Culture in Mind - An Enactivist Account:

Not Cognitive Penetration But Cultural Permeation

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"we must … confront the ever-active predictive brain in its
proper setting – inextricably intertwined with an empowering
backdrop of material, linguistic and sociocultural scaffolding"

- Clark 2016, p. 270

Culture colours cognition, even the most basic forms of perception. Quite literally, it seems. The Greek language has two words for 'blue' (light blue [*ghalazio*] and dark blue [*ble*]), but only one for 'green'. Thierry et al. (2009), using EEG, measured a specific neuronal signal, visual mismatch negativity (vMMN) over the visual cortex, in Greek and English speakers. This signal occurs c.200 milliseconds following the presentation of an oddball stimulus – for example, a square in a series of circles, or a dark blue circle in a series of light blue circles. The signal features in a pre-attentive, unconscious and very early stage of visual processing. For blue contrasts, vMMN showed significant difference in Greek speakers, but no significant difference for English speakers. That is, the way Greek and English have been enculturated appears to make a difference to the ways the brains of speakers of these respective languages respond in early visual processing to different shades of blue.

Making sense of such evidence through the lens of radical enactivism, human cognition is not only shaped but utterly *permeated* by the patterned practices in which it partakes and the socio-cultural contexts within which those practices grow and develop. Socio-cultural influences not only operate with respect to our explicitly formed and expressed beliefs and values, they can inform and infuse what we see and feel in quite basic ways – as in the cited case of such influences on the early stages of color perceiving for Greek and English speakers. In such cases the response patterns of the plastic brains of the two sets of speakers have been differently shaped, where such shaping occurs over a protracted developmental timescale.

For enactivists, brains play an important role in the ongoing dynamical attunement of organism to environment. In social interaction, for example, brain processes integrate into a complex mix of transactions that involve moving, gesturing, and engaging with the expressive bodies of others. These are bodies that, situated in various environments, incorporate artifacts, tools, and technologies, adopt diverse social roles and engage in various institutional practices. Thus, not only the body, but also physical, social, and cultural environments are important factors both evolutionarily and developmentally for any understanding of neural plasticity.

Brains do not evolve in vitro or in a vat. They evolve to function the way they do because they evolve with the body they are part of, and in environments that are coupled in specific ways to those bodies. Brains participate in a system in which neural activity is not the isolated seat of cognition but shapes and is shaped by all these other factors. Cognition, even of the most basic sort, involves transactions within the complete system – thus within the system's neural and extra-neural elements.

Enactivists emphasize not only sensory-motor contingencies but also embodied affects, as well as the role that intersubjective interaction plays in shaping cognition (Gallagher 2017; Gallagher and Bower 2014). Cognition is situated organismic activity that takes the form of complex, dynamical processes at multiple levels and on different timescales, where these processes are part of a dynamical engagement or response of the whole organism, living in and materially engaging with structured environments.

The way environments structure minds and the way minds structure environments involves a metaplasticity that goes both ways – brain activity is part of what enables changes to the physical, social, and cultural environments that change brains and vice versa (Malafouris 2013). Interventions at any point in this self-organizing system of brain-body-environment will incur (sometimes friendly, sometimes not so friendly) adjustments to the whole.

A signature feature of classical cognitivist attempts to explain behaviour is to endorse a methodologically individualistic intellectualism that favours "'process' over 'context'" (Ceci and Roazzi 1994, p. 74). Accordingly, and in tune with an aspiration to discover universal psychological laws that operate anywhere and everywhere, classical cognitivist approaches have sought to identify narrow, internal properties of individuals – indeed, usually only properties or processes of their brains – that could causally explain how behaviour is produced. Such internal factors are portrayed as independent of whatever may be happening in the cognizer's environment. Situationally specific factors are unwelcome in this class of explanations; such explanations "short shrift context" (Ceci and Roazzi 1994, p. 74).

Fundamentally for classical cognitivists – as Ceci and Roazzi (1994) astutely highlight – the processes that are assumed to constitute cognition – whether these are understood as, say, information processing or neurocomputational activity – are of special explanatory interest. All else, the influences of culture and context included, is treated as a "form of noise" (p. 74). Accordingly, "context is viewed as an adjunct to cognition, rather than a constituent of it" (Ceci and Roazzi 1994, p. 75).

