ORIGINAL RESEARCH

Baby Logic – a Hinge Epistemology

Jakob Ohlhorst[1] (ORCID)

Abstract

Epistemologists have begun paying attention to the phenomenon of *core cognition* from developmental psychology. Core cognition posits innate automatic cognitive modules that enable children to quickly grasp and learn certain concepts. A key element of core cognition is sometimes named *core knowledge* because it encodes the constraints, parameters, and concepts that are required for core cognition modules to function. Until now, no successful epistemological account of it has been presented, and it is difficult to integrate into standard accounts of epistemology given that it is only implicitly believed, not accessible to explicit cognitive processing, and innate. In this paper I propose an account of the epistemology of core cognition, focussing on the epistemic status of this core knowledge. I argue that, rather than being knowledge, or some ordinary justified belief, it consists of Wittgensteinian *hinge certainties*. These are the implicit presupposition that we need for our epistemology to function. I illustrate the argument with the core cognition of causality. Finally, I propose that even though core knowledge consists of unjustified hinges, we are epistemically entitled to trust them to be accurate.

Keywords Core cognition · Hinge epistemology · Developmental psychology · Entitlement

1 Introduction

One-year-old Leyla sees a big ball rolling toward a toy brick tower. The ball hits the tower. The tower collapses. Leyla understands that the ball caused the tower to collapse. That is, she conceives of the event as causal.

✉ Jakob Ohlhorst
j.ohlhorst@proton.me

1 Department of Philosophy, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

🖄 Springer

Traditional empiricists might argue that Leyla is much too young and that she cannot possibly have acquired enough experience to grasp the concept of causality or causal events as such because she needs to build these complex concepts from the ground up. Meanwhile, an influential approach in developmental psychology, defended especially by Carey (2009), Katherine Kinzler & Elizabeth Spelke (2007), and most recently Spelke (2022), argues that children like Leyla can draw on innate "*core knowledge*" that helps them to come to grips with their environment. Children possess *core cognition modules* that among others allow them to identify objects and predict how these will behave – for instance, an object that is hit by another object, say a ball, will start moving (or topple over).[1]

Core cognition and related phenomena have recently begun to gain attention from epistemologists. (Jenkin, 2020; Greco, 2021) In particular, Jenkin (2020) argues that our core cognition justifies the core cognitive perceptual beliefs that it delivers because it is based on our "core cognitive constraints" – what I called "core knowledge" above – as reasons. However, this leaves a theoretical gap: what is the epistemic status of these core cognitive constraints, this "core knowledge"? How can they serve as reasons in our core cognition?

Innate "core knowledge" plays a strange epistemological role, and there is no straightforward way how to integrate it into standard epistemology because it does not behave like the ordinary beliefs with which epistemologists usually deal. In this paper, I will answer the question what exactly the epistemic status and role of "core knowledge" is. Namely, I will argue that this innate "core knowledge" does not consist of knowledge in the standard epistemological sense, but of Wittgensteinian (1969) *hinge certainties*.

For this purpose, I will first introduce the basics of core cognition. Second, I examine its epistemology. Taking Jenkin's (2020) argument that core knowledge serves as reasons that justify the beliefs produced by our core cognition as a starting point, I argue that core knowledge consists of Wittgensteinian hinge certainties. Third, I show why core knowledge cannot be ordinary knowledge or some other garden variety epistemic status instead, and I deal with objections against the concept of core hinges. Finally, I will offer a suggestion how core knowledge may nevertheless be epistemically warranted. Namely, we may be entitled to rely on it.

2 Core Cognition

Cognition of mechanical causality, as it is illustrated in our example with Leyla gives us a nice illustration of core cognition in general. This originates from Michotte's (1963) early studies in the perception of causation. He observed that adults will generally perceive any two objects of similar size moving relatively to each other accord-

---

[1] Other empiricists argue that such knowledge can be acquired through constrained constructive learning. (Cohen et al., 2002); Carey, 2009, pp. 242–243) also considers constructive learning to be an element of core cognition, with the *caveat* that constructionist models alone cannot account for causality's modal profile and pointing out the large number of generations required for successful concept acquisition. This paper aims to explain the epistemology of core cognition; I therefore do not consider these empiricist alternatives.

ing to a particular set of parameters as a causal event – one object will be perceived to have caused the other to move. These parameters are roughly that the first object must move towards the second, enter into contact with it, and change its speed or stop entirely; the second object must start moving in the moment the first loses speed (*see* Fig. 1). In the meanwhile, these objects can be of *any* category, billiard balls, shapes on a screen, even non-objects like shadows. This is an automatic cognitive process that simply delivers its cognitive output.

