitive success because of intellectual virtue) is more valuable than mere true belief that falls short of knowledge.

²⁴ Duncan Pritchard (e.g., 2012) has challenged both directions of this biconditional. For similar worries, see Kallestrup and Pritchard (2012; 2013; 2014). Cf., Greco (2012) for an attempt to respond to some of these challenges.

²⁵ Krist Vaesen (2011) has put forward an argument to this effect. For a reply, see Kelp (2014).

However, there seems to be an additional value we attach to one's remembering someone's birthday *via* biological memory which is a value that is not present when that birthday is stored merely in extended memory. One potential explanation underlying this intuition, is that in the case of biomemory, the movement from short-term to long-term memory storage is both fragile and positively correlated with a certain kind of epistemic effort²⁶. Suppose your friend tells you her birthday is 9 October 1985. If you do not think about this date again (i.e., you don't focus on it, rehearse it to yourself) it will probably remain in your short term memory between 18-30 seconds. Will the date move to long-term memory storage? That depends. Simply repeating the date several times in your mind or out loud—what is called *maintenance rehearsal*—will help keep the date in short-term memory a bit longer. But the type of rehearsal that is important for transferring the date to long-term memory—*elaborative rehearsal*—takes more effort²⁷. Elaborative rehearsal involves a deeper processing, where one connects the information to other information that is already stored in memory. In this example case, you might consider how your friend's October birthday is a fall birthday, and that it's shortly after your own birthday.

When one remembers your birthday *via* biological memory storage, chances are, one has processed it by some form of elaborative rehearsal. The same is not so, in the case of extended memory, such as via an electronic calendar. The movement from short-term to long-term memory requires no kind of deeper processing, but is instead automatic. This is perhaps one reason why memory knowledge in the biological case might be appreciated as an achievement, an achievement of deep processing and successful elaborative rehearsal, while memory knowledge in the extended case is not²⁸. It is incumbent upon the robust virtue epistemologist who wishes to embrace extended cognition to account for how to treat these kinds of case pairs while retaining the full biconditional between knowledge and achievement.

²⁶ There are also external factors which contribute to the fragility of biomemory in comparison with extended memory. For example, as Atkinson & Shrifin (1968) note, drinking alcohol impairs the transfer of information from short-term to long-term storage in biological memory.

²⁷ See, for example, Goldstein (2011).

²⁸ For some recent discussion defending the view that difficulty is an essential feature of valuable achievements, see Bradford (2013; 2015).

4.3 THE INTEGRATION PROBLEM

Recall again the case of ‘True Temp’ (from §1). The virtue reliabilist, as was said, has a convenient story for why True Temp’s ambient temperature beliefs aren’t knowledge, by virtue reliabilist lights. This is because the truth of the deliverances of the thermometer is not creditable to an intellectual virtue of Temp’s, but rather, to the thermometer. As Pritchard (2010) formulates the idea, cases like Temp fail a plausible virtue reliabilist’s condition on knowledge which he calls $COGA_{WEAK}$.

$COGA_{WEAK}$: If S knows that p , then S ’s true belief that p is the product of a reliable belief-forming process which is appropriately integrated within S ’s cognitive character such that her cognitive success is to a significant degree creditable to her cognitive agency (2010, 136-7).

However, suppose Temp were to come to learn about the thermometer that is causing his beliefs, and that he over time came to realise that it was in fact reliable. As Pritchard suggests, we should now have no problem suggesting that his cognitive successes would be to a significant degree creditable to his cognitive agency and thus that Temp can come to know the deliverances of the thermometer.

What this indicates is that, at least for extra-organismic artifacts that are not (like biological memory) innate, these plausibly cannot be appropriately integrated within an individual’s cognitive character by the lights of $COGA_{WEAK}$ *unless* (at least) the individual has some meta-belief about the artefact to the effect that it is reliable (as would be the case were Temp to form such a belief about his thermometer). Whereas, by contrast, it seems that in the case of *innate* biological mechanisms, we needn’t ever actually form much a meta-belief about their reliability in order to gain knowledge by trusting them. (It would be after all absurd to suppose that one must first believe that biological memory is reliable before one can come to acquire knowledge by retrieving information from memory).