Going against the standard conceptions of cognition, these authors (along with many others in the E-cognition movement) called for an approach to cognition that could "integrate the environmental dimensions into a more comprehensive theoretical framework of organism-environment interaction" (Ceci and Roazzi 1994, p. 76). They sought a framework that would enable us to understand the "intersection in development of an individual's biological background and the sociocultural environment in which the individual grows up" (Ceci and Roazzi 1994, p. 76).

In what follows, we advance a radically enactive account of cognition, just the sort of framework that Ceci and Roazzi (1994) were looking for. We provide arguments in favour of the possibility that cultural factors *permeate* rather than penetrate cognition, such that cognition extensively and transactionally incorporates cultural factors rather than there being any question of cultural factors having to break into the restricted confines of cognition.

Section 1 reviews the limitations of two classical cognitivist, modularist accounts of cognition and ultimately gives reasons for going beyond the cognitive penetrability debate. There are empirical reasons to adopt a revisionary, new order variant of cognitivism – a Predictive Processing account of Cognition, or PPC. Yet, to do so reveals that although it appears the contentful adjustment of predictive hypotheses is possible, the question of cognitive penetrability no longer arises.

Building on this conclusion, Section 2 then looks closely at Ramstead et al.'s (2016) attempt to explain how cultural factors might make a difference to cognition by appealing to our sensitivity to cultural affordances as explained under the auspices of PPC. While that proposal is prima facie promising, Section 3 reveals that, in committing to a cognitivist interpretation of PPC à la Clark (2016), it is conservatively and problematically attached to the idea of inner models and stored knowledge.

Finally, Section 4 seeks to honour Ramstead et al's (2016) motivating insights while avoiding troublesome theoretical commitments. To achieve this it offers a radically enactive alternative account of how cultural factors matter to cognition. Going the radically enactive way requires yet another theoretical twist – one that requires abandoning any vestige of the idea that cultural factors might contentfully communicate with basic forms of cognition. In place of that idea, the possibility that culture permeates cognition is promoted.

Pulling all the threads together, we conclude that careful scrutiny of the available theoretical possibilities gives compelling reason to favour the possibility that culture permeates, rather than penetrates, cognition and a radically enactive approach to thinking about how it does so.

1. Cognitivist Options: Contentful Encapsulation, Binding or Adjusting?

Questions about whether and how deeply cultural and contextual factors might penetrate cognition are only intelligible against the backdrop of particular assumptions about the nature of cognition. This is because how we conceive of cognition determines how we think it is possible that cultural and contextual factors could make a difference to it.

For example, the cognitivist debate about whether early vision can be cognitively penetrated or not assumes that the content of early visual processes is at least open to cognitive penetration – which is to say that contentful attitudes of belief, desire, knowledge and the like might *contentfully* inform what we see at the early and elementary stages of visual processing. Conversely, early vison will be cognitively impenetrable just in case the contents of early vision remain untouched by any contentful attitudes the perceiver may have (Pylyshyn 1999; Raftopoulos 2001).

Importantly, questions about whether some or other cognitive process might be cognitively penetrated turn on whether the process in question can be modified "in virtue of the [presumed] content of states of the cognitive system" (MacPherson 2012, p. 27). Highlighting the importance of this requirement, MacPherson (2012) emphasizes –focusing on case of early vision– that "there have to be some links between the content of the cognitive state and the content of the perceptual state that is affected of a nature such that the effect on the content of the perceptual experience is made intelligible" (p. 27). Early vision will only be cognitively penetrable if it can be somehow informed in some integral way that is contentful and not merely causal.[1]

Sensu stricto, cognitive penetrability is only possible if there can be influential links between two sources of content such that the links in question can be made intelligible. That cognitive penetration requires the existence of intelligible links between two sources or types of content is a fundamental assumption for all parties in the cognitive penetrability debate. This assumption operates in the background and goes without notice since anyone embroiled in this debate must subscribe to cognitivism and the assumption that the relevant forms of cognition are contentful.

It is easy to see the importance of these framing assumptions by focusing on the fact that there are at least two senses in which a given process might be cognitively impenetrable: these two senses exhibit different modal force. The process of, say, digestion of carbohydrates is necessarily cognitively impenetrable if it turns out –as we might safely assume– that digestion lacks any contentful attitudes that could possibly be penetrated. By contrast, the processes of, for example, early vision are widely thought to be possibly cognitively impenetrable. On the assumption that early visual processes are content involving they will turn out to be cognitively impenetrable if it turns out, contingently, that their contents cannot be informed by other contentful attitudes of perceivers.