Taking Michotte's work as a starting point, Leslie and Keeble (1987) expanded the project of investigating a core module for causal cognition from adults to the capacities of children. They showed Michottian launching scenarios as well as analogous events that did not satisfy the parameters for causality to six-month-old children. First, infants were either habituated to a Michottian launching event or a control scene that did not satisfy the parameters – that means they were shown the event until they lost interest. Next, the infants were shown the very same scene but in reverse.

While the non-causal control event was hypothesised to not be novel and to not dishabituate the infants because it simply represented objects moving in different directions than before, the reverted event satisfying Michottian criteria was hypothesised to be newly interesting because the objects' *causal role* was inverted – the object that originally did the pushing was now being pushed – therefore leading to dishabituation and the children gaining new interest. This hypothesis was confirmed, and Leslie and Keeble took this as evidence for the claim that already six-month olds were able to ascribe causality to events and causal roles to objects.

This claim is reinforced by the widely replicated result that in Michottian launching scenarios that are partially hidden by a screen, children expect the objects to actually make contact. That is, if they first see what looks like a partially hidden Michottian launching event where contact would be expected to occur behind a screen, then they are surprised if the objects do not actually make contact when the screen is lifted and the scene is repeated. (Carey, 2009, pp. 225–226)

We can distinguish four elements that constitute core cognition (*see* Fig. 2). The first is the representational input; in the case of causal cognition this is plausibly visual information that has already been interpreted spatially and differentiated into objects and background by other core cognition modules. The second element is the cognitive module that processes this input. Carey (2009) calls this module the "dedicated input analyser". In the case of Michottian launching this is the set of specialised processes that interpret visual information to extract a causal interpretation. Third, there is the conceptually enriched representational output. In the case of mechanical causal cognition this would be the representational input to which (conceptual) causal relations are added: *this object has caused that object to move*. The fourth element is more abstract than the other three; it consists of the constraints, parameters, and rules according to which the dedicated input analyser processes the input to deliver an
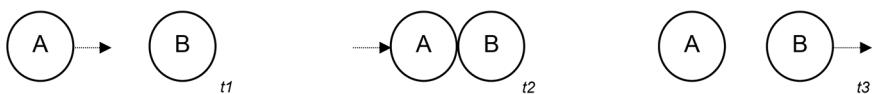

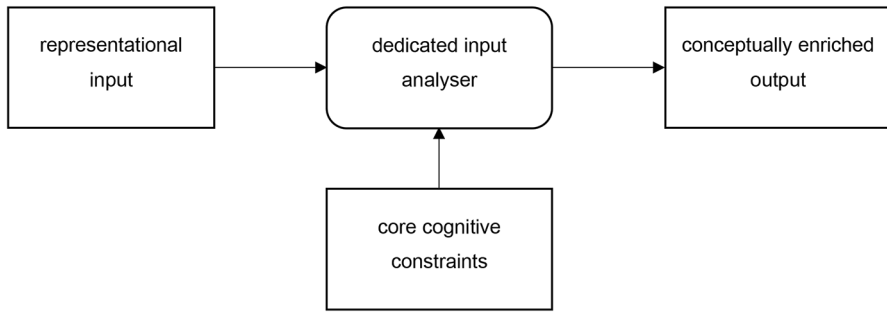**Fig. 1** The Michottian launching paradigm (Michotte, 1963)

Fig. 2 Core cognition

output. Spelke and Kinzler (2022, 2007) call this element our *core knowledge* while Carey (2009) calls them our *core cognitive constraints.* In the case of causal cognition, this consists of the conditions that an event needs to satisfy and of the concept of causation that is ascribed to these events (*see* Fig. 2).

According to Carey (2009, pp. 67–68) and Spelke (2022, pp. xix–xxi), the characteristics of core cognition are: it is grounded in cognitive modules which are innate but operative into adulthood. These modules have a long evolutionary history, and consequently we share them with other animals. Additionally, they are insulated both from explicit central cognitive processing and other sub-personal cognitive processes. Nevertheless, core cognition operates with rich conceptual content and plays an inferential role; that is, it influences further beliefs and behaviour.

Spelke and Kinzler (2007) argue that there are only four to five core cognition systems: object cognition, cognition of agency, number cognition, spatial interpretation, and maybe social cognition. Spelke (2022) extends this also to language and forms. I tend towards a more fine-grained model of our core cognition modules because it seems that we can examine the functioning of more particular submodules like mechanical causation in isolation. These distinct submodules may very well be integrated into broader systems of core cognition as Spelke defends them. So, what epistemological role does core cognition play?