Unfortunately, though, the situation is more complicated than we might initially expect. For, example, the simple suggestion that the endorsement or recognition of any extra-organismic artefact as reliable is necessary for the kind of cognitive integration demanded by $COGA_{WEAK}$ ends up looking too demanding, and in a way that reveals other dimensions which seem to matter importantly for cognitive integration. To appreciate this point, consider for example, Pritchard’s (2010) envisioned case of ‘Tempo’:

TEMPO: ‘Tempo’—is fitted from birth with a highly reliable device which records the ambient temperature and Tempo grows up in a culture where it is taken for granted that one consults one’s temperature-recording device in order to form beliefs about the ambient temperature. Interestingly, in a case like this it seems entirely unnecessary for Tempo to know that this is a reliable belief-forming process or what the source of the reliability is before he can gain knowledge via this process. For imagine that Tempo is a young child who has never even considered these questions. Wouldn’t we nonetheless straightforwardly regard him as gaining knowledge via this belief-forming process? Moreover, wouldn’t we regard Tempo’s cognitive success as being to a significant degree creditable to his cognitive agency? (2010, 146).

The case of Tempo seems to be one where Tempo can simply form beliefs via the thermometer while never pausing to consider that this particular extra-organismic artefact is reliable, even though it is not strictly innate (but rather, implanted at birth). Part of the reason here seems to do with Tempo’s membership in a social community where (unlike ours) this kind of implant-thermometer belief-forming process is the norm.

Pritchard runs a variation on this case which helpfully indicates yet another factor which seems highly relevant for the kind of cognitive integration that should matter by the lights of a weak virtue reliabilist condition such as $COGA_{WEAK}$. Consider now Tempo*:

TEMPO*: Consider [...] a variant of the Tempo case where the device was added at a later juncture. Perhaps, for instance, Tempo* comes out of a coma with this device fitted and is somehow psychologically manipulated so that he comes to trust the information from this device while continuing to non-culpably be unaware that this device has been artificially implanted in him. Can Tempo* gain knowledge by using the reliable belief-forming process that makes use of this device? To begin with at least, I take it that intuition is not on Tempo*’s side. Interestingly, however, as time goes on this intuition lessens. Imagine that Tempo* has had this device fitted for 10 years, say. Does he still not qualify as having knowledge in the relevant respects? Clearly, the matter is now less certain (2010, 148).

The case of Tempo* indicates that *time* also matters for cognitive integration of the sort that is apposite to $COGA_{WEAK}$. We have arrived at the somewhat unwieldy view that such disparate factors such as material constitution, innateness, endorsement/awareness of reliability, prevailing social norms and time can all have some bearing on whether a given extra-organismic artefact should be regarded as integrated into one’s cognitive character by the lights of a weak virtue reliabilist condition such as $COGA_{WEAK}$. The matter of how to understand the potentially complex

interplay between these integration-relevant factors, and whether there might be other such factors, is an important area for future research for virtue reliabilists²⁹, as well as virtue responsibilists, who welcome extended cognitive processes into their epistemologies.

4.4 THE AUTONOMY PROBLEM

Intellectual autonomy has long been identified as an intellectual virtue, one associated with figures such as Kant and with Enlightenment thinkers such as Hume. Intellectual autonomy involves, at its core, a disposition to intellectual self-regulation³⁰. What does self-regulation involve? As Roberts and Wood (2007: 259-60) note, it cannot mean that one never relies on the intellectual labor of another. Such an extremely self-reliant individual would manifest intellectual vice. Rather, the kind of self-regulation indicative of the virtuously intellectually autonomous individual plausibly requires relying on others to the appropriate extent (e.g., by being cautious and trusting in the right circumstances) while maintaining intellectual self-direction³¹.

I want to close by suggesting what I think are two interesting though subtly different ways in which embracing the extended cognition programme stands in *prima facie* tension with the ideal of intellectual autonomy. Firstly, it will be helpful to consider a thought experiment proposed recently by Michael Lynch (2016).

NEUROMEDIA: Imagine a society where smartphones are miniaturized and hooked directly into a person’s brain.” With a single mental command, those who have this technology—let’s call it neuromedia—can access information on any subject [...] Now imagine that an environmental disaster strikes our invented society after several generations have enjoyed the fruits of neuromedia. The electronic communication grid that allows neuromedia to function is destroyed. Suddenly no one can access the shared cloud of

²⁹ For example, as noted in §2, Palermos (2014b)—drawing on dynamical systems theory—suggests that the presence of ongoing feedback loops between the external artifacts and the agent’s organismic cognitive resources are both necessary and sufficient for cognitive integration. See also Carter, Kallestrup and Sprevak (ms.).

³⁰ As Roberts and Wood (2007: 259) note, the lexical origin of ‘autonomy’ is from the Greek words for “self” and “rule”.