Having clarified some of the background philosophical assumptions operating in the debate about cognitive penetrability, it is worth noting that there is a wealth of empirical evidence that points to the existence of top-down effects on early perception. Such findings put great pressure on the modular accounts that assume that contentful attitudes cannot communicate with or inform early perception – viz. that such attitudes don't have any influence at the bottom rungs of cognition.[2]

Defenders of traditional modular accounts argue that early perceptual processing is informationally encapsulated from the rest of cognition. They assume that early vision involves the creation of nonconceptual contents and that computations in early visual processing over such contents are specialized for and solely concerned with transforming spatio-temporal patterns of light hitting the retina into contentful representations. Building on the pioneering work of Marr (1982), visual processing is often characterized in terms of computations over contents that lead to specific low-level descriptions of a visual scene, in terms of edges, shadows, and such (Pylyshyn, 1999). For cognitivists about early vision, cognitive impenetrability follows directly: the contents of early visual processing are encapsulated from cognitive states, such as intentions, beliefs, and motivations. This is held to be so on such accounts despite the fact that early vision involves the manipulation of other sorts of contentful representations.

Yet there is a growing body of evidence suggesting that so-called top-down beliefs, desires, emotions, motivations, and intentions do contentfully influence what we see, modifying the presumed contents of low-level perceptual processing, such as brightness, shape, or texture.[3]

This research puts the modular accounts that favor the view that early vision is contentfully encapsulated under considerable pressure. The philosophical community has presented strong arguments, based on the best experimental evidence, in favor of cognitive penetrability (Arstila 2017; Marchi, 2017; Newen and Vetter, 2017; Stokes 2017; Briscoe 2015; MacPherson 2015; Siegel 2012; Lyons 2011). Summing up a conclusion from a wealth of similar work, Carruthers (2015) reports that “increasingly it has been argued that perceptual processing is deeply interactive at many different levels simultaneously” (p. 501).

One way to accommodate this putative fact within the framework of classical cognitivism without surrendering a modular theory of mind would be to propose, as Carruthers (2015) does, that the products of early perception are not encapsulated from concepts and other contentful attitudes.

The hypothesis is that culturally acquired concepts might be added to basic perceptual processing through a speedy online binding process. The conjecture is that conceptual information is transmitted rapidly to areas responsible for early perception; that there is a phase synchrony in the neural activity in the orbitofrontal cortex, temporal cortex and visual cortex which, for Carruthers (2015), suggests “meaningful interactions” (p. 502). Culturally acquired concepts might, through this means, inform and become bound up with contents of what is perceived though processes that are fast and online.

Any integration of the sort Carruthers’s proposes would have to be extremely fast. For example, Thierry et al. (2009) show, in the aforementioned studies concerning Greek and English speakers, that the first, earliest positive peak elicited by visual stimuli revealing differences between the speakers occur in parietooccipital regions of the scalp at 100-130msecs; 100msecs prior to any indication of visual mismatch negativity (vMMN).

For Carruthers’s proposal to work, whatever the exact speed of processing must be, perceptual and conceptual contents must be integrated by the time what is perceived is broadcast to consciousness. The key idea is that the nonconceptual contents of basic perception and any culturally acquired conceptual contents start out being quite separate, but they are bound together through neural processes operating on an elemental timescale. Perceiving is thus a mix of the contents served up by early perceptual processing plus an extra step of adding conceptual contents before the entire package reaches consciousness. The theory is that even if early perception is assumed to be modular, it produces nonconceptual contents that are contentfully integrated with conceptual contents in ways that make the final product – the whole package – unencapsulated.

In the end, it is unclear exactly where Carruthers's (2015) account leaves us with respect to the cognitive penetrability debate. If, on the one hand, the hypothesized binding processes somehow contentfully infuse nonconceptual with conceptual contents then it would seem that cognitive penetration occurs and the two components are contentfully integrated. If, on the other hand, the binding process only attaches a conceptual content to an untouched core of nonconceptual perceptual contents then, strictly speaking, the perceptual contents will remain contentfullly encapsulated.