3 The Epistemology of core Cognition

Jenkin (2020) has examined the role of core cognition for epistemology. She focuses on the epistemic status of the output core cognitive representations – in our example that would be the perception that the ball *caused* the tower to topple. She opposes the dogmatist thesis that such core cognitive representations are immediately defeasibly justified in virtue of their being perceptions. (Pryor, 2000) Instead, she argues that core cognitive representations are justified by a combination of *reasons* – first, the perceptual input and, second, the core cognitive constraints which are encoded in the dedicated input analysers. Leyla's representation that the ball caused the tower to topple is then justified by her visual experience, of seeing the ball approach the tower and the tower falling on contact, in combination with the Michottian causal core cog-

nition constraints, including the rule that an event satisfying these constraints means that the event was causal. This means that not only the raw experiential data play a justificatory role in core cognitive perception but also our core cognitive constraints.

Jenkin focuses on the epistemic status of the core cognitive output representations. In contrast, I am interested in the epistemic status and role of the core cognitive constraints. Jenkin (2020) shows that it can function as a kind of reason. The question is then whether they are the same kind of reason as the representational data that serve as the input for our core cognition modules. Clearly, they are different. The perceptual data function as evidential reasons that can vary and favour different interpretations. Meanwhile, core cognitive constraints formulate fixed rules which enable the interpretation of the perceptual data.

To make an analogy, the core cognitive constraints are like the fixed logical axioms of classical logic and inference rules of a proof, while the representational input is more like the variable premises. Core cognition is the innate logic that we rely on as babies. It is our baby logic.[2]

Further, these core cognitive constraints are innate and implicit or sub-personal. What would play this role of innate implicit rules and axioms in our epistemology? Not the ordinary stock of beliefs, knowledge and evidence in which epistemology usually trades.[3] Nevertheless, the horse has bolted; we cannot deny that there are core cognitive constraints governing our core cognition.

Hinge epistemology has argued that implicit rules play a key role for our epistemology as the presuppositions of our cognitive activity. Hinge epistemology arose from Ludwig Wittgenstein's (1969) response to scepticism in *On Certainty*. Wittgenstein observed, that while, *pace* Moore (1939), we do not know the antisceptical claims like "there are other minds" or "there is an external world", we are nevertheless certain of them. Further, these certainties play a fundamental enabling role for cognitive activity. Even the cognitive activity of doubting something requires these presuppositions; doubting them undermines your ability to meaningfully doubt anything. Given this presupposition role, these propositions are like hinges that must stay put "if I want the door to turn". (Wittgenstein, 1969, § 343)

Hinge certainties are more than just a response to scepticism; but they become apparent when we think about sceptical scenarios. What exactly hinges are, whether they can be true or believed, is hotly debated in hinge epistemology. (Coliva & Moyal-Sharrock, 2016) On my favoured view (Ohlhorst, 2023), they are the propositions and rules that are presupposed implicitly given our belief set and our ways of

---

[2] This takes a classical view of logical axioms as standing fast. However, on a more Quinean view that fits with Wittgenstein's remark about "another arithmetic" (Wittgenstein, 1969, § 375), these axioms can be revised or change. Our baby logic cannot be revised like we can revise logical axioms by (reasoned) *fiat* because it is innate and hardwired. Nevertheless, our baby logic's innate axioms can shift very slowly through evolutionary processes. If humans began living in an environment where probabilistic causation relations were much more frequent than deterministic ones, we might acquire a new core cognition module in the course of millennia. This module could replace our current causal core cognition, thereby introducing a changed axiom about "causality". Additionally, these core cognition modules' outputs can be overridden or limited by other modules acquired through training. For example, illusions like the Muller-Lyer lines that appear different in length do not produce the correspondent belief if the illusion is known. I would like to thank an anonymous referee for raising this issue.

[3] See more below.

updating it and acting in general. We do not need to explicitly believe them, we do not even need to *ever have thought* about them. But, if we rejected a hinge proposition, this would be in contradiction with our belief set or the ways in which we change our beliefs. (*see also* Coliva, 2015) In that way, we are rationally committed to our hinges and would not even think of rejecting them.