³¹ As Zagzebski (2013) defines intellectual autonomy, it is the “right or ideal of self-direction in the acquisition and maintenance of beliefs” (2013, 259).

information by thought alone. [...] for the inhabitants of this society, losing neuromedia is an immensely unsettling experience; it's like a normally sighted person going blind. They have lost a way of accessing information on which they've come to rely [...] Just as overreliance on one sense can weaken the others, so overdependence on neuromedia might atrophy the ability to access information in other ways, ways that are less easy and require more creative effort.

Lynch's thought experiment is obviously not a direct argument for the incompatibility of extended cognition and intellectual autonomy. It is instead motivates an indirect argument, one which shows how becoming significantly beholden to our gadgets while allowing other ways of gaining information to atrophy, is to potentially risk losing the ability to exercise intellectual autonomy—viz., by rendering oneself epistemically helpless, or *heteronymous* as Roberts and Wood describe it, and unable to regulate their intellectual lives.

A second threat to intellectual autonomy arises when we examine the potential ramifications of a radical consequent of extended cognition in the form of cognitive *enhancement*, the use of the latest medicine and technology to not merely (as in the case of Otto) restore oneself to previous levels of cognitive functioning, but to gain an advantage over normal healthy levels of cognitive functioning³². Not all forms of cognitive enhancement involve extended cognition (consider, for example, the example of Tempo* in §4.3). However, unsurprisingly, integrating various kinds of gadgets into our cognitive architecture will (as Lynch's thought experiment indicates) lead us to remove many traditional kinds of cognitive obstacles.

However, as bioethicist John Harris has argued, cognitive enhancements which succeed in removing most or all barriers to cognitive failure—as we might imagine in a near-distant future in which cognitive enhancement is the norm, undermine an important kind of freedom relevant to intellectual autonomy, which is the freedom to *fail*. Drawing from Milton's *Paradise Lost*, Harris writes, in response to contemporary arguments in favour of cognitive enhancement, "Milton's insight is the crucial role of personal liberty and autonomy: that sufficiency to stand is

³² For a discussions of various technologies used in current forms of cognitive enhancement, see Sandberg and Bostrom (2006). Cf., Bostrom and Roache (2007), Bostrom and Savulescu (2009) and Savulescu et. al (2011).

worthless, literally morally bankrupt, without *freedom to fall*' Harris (2011, 110)³³. Though contemporary possibilities for extended cognition are nowhere near removing all obstacles (as is the case in Lynch's neuromedia thought experiment), Harris's worry becomes relevant when we consider how far extended cognition can be potentially taken, and whether extreme forms of removing cognitive obstacles can be reconciled with the kind of intellectual freedom that's needed to self-direct our intellectual lives³⁴.

³³ For some related arguments to the effect that human enhancement erodes the worth of human accomplishment, see Sandel (2012) and Kass (2004). Cf., Carter and Pritchard (ms) for a response to this line of objection.

³⁴ Thanks to Emma C. Gordon and Orestis Palermos for helpful feedback. [Add further acknowledgements]

References

- Aizawa, Kenneth. 2012. "Distinguishing Virtue Epistemology and Extended Cognition." *Philosophical Explorations* 15 (2): 91–106.
- Alfano, Mark. 2012. "Expanding the Situationist Challenge to Responsibilist Virtue Epistemology." *The Philosophical Quarterly* 62 (247). Wiley Online Library: 223–49.
- . 2013. *Character as Moral Fiction*. Cambridge University Press.
- . 2014. "Expanding the Situationist Challenge to Reliabilism About Inference." In *Virtue Epistemology Naturalized*, edited by Abrol Fairweather, 103–22. Springer.
- . 2016. "Friendship and the Structure of Trust." In *From Personality to Virtue*, edited by Alberto Masala and Jonathan Webber, 186–206. Oxford: Oxford University Press.
- Alfano, Mark, and Gus Skorb. Forthcoming. "The Embedded and Extended Character Hypothesis." In *Philosophy of the Social Mind*, edited by Julian Kilverstein. Routledge.
- Atkinson, R. C., and Shiffrin, R. M. 1968. "Human Memory: A Proposed System and its Control Processes." *The Psychology of Learning and Motivation: Advances in Research and Theory*, (ed.) K. W. Spence, 89–195, Academic Press, York.
- Axtell, Guy. 2000. "Introduction." In *Knowledge, Belief and Character: Readings in Contemporary Virtue Epistemology*, edited by Guy Axtell, xi–xxix. Rowman & Littlefield Publishers.
- Baehr, Jason. 2004. "Virtue Epistemology." *Internet Encyclopedia of Philosophy*.
- . 2011. *The Inquiring Mind*. Oxford: Oxford University Press.
- Battaly, Heather. 2015. *Virtue*. John Wiley; Sons.
- . 2016. "Extending Epistemic Virtue: Extended Cognition Meets Virtue-Responsibilism." In *Extended Epistemology*, edited by J. Adam Carter, Andy Clark, Jesper Kallestrup, Orestis Palermos, and Duncan Pritchard. Oxford: Oxford University Press.
- Beer, Randall D. 1995. "A Dynamical Systems Perspective on Agent-Environment Interaction." *Artificial intelligence* 72(1): 173–215.
- BonJour, Laurence. 1980. "Externalist Theories of Knowledge." *Midwest Studies in Philosophy* 5: 53–73.
- Bostrom, Nick and Rebecca Roache (2007). 'Human Enhancement: Ethical Issues in Human Enhancement', *New Waves in Applied Ethics*, (eds.) J. Ryberg, T. Petersen, & C. Wolf, London: Palgrave Macmillan.
- Bostrom, Nick and Julian Savulescu. 2009. "Human Enhancement Ethics: The State of the Debate." *Human Enhancement*, (eds.) N. Bostrom & J. Savulescu, 1–22, Oxford: Oxford University Press.
- Bradford, Gwen. 2013. "The Value of Achievements." *Pacific Philosophical Quarterly*, 94 (2), 204–224.
- . 2015 *Achievement*, Oxford: Oxford University Press.