There is another possibility. There are strong empirical grounds for thinking that perceptual processes are neither linear nor sequentially staged in the way that either of the above modular theories suppose. Impressed by these findings many researchers have been attracted to predictive processing accounts of cognition, or PPC (Hohwy 2013, Clark 2016, Frith, 2016). According to PPC, the brain constantly and pro-actively forms models and hypotheses about what it will perceive in the sensory stream, and it corrects its predictions by adjusting to or acting on the incoming sensory information in an ongoing attempt to minimize error.

Conceiving of perception under the auspices of PPC raises deep questions about the appropriateness of the penetration metaphor that fuels the debates about cognitive penetrability. This is because, according to PPC, contentful attitudes –in the form of predictive hypotheses– are assumed to come into play prior to any processing of sensory information in early perception. Such hypotheses are already in communication with incoming information supplied by the so-called lower levels of perceptual processing. This kind of interchange is one in which hypotheses are contentfully adjusted: it continues, on an on, as the contents of the hypotheses are altered in a dynamic way over time via feedback connections that tune and toggle the precision weightings given to anticipated possibilities. Top-down predictions are compared with and modified by low-level incoming sensory information, as the brain is forever on the lookout for possible mismatches, i.e., error signals.

According to PPC, error signals are communicated up the line in a feed-forward way to higher levels of processing thereby correcting and adjusting the predictive model. Through further recurrent loops, a better predictive model is generated and fed down again to the sensory input layer until a sufficiently low error signal is achieved. In PPC, then, top-down attitudes play a crucial role – even in early perception – since they contribute directly to the content of what is perceived via their predictions about what is likely to be seen.

Unlike the two modular theories discussed above, PPC requires us to revise thinking about cognitive penetrability quite fundamentally. Adoption of a PPC framework renders all modular accounts outmoded, whether they think of the contents of early perception as contentfully encapsulated or contentfully integrated.

There is much that speaks in favor of PPC, but to pursue this line is to embrace a radically revisionary framework that turns a great deal of previous cognitivist thinking on its head. In particular, PPC relinquishes the traditional assumption found in modular theories of perception that the we build models of the world in a staged manner based on incoming information (Clark 2016. p. 29-37, p. 51). According to PPC, our prior assumptions and hypotheses about what we expect to perceive in certain circumstances already shape and inform even the most basic perceptual activity. As such, to adopt PPC pushes us to abandon asking whether perceiving might be cognitively penetrated or otherwise since on the PPC account that question no longer makes sense because perceiving is always already contentful and continually contentfully adjusted in ongoing processes.

2. Cultural Affordances Meet Neurocomputational Models

Suppose we take PPC seriously as a framework for understanding even the most basic forms of cognition. How, through its lens, ought we to understand the way cultural factors make a difference to what we perceive and think at a fundamental level? According to Clark (2016), PPC contends that cultural factors shape and inform our basic cognitive abilities, skills and tendencies through interactions occurring over protracted, multi-generational timescales.

The transformative processes that make our brains receptive to cultural influences involve prolonged exposure to local, socioculturally specific, patterned practices

(Roepstroff et al. 2010, Hutto and Kirchhoff 2015): our basic cognitive capacities are ready to be shaped by socio-cultural factors because we repeatedly use them within socio-culturally designed environments. Our basic cognitive capacities are scaffolded by being repeatedly deployed in specific ways that conform to established routines, customs and institutions – and, in some cases, using our basic capacities in such contexts enables the emergence of new forms and varieties of cognition (see Hutto and Satne 2015, Hutto and Myin 2017).[4]

With the advent of the practices involving external symbols, for example, came the possibility of reading, writing, structured discussion, and schooling in the sociocultural specific forms we are familiar with today. Arguably, that brought cognitive capacities into being for the first time – capacities of the sort required for being able to think about certain subject matters – such as mathematics (Overman 2016). The big idea is that through continual exposure to and involvement in sociocultural patterned practices, "Prediction hungry brains …. acquire forms of knowledge that were generally out-of-reach" (Clark 2016, p. 277).[5]

Clark (2016) maintains that our interaction with material and socio-cultural designer environments train, trigger, and repeatedly transforms our more biologically basic forms of cognition. Ramstead et al. (2016) seek to understand how this happens as a matter of our becoming attuned to special kinds of cultural affordance – where such attunement is understood as a matter of embodying a "shared sets of expectations, reflected in the ability to engage immersively in patterned cultural practices" (p. 7). For humans, as these authors recognize, the regularities to which we are sensitive are "densely mediated (and often constituted) by cultural symbols, narratives, and metaphors” (Ramstead et al. 2016. p. 14).