Moyal-Sharrock (2004) has proposed a reading of *On Certainty* that aligns perfectly with the suggestion that core cognitive constraints or core knowledge consist of hinges. Notably, she has argued that one type of hinges that Wittgenstein talks about are *animal certainties*: they can be innate, they are not believed, and they are anchored in our being an animal or living organism. Additionally, explicit beliefs whose content is the same to some hinges' content cannot be identified with these hinge certainties. (Moyal-Sharrock, 2004, p. 8)[4]

One example for an animal certainty is the hinge "I have a body" – we usually do not hold this belief explicitly or even consider it, many may never have considered it. Instead, we implicitly presuppose it in the course of being an embodied agent. Core cognitive constraints are such animal certainties. They are not believed, but rather they represent the rules according to which we change our beliefs. They are part of our animal nature, and we do share some of them with other species. Finally, an explicit belief cannot be identified with the core cognitive constraint of the same content, given that a change in explicit beliefs does not influence your core cognitive constraints in the least. (Moyal-Sharrock, 2004, p. 8)

In that case, core cognitive constraints are innate hinge certainties that are implicitly presupposed to enable our cognition of causality, objects, number, agency, and others. Many people never have thought about the rules enabling their causal reasoning, but they nevertheless are committed to their core cognitive constraints. Rather than being evidential reasons that justify our core cognitive representations, core cognitive constraints are the implicit presuppositions that we need to justifiedly acquire core cognitive output representations like "the ball caused the tower to fall over". These core hinges constitute the axioms of our baby logic.

I defined hinges through their semantic and pre-evidential role. Core cognitive constraints are not defined by the same role. Instead, they play a functionally analogous role in the cognitive processing of information – core cognitive constraints determine and limit how cognitive inputs are processed. Consequently, there could be core cognitive constraints that are not hinges because they fail to play this systematic determinative role.

For example, if we have a vestigial core cognition module whose output is systematically overridden or not represented, then its core cognitive constraints would not be hinges. Meanwhile, core cognition modules that only function in highly specific contexts, say with high adrenaline levels, can nevertheless encode core hinges for these particular contexts. In these contexts, the rule functions as an unquestioned and arational hinge, but outside of these (high adrenaline) contexts it would not stand

---

[4] Moyal-Sharrock and I disagree about the semantic status of hinges. While she considers them to be pre-semantic and not truth-apt; I am happy to consider hinges to be semantically evaluable. They can be true or false, but their falsehood has devastating epistemic consequences for the person committed to them, because it means that a considerable part of their belief system is false.

up to scrutiny. For hinge epistemologists, this may be a peculiar suggestion because usually hinges are conceived of as quite static and only changing slowly – like a river bed. (Wittgenstein, 1969, § 96–99)[5]

Sudden shifts in hinges are arguably possible, e.g. in sudden religious conversions. My principal criterion about changing hinges is that shifts must be arational, which is satisfied here. Shifts in hinges are arational because hinges determine what counts or does not count as a reason for you – as a consequence there can be no subjective reasons speaking against your hinges. To stay with the example of a religious conversion: Somebody with atheistic hinges will not accept any reasons speaking for the existence of a deity, miracles, for example, are simply deemed impossible. Thus accepting hinges about the existence of a deity has to happen arationally, without any reasons speaking for it. Still, some may consider such context-specific hinges to only be context-specific quasi-hinges.

The core cognition of causality that I introduced as an example integrates perfectly with this hinge epistemological account. Hume (2004) famously developed a sceptical argument against the knowability of causality. That is, the rules underlying the concept of causality are undermined by sceptical arguments. Consequently, we can appeal to our core hinge certainties that we presuppose in the case of causality to sidestep the sceptic's argument. If we are to have beliefs about the world in any meaningful sense, then we must presuppose that it is structured causally. In a way, this is a Neo-Kantian, psychologising, response to Hume's challenge.

4 Objections and Alternatives

Objections against this proposal arise from two sides. The first side is proposing alternative epistemological accounts of core cognition, and the second side is criticising the hinge epistemological *bona fides* of core cognitive constraints.

4.1 Epistemological Alternatives

Note that Spelke and Kinzler (2007) call our core cognitive constraints core *knowledge*. So maybe core cognition is based on innate knowledge rather than hinges? Knowledge in the epistemological sense is *factive*. That is, a state's being knowledge entails its content being true. (Williamson, 2001) Core "knowledge" however is hardly factive, it consists of approximative rules (Carey, 2009, pp. 10–11). In our core cognition of causality, we even classify shadows or dots on a screen as causing each other to move. Similarly, our object cognition can also classify non-objects like dots of light, rainbows, or clouds as objects as long as they don't violate the constraints imposed by object core cognition. Finally, children appear to classify anything with eyes as a potential agent (Carey, 2009, p. 187; Spelke, 2022, p. 249). But if these core cognitive constraints track the world so inaccurately then they are not knowledge in the epistemologist's sense.

---

[5] Thanks to [CR] for his helpful suggestions.

An alternative, slightly weaker, argument against calling core hinges core knowledge is to make the point that these constraints are not based on any reasons and simply presupposed. Spelke (2022) in her latest work does not describe core "knowledge" as knowledge in epistemological terms, e.g. as justified true belief, but rather as the foundations on which our ordinary knowledge is built.