- Carter, J. Adam. 2016. "Robust Virtue Epistemology as Anti-Luck Epistemology: A New Solution." *Pacific Philosophical Quarterly* 97 (1): 140–55.
- Carter, J. Adam, and Emma C. Gordon. 2014. "Openmindedness and Truth." *Canadian Journal of Philosophy* 44 (2): 207–24.
- Carter, J. Adam, Jesper Kallestrup, Orestis Palermos and Duncan Pritchard. 2014. "Varieties of Externalism." *Philosophical Issues* 24 (1): 63-109.
- Carter, J. Adam, and Orestis Palermos. 2015. "Active Externalism and Epistemology." *Oxford Bibliographies*. doi:[10.1093/OBO/9780195396577-0285](https://doi.org/10.1093/OBO/9780195396577-0285).
- Carter, J. Adam, and Duncan Pritchard. Forthcoming. "Extended Entitlement." *New Essays on Entitlement*, (eds.) P. Graham & N. Pedersen. Oxford: Oxford University Press.
- . 2016. "The Epistemology of Cognitive Enhancement" (ms).
- Clark, Andy. 2008. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*: Oxford University Press.
- Clark, Andy, and David Chalmers. 1998. "The Extended Mind." *Analysis*. 7–19.
- Code, Lorraine. 1987. *Epistemic Responsibility*. Hanover, NH: University Press of New England.
- Doris, John Michael. 2002. *Lack of Character: Personality and Moral Behavior*. Cambridge University Press.
- Ebbinghaus, Hermann. 1885. *Über das Gedächtnis [Memory: A Contribution to Experimental Psychology]*. Translated by Henry A. Ruger & Clara E. Bussenius (1913). New York: Teachers College, Columbia University.
- Fricke, Eizabeth. 2006. "Testimony and Epistemic Authority." in *The Epistemology of Testimony*. edited by Jennifer Lackey and Ernest Sosa. N.Y.: Oxford University Press.
- Goldman, Alvin. 2011. "Reliabilism." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta, Spring 2011. <http://plato.stanford.edu/archives/spr2011/entries/reliabilism/>.
- Greco, John. 2002. "Virtues in Epistemology." In *Oxford Handbook of Epistemology*, edited by Paul Moser. New York: Oxford University Press.
- . 2010. *Achieving Knowledge: A Virtue-Theoretic Account of Epistemic Normativity*. Cambridge University Press.
- . 2012. "A Different Virtue Epistemology." *Philosophy and Phenomenological Research* 85 (1): 1–26.
- Greco, John, and John Turri. 2015. "Virtue Epistemology." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta, Fall 2015. <http://plato.stanford.edu/archives/fall2015/entries/epistemology-virtue/>.
- Haddock, Adrian, Alan Millar, and Duncan Pritchard. 2010. *The Nature and Value of Knowledge: Three Investigations*. Oxford University Press.
- Harris, John. 2011. "Moral Enhancement and Freedom." *Bioethics* 25, 102–11.
- Harman, Gilbert. 2000. "The Nonexistence of Character Traits." In *Proceedings of the Aristotelian Society*, 100:223–26. 1. Wiley Online Library.
- Jarvis, Benjamin. 2015. "Epistemology and Radically Extended Cognition." *Episteme* 12 (4): 459–78.