The main hypothesis of Ramstead et al. (2016) is that feedback loops mediating shared attention and shared intentionality are the primary platform upon which we acquire our special sensitivity to cultural affordances. This is all part and parcel of the individual’s history of interactions and the shaping of expectations that history entails.

Despite entertaining the possibility that the whole story about how we are shaped by cultural affordances might be told in contentless, radically enactive terms, Ramstead et al. (2016) cannot imagine how this might be done without appeal to neural models and special kinds of stored knowledge. For example, they are convinced that in order to be sensitive to cultural affordances we “*must ha*ve shared sets of expectations—we *must know* what others expect us to expect” (Ramstead et al. 2016, p. 7, emphasis added).

This insistence –this ‘musty’ thinking– leads them to embrace an intellectualized position; one that stands halfway ‘in-between’ enactivist and cognitivist accounts of cognition and tries to marry the two at the altar of PPC (Hutto and Myin 2017). Thus, these authors, following Clark (2016) endorse a *conservative* enactive account of cognition through which they hope to account for the special knowledge that they think is needed to fill the perceived explanatory gap.

Specifically, Ramstead et al (2016) maintain that “predictive processing models offer a plausible implementation for the *neural-computational realization* of affordance-responsiveness in the nervous system” (p. 12, emphasis added). Elaborating on this proposal, they tell us that the brain uses generative models which function:

to dynamically extract and encode information about the distal environment as sets of probability distributions. The information involved here can be natural or conventional in kind … The system uses this generative model to guide adaptive and intelligent behavior by 'inverting' that model through Bayesian forms of (computational, subpersonal) inference (Ramstead et al. 2016. p. 9).

They are thereby committed to the existence of neurocomputational models – models that exist in cognitive systems– which those systems must call on to explain how they are able to produce and guide "skilled intelligent, context-sensitive, adaptive behavior" (Ramstead et al. 2016. p. 7).

3. Doing Without Neural Models: A Radical Take on Cognition

A long tradition has it that only some organisms –only those that are truly cognitive– learn and deploy models that guide their behavior. Accordingly, those creatures capable of "only model-free responses are, in [a backward-looking sense] condemned to repeat the past, releasing previously reinforced actions when circumstances dictate" (Clark 2016, p. 254). Such creatures would be behaviorally dumb devices – mechanisms that behave only in accord with blind habit.

By contrast, the cognitively well-equipped creatures make use of models to act on the world intelligently, because having a model is thought to be what enables them "to evaluate potential actions using (as the name suggests) some kind of inner surrogate of the external arena … [thus they are] able to 'navigate into the future'" (Clark 2016, p. 254).

It is wildly implausible that any living system could be as simple and stupid as the model-free picture portrays the creatures at what is sometimes deemed to be the bottom rung of animal life. For example, new findings have shown that even bacteria are remarkably sophisticated in the ways in which they adapt, attune and respond to their environments (Losick and Desplan 2008, Tagkopoulos et al. 2008, Perkins and Swain 2009, Balázsi et al. 2011, Locke 2013). Thus, in an effort to make best sense of these findings, Fulda (2017) reports that, "the responsiveness of even the simplest living systems is remarkably flexible … microbiologists take this responsiveness to be evidence of cognition. After all, it is too supplely adaptive for a machine. Bacteria can respond appropriately to novel conditions, that is, conditions that have no evolutionary or developmental counterpart" (p. 77).

What should we make of this? One natural answer is to deny that there is any model-free behaving. According to that answer, all behavior is model-driven. On such a view, it's models all the way down; models of some kind must drive even the most basic forms of cognition. Any differences in organismic responsiveness would, thus, just a matter of degree of the sophistication of model used or how well it is used as opposed to the responsiveness in question being model-driven as opposed to model-free. It seems that this is the sort of answer that Clark (2016) favors: he readily admits that the standard story is "almost certainly over-simplistic" (p. 253). For, despite acknowledging the intuitive pull of the model-based/model-free distinction, he admits that that distinction resonates "with old (but increasingly discredited) dichotomies between habit and reason, between emotion and analytic evaluation" (Clark 2016, p. 253).

The more fundamental question is why posit any models as the drivers of behavior at all. Some do so because they are persuaded by the following line of argument: "There is a gap between the mind and the world, and (as far as anybody knows) you need to posit internal representations if you are to have a hope of getting across it. Mind the gap. You'll regret it if you don't" (Fodor 2009, p. 15).