Alternatively, you might go the empiricist route and argue that core cognitive constraints do not encode rules about external facts but rather rules about seemings or appearances.[6] Our core knowledge would consist of rules of the form: *if an event satisfies criteria i,..., n then the event* appears *causal*. Which we could know – in opposition to the false rule: *if an event satisfies criteria i, ..., n then the event* is *causal*. In the former case, we would need an additional hinge rule to take us from appearance to fact.

While I cannot strictly exclude this alternative, I do not see any psychological reason for why our cognitive system should have any such epistemological scruples. Our (core) cognitive outputs seem to be directly about the external objects, and not about seemings that we then approve or reject. I contend that subjects describe Michottian launching as a causal event and not one that *seems* causal. Additionally, such appearance core knowledge would be even stranger: what would it be knowledge about? How would it be an accurate rule? In other words, would rules about appearances not simply be vacuously accurate?

We might still insist that, although these core cognitive constraints are not knowledge, they still serve as reasons according to Jenkin (2020). If they are to successfully function as reasons, then they must themselves be in some good epistemic standing. So, are the core cognitive constraints epistemically justified somehow? I will consider the two principal candidates for the justification of our core cognitive constraints: the first is evidential justification, the second is reliabilist justification.

I think that we all can agree that six-month-old infants do not yet have enough evidence for their core cognitive constraints to be evidentially justified. If the corresponding modules and concepts are innate, then they arguably will also lack evidential justification.

We could consider the option that with age we do gather the evidence required to justify the cognitive constraints. We *bootstrap* the justification for them.[7] (Vogel, 2000) As I argue elsewhere (Ohlhorst, 2023), this bootstrapping is viciously circular and therefore unable to furnish evidence for what it presupposes. Consider our example with the core cognitive constraints encoding mechanical causality. If I bootstrapped the evidential justification for there being mechanical causality, I would be using my innate core hinge certainty that there is causality to evidentially justify the belief that there is causality. But this is circular evidence, and therefore it fails to justify.

Are core cognitive constraints reliabilistically justified instead? That is, is there a reliable cognitive process that produces our core cognitive constraints? (Goldman, 1979) If my model of core cognition is accurate, then core cognitive constraints

---

[6] I would like to thank an anonymous referee for raising this possibility.

[7] Note that this is a different kind of bootstrapping than the one that Carey (2009) talks about. One is the bootstrapping of epistemic justification, the other is the bootstrapping of concept possession.

themselves are not the product of a reliable cognitive process; they govern other cognitive processes. If they are not the product of a reliable process, they cannot be reliabilistically justified.

We might broaden the notion of a reliable process and consider the evolutionary history of our core cognition as a process that reliably brought about many accurate core cognitive constraints. Core cognitive constraints would then not be cognitively reliabilistically justified, but evolutionarily reliabilistically justified.

First, I want to note how revisionary this notion of a true-belief-producing process is. Reliabilism might lose quite some sympathisers if it went down this evolutionary road. Second, I am doubtful that evolutionary history aims for accuracy, and, consequently, that it is reliable at all. (Churchland, 1987) Many core cognition modules from evolutionary history clearly do not have the goal of accuracy but rather insuring survival – generating false positives is often evolutionarily preferrable to generating false negatives even at the expense of true negatives. Just as core cognition is not guided by core *knowledge*, it is not epistemically reliably produced.

Might we instead simply justify core cognitive constraints through a different reliable method? Namely, could we apply the track-record argument with which we tried to bootstrap evidence for our core cognitive constraints, but use it to reliably establish their accuracy? Again, this would only grant reliabilist justification to sophisticated adults, barring it from children and animals who cannot formulate track-record arguments. This looks a lot like Sosa's (2015) two-levels account where we may have reflective justification but no animal justification. This is an unappealing solution if *animal* hinge certainties lack animal justification.

Additionally, as Sosa (2021) has noted more recently, reflective knowledge is vulnerable to sceptical arguments about the background conditions of our epistemic competences, thereby even threatening our reflective justification. Sosa argues that we can blamelessly *assume* hinge propositions about the background conditions of our epistemic competences to gain reflective justification, notwithstanding sceptical arguments about these background conditions. (Sosa, 2021, p. 127) These hinges are however not part of our core cognition which is not about our own competences.