- Kallestrup, Jesper, and Duncan Pritchard. 2012. "Robust Virtue Epistemology and Epistemic Anti-Individualism." *Pacific Philosophical Quarterly* 93 (1): 84–103.
- . 2013a. "Robust Virtue Epistemology and Epistemic Dependence." In *Knowledge, Virtue, and Action: Essays on Putting Epistemic Virtues to Work*, edited by Tim Henning and David P Schweikard. London: Routledge.
- . 2013b. "The Power, and Limitations, of Virtue Epistemology." In *Powers and Capacities in Philosophy: The New Aristotelianism*, edited by John Greco and Ruth Groff, 248–69. London: Routledge.
- Kelp. 2013. "Knowledge: The Safe-Apt View." *Australasian Journal of Philosophy* 91 (2): 265–78.
- . 2014. "Extended Cognition and Robust Virtue Epistemology: Response to Vaesen." *Erkenntnis* 79 (3): 729–732.
- Lackey, Jennifer. 2007. "Why We Don't Deserve Credit for Everything We Know." *Synthese* 158 (3): 345–61.
- Lehrer, Keith. 1990. *Theory of Knowledge*. Routledge.
- Lynch, Michael P. 2016. *The Internet of Us: Knowledge More and Understanding Less in the Age of Big Data*. W.W. Norton.
- Menary, Richard. 2007. *Cognitive Integration: Mind and Cognition Unbounded*. Palgrave Macmillan.
- Montmarquet, James. 1993. *Epistemic Virtue and Doxastic Responsibility*. Rowman & Littlefield Publishers.
- Navarro, Jesús. 2015. "No achievement beyond intention." *Synthese* 192(10): 2015. 3339-3369.
- Palermos, S. Orestis. 2014a. "Loops, Constitution, and Cognitive Extension." *Cognitive Systems Research* 27. Elsevier: 25–41.
- . 2014b. "Knowledge and Cognitive Integration." *Synthese* 191 (8). Springer: 1931–51.
- . 2015. "Active Externalism, Virtue Reliabilism and Scientific Knowledge." *Synthese* 192(9): 2955-2986.
- . Forthcoming. "Spreading the Credit: Virtue Reliabilism and Weak Anti-Individualism." *Erkenntnis*. doi: 10.1007/s10670-015-9741-2
- Pritchard, Duncan. 2009. "Knowledge, Understanding and Epistemic Value." *Royal Institute of Philosophy Supplement* 64: 19–43.
- . 2010. "Cognitive Ability and the Extended Cognition Thesis." *Synthese* 175 (1). Springer: 133–51.
- . 2012. "Anti-Luck Virtue Epistemology." *Journal of Philosophy* 109 (3): 247–79.
- Pritchard, Duncan, and John Turri. 2014. "The Value of Knowledge." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta.
- Riggs, Wayne. 2010. "Open-Mindedness." *Metaphilosophy* 41 (1-2): 172–88.
- Sandel, Michael. (2012). "The Case Against Perfection: What's Wrong with Designer Children, Bionic Athletes, and Genetic Engineering?" *Arguing About Bioethics*, (ed.) S. Holland, London: Routledge

- Sandberg, Anders and Nick Bostrom (2006). ‘Cognitive Enhancement: A Review of Technology’ (ms).
- Savulescu, J., ter Meulen, R., & Kahane, G. (eds.) (2011). *Enhancing Human Capacities*, New York: Wiley-Blackwell.
- Sosa, Ernest. 1980. “The Raft and the Pyramid: Coherence Versus Foundations in the Theory of Knowledge.” *Midwest Studies in Philosophy* 5: 3–25.
- . 2009. *A Virtue Epistemology: Apt Belief and Reflective Knowledge, Volume I*. Oxford University Press.
- . 2015. *Judgment and Agency*. Oxford: Oxford University Press.
- Turri, John. 2011. “Manifest Failure: The Gettier Problem Solved.” *Philosopher’s Imprint* 11 (8): 1–11.
- Vaesen, Krist. 2011. “Knowledge Without Credit, Exhibit 4: Extended Cognition.” *Synthese* 181(3): 515-529.
- Zagzebski, Linda Trinkaus. 1996. *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical Foundations of Knowledge*. Cambridge University Press.
- . 2013. “Intellectual Autonomy.” *Philosophical Issues* 23: 244–261.