Of course, this can't be Clark's reason. The idea that inner models are needed to explain behaviour has long be challenged by the 4E-movement – embodied, enactive, ecological, extended – in cognitive science that Clark and company embrace. Those attracted to such views are thus happy to propound the roboticist's slogan, that, "The world is its own best [model]/representation" (Clark 1997, p. 46; see also Brooks 1991). Yet, against this idea, it has been plausibly argued that "the world can't be its own best [model]/representation because the world doesn't [model]/represent anything; least of all itself" (Fodor 2009, p. 15).

In light of this, for those attracted to the 4E-approaches it seems, at least at first blush, that a better answer would be to hold that an "agent does not have a model of its world – it is a model" (Friston 2013, p. 213). This obviates having to address the awkward question of how the world, itself, can be a model. But, what exactly might it mean to say the system or agent itself is a model? Friston et al. (2012, p. 6) advise that, "We must here understand 'model' in the most inclusive sense, as combining interpretive dispositions, morphology, and neural architecture, and as implying a highly tuned 'fit' between the active, embodied organism and the embedded environment." Following through on this logic, we are told that "in essence, [biological/cognitive systems] become models of causal structure in their local environment, enabling them to predict what will happen next and counter surprising violations of those predictions" (Friston 2012, p. 2101).

This looks like progress. Yet, if we understand models à la Friston's proposal we face the question of how the system itself can both be a model and, simultaneously, use a model to drive its behavior. Is the claim that systems are models descriptive or explanatory?

In this context, it is useful to consider Clark's (2016) discussion of Sokolov's work on habituation and what drives the thought that models are required to explain even very similar forms of psychological behavior and responsiveness. He writes:

> One might have thought of [habituation] as some kind of brute physical effect due to some kind of low-level sensory adaption. Sokolov noticed, however, that even a reduction in the magnitude of *some habituated stimulus* could engage 'dishabituation' and *prompted a renewed response*. Sokolov concluded that the nervous system *must learn and deploy a 'neuronal model'*" (Clark 2016, p. 89, emphases added).

Admittedly, we observe that the system, as a whole, exhibits flexible behavior and is capable of learning. That is a true description of its cognitive capacities. But why *must* it learn a model; how does that explain this flexibility? Does the brain or nervous system learn and deploy a neural model or does the system –as a whole– through its sustained history of worldly engagements – simply become capable of adapted, flexible, and selective responses?

In any case, what might it mean to say that an organism or system learns and deploys a model? Clark (2016) everywhere advances the idea that cognizers acquire knowledge that can be appealed to in order to causally explain their subsequent behavior. Clark (2016) talks of model-driven systems in the following terms: as "using stored knowledge" (p. 6); as "knowledgeable consumers" (p. 6); as acquiring "bodies of knowledge" (p. 68); as something that "learns and deploys a generative model" (p. 22); as building up "the sensory scene using knowledge" (p. 25, p. 17); as "the brain using stored knowledge to predict" (p. 27); of successful perception requiring "the brain to use stored knowledge and expectations" (p. 79); and so on, and on.

To take such talk seriously as part of an explanation we are owed the details of precisely what changes in the system occur when it acquires a model – when it learns a model– and how such structural changes amount to the acquisition of knowledge that can causally explain and drive the relevant responding. There is reason to doubt that this can be achieved (Hutto and Myin 2017, p. 26-53). Yet without a substantive proposal about how acquired knowledge can causally explain behavior, talk of the system's learning and using models provides no explanation, only the illusion of one.

Here it is useful to compare our compelling need to think that we must explain behavior by reference to systems being guided by neural models with Wittgenstein's (1953, 1983) famous observations about our compelling need to explain rule-following behavior with reference to being guided by our grasp of rules.

In the latter case, the grasped rule was meant to be distinct from and to stand, over and above, any actual attempts to apply it. For it seems that if we are to explain our capacity to follow a rule then there *must be* something – some fact – which determines which rule we are trying to follow and hence which standard we are answerable to. Wittgenstein thinks not; although he recognizes how deep the compulsion to think otherwise can run and its confounding effects on what we imagine is possible and needed to explain such phenomena.

> 'How can one follow a rule?' That is what I should like to ask. But how does it come about that I want to ask that, when after all I find no kind of difficulty in following a rule? Here we obviously misunderstand the facts that lie before our eyes (RFM VI §38).