4.2 Hinge Epistemological Worries

My proposal is far from Wittgensteinian orthodoxy. Standard accounts of hinges consider them to be essentially *culturally and socially* shared instead of innate. (Coliva, 2023, p. 148) They are the background world-view that we implicitly acquire when being taught particular facts about the world by our linguistic community. (Wittgenstein, 1969, § 143) Consequently, my proposal about innate hinges is a departure from Wittgenstein's and most hinge epistemologists' views.

I am in no way committed to Wittgensteinian orthodoxy. Epistemology and cognitive psychology have evolved considerably since Wittgenstein died in 1951; this needs to be taken into account. Most notably, Wittgenstein only was aware of behaviourist psychology, and the cognitive turn was only just beginning. Meanwhile, epistemology was mostly focussed on sense-datum theory and positivist empiricism. Consequently, Wittgenstein could not take the role of core cognition into account.

The functional parallels between core cognitive constraints and hinge certainties warrant the expansion of hinges to include innate core cognitive constraints. Additionally, there are other hinge epistemologists who have contended with the possibility of innate hinges, especially Moyal-Sharrock (2004) and Greco (2021).

Many hinge epistemologists argue that hinges must be socially shared in order for them to function as such. I disagree. Many epistemologically interesting phenomena can be explained by considering individualist hinges, for example delusions can be modelled as individualist hinges (Campbell, 2001) and religious disagreement explained by a divergence in hinges (Ranalli, 2020). Note that some of these individualist hinges – e.g. *my name is NN* (Wittgenstein, 1969, § 660) – do have shared generalised counterpart hinges like *everyone knows their name*. Shared hinges explain successful coordination and communication. Core hinges are, given their biological basis, (almost) universally shared, but not through cultural or social pathways. This means that they give us an innate cognitive common ground, independently of our linguistic practices, which we wouldn't have without core hinges. As mentioned, this goes against the grain of Wittgenstein's own account.

A more challenging worry is that hinge certainties cannot be false for the subject because they are the foundation on which their world-view is constructed. (Wittgenstein, 1969, § 660–676) I have been quite explicit in admitting that our core cognitive constraints are sometimes inaccurate, and we can know them to be so. This is after all the reason why they do not consist of core *knowledge*. Thus, core cognitive constraints' possibility of being inaccurate is seemingly incompatible with their being hinges.

In response, I want to note that, even if we take some proposition that corresponds to our core cognitive constraints to be inaccurate, we still cannot shed the core cognitive constraint. As Carey (2009) argues, our core constraints remain operative in cognition throughout our life and are insulated from our explicit knowledge; in that sense, they are *certainties*. Even if you are a Humean sceptic or a quantum physicist who rejects causality as unknowable or incoherent, you will be unable to stop making causal judgments in your everyday life (Spelke, 2022, pp. 193–194). You are still implicitly committed to your hinge certainty that there is causality – a point that both Hume (2004) and Reid (2012) already noted. Hence, core hinges can remain operative in your epistemic household, even if you recognise them to be false.[8]

Finally, Greco (2021) has recently drawn on hinge epistemology and the concept of *procedural knowledge* to explain what he calls "common knowledge". Common knowledge is the shared background world-view that we all have in common. It is the basis for the production and transmission of ordinary knowledge and it consists of hinges. (Greco, 2021, p. 103). He argues that we possess our common knowledge as *procedural knowledge* which in its broadest sense is characterised as the knowledge that we manifest in the exercise of some task or activity. The concept "procedural knowledge" originates from cognitive science, and core cognition is frequently used as an example for procedural knowledge. In the meanwhile, core cognition constitutes

---

[8] To be more precise, what I think happens here is, that our explicit beliefs limit the domain of our core cognitive constraints. While, at the outset, core hinges apply without constraint to all objects satisfying their parameters, in sophisticated cognisers the core hinge's domain is limited.

only a subset of our total procedural knowledge – the knowledge manifested when riding a bike or reading this paper clearly isn't innate. Consequently, our respective theses have different targets.

Is my account then simply a special case of Greco's theory? One important point where we disagree is that Greco is serious about the "knowledge" part – he argues that our hinges are indeed common and procedural *knowledge*. As argued already, I do not think that our core hinges – or our hinges in general — are factive or justified. Greco is consequently wrong on the knowledge-part which plays a key role for his account. Both Coliva (2023) and Pritchard (2022) agree in their discussions of Greco's work that we have this common knowledge as knowledge, but they also contest its epistemic status as consisting of hinges that do not require any verification. They both differentiate this common knowledge from hinges that are "visceral" (Pritchard, 2022) or "hinges+" (Coliva, 2023) which are presupposed in cognitive activity. It seems that innate core cognition would be an exemplary case of "visceral" commitment.

Otherwise, I broadly sympathise with Greco's proposal; the idea that hinges are procedural "knowledge" is very interesting and offers a natural expansion of my account of baby logic. However, I want to flag that the procedures and activities in which hinges are manifested through procedural knowledge would be extremely broad. Basically *anything* that agents do in the broadest sense, from dreaming, doubting, and thinking to kissing, building a sand castle, and riding a bicycle are procedures which can manifest implicit hinges. Note how abstract this conception of agency is. Still, it gels nicely with Wittgenstein's own quasi-pragmatist tendencies. (Wittgenstein, 1969, § 422)

Coliva criticises Greco's proposal that some hinges are innate – first nature – procedural knowledge, i.e. core hinges, as going against the grain of Wittgenstein's anti-psychologistic philosophical project of anchoring our concepts in social practices. Procedural knowledge, according to Coliva, also cannot consist of hinges that are culturally acquired as our second nature because it still would be a kind of knowledge for Greco. (Coliva, 2023, pp. 148–149)

If we do not follow Greco concerning procedural knowledge's status as *knowledge*, just as we did not follow Spelke (2022) concerning "core knowledge" – both concepts of "knowledge" were not coined with regards to epistemological sensitivities after all – then at least some procedural "knowledge" may consist of hinges. This is an option that Coliva grants for culturally acquired procedural knowledge.

Regarding Coliva's Wittgensteinian critique of innate hinges, we can reiterate that Wittgenstein wasn't aware of the phenomenon of core cognition and the research surrounding it that shows how deeply anchored it is. (Carey, 2009; Spelke, 2022) Hence our proposed departure from Wittgenstein's position is warranted by the state of psychological research.

4.3 Some Epistemic Warrant?

Let us take stock. Our core cognitive constraints are arational hinge certainties to which we are committed because otherwise we would be unable to believe or act in any way. Given their evolutionary history, these core hinges also would be globally

shared among cognitively normal human subjects.[9] This may be a happy situation to hard-boiled hinge epistemologists who do not think that hinges are epistemic at all. But epistemologists in general who are interested in core cognition may find it an unhappy situation to think that we have arational innate hinge certainties that lack both evidential and reliabilist justification.

Do they have to content themselves with this sad state of affairs? No they do not. While I am pessimistic about the prospects to *justify* our core hinges through evidence or reliability, Wright (2004, 2014) has proposed that we may be *entitled to trust* our hinge certainties to be accurate. By entitlement, he does not mean that there is ordinary justification, but rather a broader epistemic warrant. The basic argument for entitlement is that we are epistemically better off if we trust our hinge certainties to be accurate than if we do not. Wright spells out different ways how this argument might work, I will focus on only one.

Given that I mentioned Kantian (1998) transcendental categories above, I will specifically introduce Wright's (2004, pp. 200–203) Strawsonian proposal that we have a claim to entitlement to trust our hinges. The Strawsonian argument makes the point that our experience presents itself in a way that the only way to make sense of it is by presupposing that there are such things as external objects and causality. Our worldview and experience would become incongruent if we rejected our core cognition's presentation of the world, our cognitive schema. Therefore, we are entitled to trust it.

Unfortunately, Wrightean entitlement is explicitly of a very intellectual sort. It only gives us a claim to entitlement to trust in hinges if we are at least in principle able to grasp Wright's arguments – which is no easy feat. We are again stuck with an over-intellectualised kind of epistemic warrant for our core hinges. (Wright, 2014, p. 243)

Based on Wright's theory, I have proposed a less demanding kind of entitlement, that is even accessible to toddlers. (Ohlhorst, 2023) I have argued that we are entitled to trust in our hinges in general because they enable us to be *cognitively active*. If we did not trust them, then we would be cognitively paralysed. I also argued that there is even a simple entitlement of cognitive activity that only requires a minimal awareness of the cognitive capacity's operation. I contend that we are minimally aware of our core cognition's operation, even as babies, and that we are therefore entitled to trust its operations and the core hinges encoded in them.

5 Conclusion

What is the epistemic status of our core cognition? I have defended the thesis that these innate core cognitive processes encode Wittgensteinian hinge certainties. Presupposing these core hinge certainties enables us to rely on our core cognition; therefore, we are epistemically warranted to trust them to be accurate.

This proposal allows us to integrate core cognition as a model from cognitive psychology into our epistemological framework while the standard toolbox of epis-

---

[9] That divergence in hinges entails psychopathologies is a running theme in hinge epistemology. (Campbell, 2001; Moyal-Sharrock, 2004)

temology cannot integrate it completely. The fact that we need hinge epistemology to explain the epistemological role of core cognition offers some support for the theoretical importance of hinge epistemology.