> But is that all? Isn't there a deeper explanation; or mustn't at least the understanding of the explanation be deeper? – Well have I myself a deeper understanding? Have I got more to give in the explanation? (PI §209)

We follow rules, obey orders and the like. We can describe the circumstances under which we learn to do so, but we cannot give a deeper –philosophically illuminating– explanation of what makes this possible in the terms of grasping the content of the rules in question.

Rather, we are reminded that, "Following a rule is analogous to obeying an order. We are trained to do so; we react to an order in a particular way" (PI §206). As Wright (2008) expounds:

> To say that in basic cases, we follow rules without reason is to say that our moves are uninformed by—are not the rational output of—any appreciation of facts about what the rules require. This is, emphatically, not the claim that it is inappropriate ever to describe someone as, say, knowing the rule(s) for [say] the use of 'red', or as knowing what such a rule requires. Rather it is a caution about how to understand such descriptions—or better: how not to understand them … In basic cases *there is no such underlying rationalizing knowledge enabling the competence* (p. 140, emphasis added).

The moral Wright (2008) derives from this is that in basic cases of rule-following, "The knowledge *is* the competence" (p. 140).

In this case, we are brought to see something that is already there before our eyes but which is blocked from sight by our attachment to misguided ways of framing the issues. This attachment is philosophical, not scientific in character, and it fuels misplaced explanatory urges of a 'musty' variety that have no place in the sciences of the mind.

A similar analysis can be given to claims that we 'must' learn and deploy models if we are to explain flexible behaviors on the grounds that only then will we be able to explain how it is the case that such behaviors can be intelligent and flexible.

We can avoid this demand by speaking of an organism's or system's embodied know-how or competence, rather than assuming that it must be learning models or using bodies of knowledge. This would be to understand cognition as as kind of acting and interacting. That is what lies at at heart of a radical as opposed to a conservative enactivism (Hutto 2005). For in explaining flexible behavior the former makes no appeals to the idea of stored, mediating knowledge.

4. Culture Permeates Cognition: A Radically Enactive Account

Because enactivists start with different assumptions than cognitivists about the nature of cognition and how to explain adaptive responsiveness, they propose quite a different way of thinking about how culture connects with and influences cognition. The human brain not only evolved along with the human body, and works the way it does because of that; it's also not isolated, but rather dynamically coupled to a body that is in turn dynamically coupled to an environment. The organism operates on the situation itself rather than on a model of the situation inferred by the brain. The complex interactions and transactions of brains, bodies and environments are structured by the physical aspects of neuronal processes, bodily movements, affects, anatomy and function, and environmental regularities.

We can think of these interactions and transactions as forms of ongoing dynamical adjustments in which the brain, as part of and along with the larger organism, settles into various kinds of attunement with the environment – attuning to physical, social and cultural factors (Gallagher et al. 2013; Gallagher 2017). Neural accommodation occurs in this larger system. Notions of adjustment and attunement can be cashed out in terms of physical states, or more precisely, physical dynamical processes that involve brain and body, autonomic and peripheral nervous systems, as well as affective and motoric changes.

Many accounts of perception restrict the analysis to questions of recognition. As we've seen, the question is often about how the visual system recognizes what is out there in the world given that its access is limited to sensory input. This leads to the idea that the pure function of perception is to solve a puzzle, and what better way to solve a puzzle than to use inferential logic. But perception's function is never purely recognitional; seeing, for example, involves more than recognition and motor control.

The senses are not charged with just identifying or recognizing objects or guiding bodily movement in the world. A full-bodied response always involves more than that; there are always ulterior motives in the system. Because the organism desires food or rest or sex or aesthetic enjoyment or understanding, etc. the eye is never innocent.

We saw how enculturation made a difference to the way the brains of Greek and English speakers respond in early visual processing to different shades of blue, revealing that neuronal activity in the earliest of perceptual processing areas, such as V1, is more than simple feature detection. V1 neurons anticipate reward if they have been attuned by prior experience (Shuler and Bear 2006). This is not a matter of receiving sensory data first, followed by inferential processes that then calculate reward possibility. Rather, it's an intrinsically reward-oriented response or attunement to stimuli due to prior experiences and plastic changes. Indeed, there's no room for or need for inferences in this respect. In the same way that, already attuned by prior experience and enculturation, the visual cortexes of Greek and English speakers differ in how they respond to different shades of blue, V1 is already attuned to reward possibilities.