For cognitive scientists, this thesis is interesting because of the far-reaching epistemological role of hinge certainties. Differently from Greco (2021) and others, I do not think that every human being *must* share the same hinges. While it is highly likely that most people have the same core hinges given their biological anchoring, it can occur that someone lacks a core cognition module, and thereby the relevant core hinges. This may lead to pathological outcomes, the classical example here would be the difficulties of communication that arise from impaired social cognition and the missing correspondent hinges (Spelke, 2022, p. xix).

Declarations

Conflict of Interest No conflict of interest to report.

References

Campbell, J. (2001). Rationality, meaning, and the analysis of delusion. *Philosophy Psychiatry & Psychology*, *8*(2), 89–100.

Carey, S. (2009). *The origin of concepts*. Oxford University Press.

Churchland, P. (1987). Epistemology in the age of Neuroscience. *The Journal of Philosophy*, *84*(10), 544–553.

Cohen, L. B., Chaput, H. H., & Cashon, C. H. (2002). A constructivist model of infant cognition. *Cognitive Development*, *17*(3–4), 1323–1343. https://doi.org/10.1016/S0885-2014(02)00124-7

Coliva, A. (2015). *Extended rationality*. Palgrave Macmillan.

Coliva, A. (2023). Hinges in the knowledge economy. On Greco's common and procedural knowledge. *Synthese*, *201*(5), 149. https://doi.org/10.1007/s11229-023-04130-5

Coliva, A., & Moyal-Sharrock, D. (Eds.). (2016). *Hinge Epistemology*. Brill.

Goldman, A. I. (1979). What is Justified Belief. In G. S. Pappas (Ed.), *Justification and Knowledge* (pp. 1–23). Reidel.

Greco, J. (2021). *The transmission of knowledge*. Cambridge University Press. https://doi.org/10.1017/9781108560818

Hume, D. (2004). *An enquiry concerning human understanding*. Dover philosophical classics.

Jenkin, Z. (2020). The epistemic role of core cognition. *Philosophical Review*, *129*(2), 251–298. https://doi.org/10.1215/00318108-8012850

Kant, I. (1998). In P. Guyer, & A. W. Wood (Eds.), *Critique of pure reason*. Cambridge University Press.

Leslie, A. M., & Keeble, S. (1987). Do six-month-old infants perceive causality? *Cognition*, *25*(3), 265–288. https://doi.org/10.1016/S0010-0277(87)80006-9

Michotte, A. (1963). *The of Perception Causality*. Basic Books.

Moore, G. E. (1939). Proof of an External World. *Proceedings of the British Academy*, *25*, 273–300.

Moyal-Sharrock, D. (2004). *Understanding Wittgenstein's on Certainty*. Palgrave Macmillan.

Ohlhorst, J. (2023). *Trust Responsibly Non-Evidential Virtue Epistemology*. Routledge. New York

Pritchard, D. (2022). Hinge commitments and common knowledge. *Synthese*, *200*(3), 186. https://doi.org/10.1007/s11229-022-03647-5

Pryor, J. (2000). The skeptic and the dogmatist. *Noûs*, *34*(4), 517–549. https://doi.org/10.1111/0029-4624.00277

Ranalli, C. (2020). Deep disagreement and hinge epistemology. *Synthese*, *197*(11), 4975–5007. https://doi.org/10.1007/s11229-018-01956-2

Reid, T. (2012). *An inquiry into the human mind*. Cambridge University Press.

Sosa, E. (2015). *Judgment and Agency*. Oxford University Press.

Sosa, E. (2021). *Epistemic explanations*. Oxford University Press. https://doi.org/10.1093/oso/9780198856467.001.0001

Spelke, E. S. (2022). *What babies know: Core knowledge and composition* (Vol. 1). Oxford University Press.

Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science*, *10*(1), 89–96. https://doi.org/10.1111/j.1467-7687.2007.00569.x

Vogel, J. (2000). Reliabilism leveled. *The Journal of Philosophy*, *97*(11), 602–623.

Williamson, T. (2001). *Knowledge and its limits*. Oxford University Press.

Wittgenstein, L. (1969). In Anscombe, & von G. H. Wright (Eds.), *Über Gewissheit—On Certainty*. G. E. M.

Wright, C. (2004). I—Crispin Wright: Warrant for nothing (and foundations for free)? *Aristotelian Society Supplementary Volume*, *78*(1), 167–212. https://doi.org/10.1111/j.0309-7013.2004.00121.x

Wright, C. (2014). On Epistemic Entitlement (II). In D. Dodd & E. Zardini (Eds.), *Scepticism and Perceptual Justification* (pp. 213–247). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199658343.003.0011