Furthermore, in synchrony with central perceptual processes, autonomic and peripheral nervous systems are activated generating dynamical patterns that makes it unclear what is regulating what. Specifically, along with the earliest perceptual processing, the medial orbital frontal cortex is activated initiating a train of muscular and hormonal changes throughout the body, modulating processes in organs, muscles, and joints associated with prior experience (Barrett and Bar 2009). Sensory responses are coordinated with, modulate and guide affective and action responses and vice versa. Perceptual stimulation generates not just brain activation, but also specific bodily affective changes that are already integrated with sensorimotor processes tied to the current situation.

5. Conclusion

In sum, rather than wondering if cultural factors might contentfully penetrate or adjust cognition, we defend the idea that cultural factors color or permeate cognition. We have sketched and motivated a radical enactivist way of understanding how this occurs. Going the radical way requires turning one's back on some familiar and deeply ingrained ways of thinking about how best to explain behavior. Thus, when Clark (2016) asks, "Why not simply ditch the talk of inner models and internal representations and stay on the true path of enactivist virtue?" (p. 291), we answer "Why not, indeed!".

Like those who cannot see how to escape the rule-following paradox, cognitivists are hampered by the limits of their philosophical imaginations. Clark, for example, rhetorically asks: “Could we have told our story in entirely non-representationalist terms, without invoking the concept of a hierarchal probabilistic generative model at all?” (2016 p. 293). In reply he confesses that “as things stand, *I simply do not see how* this is to be achieved” (p. 293, emphases added).[6] Luckily, for those whose sight is attuned to a different set of philosophical commitments, a more rewarding vision of cognitive science is a live possibility.

Acknowledgments: The authors thank the Australian Research Council for funding the Discovery Project “Minds in Skilled Performance” (DP170102987) for supporting this research.

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Notes

[1] Brogaard and Chomanski (2015) make this point clearly. They write "Consider the following example of a top-down influence on experience. Izzy is attending a difficult biochemistry lecture on migraines. Her thoughts about the difficult theories about the nature of migraines activate her amygdala, yielding a stress reaction. The activation in the amygdala causes her to develop migraine auras. Her thoughts about migraines thus resulted in an alteration of her visual experience, yet it cannot rightly be considered a case of cognitive penetration.

This is because the steps in the chain from the cognitive state to the alterations in her visual experience are not semantically coherent. There is no inferential relation between her thoughts about migraines and her stress reaction or between her stress reaction and her visual experience. So, even though her thoughts of migraines exert some top-down influence on her visual experience, this influence is not an instance of cognitive penetration" (p. 471).

2 That early perception might be modular in the sense of being informationally encapsulated and isolated from the rest of cognition was first and most prominently advanced by Fodor (1983). According to the modularity thesis some cognitive systems are informationally encapsulated just in case they are only responsive to a select set of inputs, and insensitive to any other kind of information or content. In Fodor's framework, modules are constrained by the information contained in the select set of inputs to which they are responsive and unaffected by whatever other information is available elsewhere in cognition. As such, if early perception is modular then it is precluded from communicating with a wider set of contentful attitudes – e.g. expectations, knowledge, and beliefs.

3 Goldstone et al. (2001) report that "one of the largest sources of evidence that concepts influence perceptual descriptions comes from the field of categorical perception" (p. 28). For example, they cite work by Goldstone (1994) regarding the perception of dimensions of brightness and size which revealed that "experience with categorizing objects actually decreased people's ability to spot subtle perceptual differences between the objects, if the objects belonged to the same category" (Goldstone et al. 2001, p. 29).

4 A prime example of such sociocultural scaffolding would be acquiring our folk psychoclogical capacity to understand actions in terms of reasons through the mastery of certain kinds of narrative practice (Hutto 2008, Hutto and Kirchhoff 2015).

[5] Citing Heyes's (2012) work on how reading and writing act as springboards for the creation of new cognitive capacities, Clark (2016) defends the idea that "many of our capacities for cultural learning are themselves cultural innovations, acquired by social interactions rather than flowing directly from fundamental biological adaptations" (p. 281).

[6] In this passage Clark (2016), like so many others, appears to be offering an inference from lack of imagination argument rather than an inference to the best explanation argument. For further details on the important but often overlooked difference between these two forms of argument see Hutto (2008) p. 94.