Two Challenges to Hutto's Enactive Account of Pre-linguistic Social Cognition

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Abstract

Daniel Hutto's Enactive account of social cognition maintains that pre- and non-linguistic interactions do not require that the participants represent the psychological states of the other. This goes against traditional 'cognitivist' accounts of these social phenomena. This essay examines Hutto's Enactive account, and proposes two challenges. The account maintains that organisms respond to the behaviours of others, and in doing so respond to the 'intentional attitude' which the other has. The first challenge argues that there is no adequate account of how the organisms respond to the correct aspect of the behaviour in each situation. The second challenge argues that the Enactive account cannot account for the flexibility of pre- and non-linguistic responses to others. The essay concludes that these challenges provide more than sufficient reason to doubt the viability of Hutto's account as an alternative to cogntivist approaches to social cognition.

Keywords: Enactivism; Mindreading; Intentional Attitudes; Pre-linguistic understanding; Social Cognition;

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1. Introduction

An infant is watching an adult trying to reach for a toy. After a few moments, the infant picks up the toy and hands it to the adult. Such interactions are common-place by the time an infant reaches 14 months of age (Warneken & Tomasello, 2007), but there remains significant philosophical debate about how we should explain this kind of behaviour. Theory-theory (Botterill & Carruthers, 1999; Gopnik & Wellman, 1992; Segal, 1996), Simulation theory (Goldman, 1989, 1993, 2006; Gordon, 1996; Heal, 1996) and Direct perception (Gallagher & Zahavi, 2008) approaches to social cognition all believe that this kind of interaction should be explained by claiming that the infant is able to understand or grasp the adult's psychological state. These approaches differ significantly in their explanations of how the infant attributes mental states to the adult, with Theory-theory maintaining that the infant infers the other's mental states through the use of a 'theory of mind', whilst Simulation theory suggesting that the infant manages to 'simulate' the other's mental state using her own cognitive apparatus, and then infers that this is the mental state the other has (although some Simulationist approaches attempt to do away with inference altogether, e.g. Goldman and Gallese 1996). Recently hybrid accounts incorporating aspects of both Simulation- and Theory-theory have also become popular (Nichols and Stich, 2003). By contrast, Direct perception views maintain that the infant can directly perceive the adult's psychological state. However, despite these differences, all these views concur that attributing to the infant knowledge (of some kind) of the adult's psychological state best explains this interaction.

Daniel Hutto's Enactive account of social cognition (henceforth, the Enactive account) stands in contrast to these views by maintaining that the infant does not need to know what the adult's psychological state is in order to respond appropriately to it.[1] This short piece examines the Enactive account and introduces two challenges. The first challenge is to the Enactive account's claim that the infant responds to a 'sign' for the adult's intentional state, rather than the state itself. The worry is that there are potentially many signs to which the infant could respond, and it is not clear how she is able to pick out the appropriate one in each situation. The second challenge addresses the flexibility of human interactions, and argues that the Enactive account does not have resources to accommodate this feature of human behaviour.

[1] There are a number of accounts of cognition which describe themselves as 'Enactive'. Throughout this paper the focus is on Hutto's brand of Enactivism as defended in his book 'Folk Psychological Narratives', and the arguments explored may not apply to other Enactive approaches.

2. The Enactive account of social cognition

In order to fully understand the Enactive account one must first understand its architectural commitments. This section gives an overview of these commitments before going on to show how they form the foundation of the Enactive account of social cognition.

2.1 Architectural commitments of the Enactive account

A controversial claim made by the Enactive account is that pre-linguistic infants and non-human organisms cannot have representational mental states. Representational mental states are psychological states that are directed at some state of affairs, where the state of affairs is represented to the organism in some way.[2] The state of affairs towards which the organism is directed is the 'content' of the organism's mental state, and the manner in which it is directed is the 'attitude'. In saying that Alfred wants a dog, we are saying that Alfred is in a particular psychological state: one where he is directed in the manner of 'wanting' towards a particular state of affairs – owning a dog. In order for Alfred to have this particular psychological state, he must have the capacity of representing the state of affairs that is 'owning a dog'. Hutto argues that only organisms with language are capable of representational mental states (FPN[3], p.23, 61 & p.122-3; 2009, p.545; forthcoming).[4]

This commitment has a number of important consequences for the Enactive account. First, whilst the Enactive account denies non-linguistic organisms representational mental states, it does not deny that they are able to have intentionality, that is, it does not deny that these organisms can engage in activities that are directed at particular features of the world. The Enactive account therefore needs an alternative account of how such intentionality comes about. This it gives in the form of 'Intentional attitudes', organismic states which enable the organism to be directed towards the world without having representational mental states. An organism has an intentional attitude when it is engaged in a 'goal-directed activity' (Hutto forthcoming, ms. p 11). Because intentional attitudes are a type of activity, they should be understood as a state the whole organism is in, rather than a state of the organism's cognitive system. Importantly, an organism does not need to represent the state of affairs or worldly feature that it is directed towards in order to be in the intentional attitude that is directed towards that state of affairs. A bat flying towards the source of an FM wave it has just perceived has an intentional attitude, because its activity is directed towards the source of the FM wave. The bat

[2] Note that organisms are not directed towards the proposition, but towards the state of affairs represented by that proposition.
[3] FPN: Hutto, D.D. (2008) Folk Psychological Narratives: the sociocultural basis of understanding reasons.
[4] This essay will not discuss or assess Hutto's reasons for holding this view, for more see FPN, ch. 5&7.

does not cognitively represent the source of the FM wave as the goal of its activity, but this does not preclude us from characterising the activity as intentional.

In characterising intentional attitudes as activities, the Enactive account is making a distinctive claim regarding the architecture of non-linguistic cognition. It is an important feature of representational mental states that they can be cognitively integrated with each other, meaning that they can enter into the inferential processes required for reasoning. In being activities, however, intentional attitudes do not have the right structure to enter inferential relations and reasoning processes (FPN, p. 60). One cannot infer another intentional attitude from an existing one. Intentional attitudes are simply states that an organism goes into; they just do not have the right kind of structure to enter into logical relations with other aspects of the organism. Furthermore, in saying that non-linguistic organisms can only have intentional attitudes, the Enactive account is denying that non-linguistic organisms can engage in the kind of inferential and logical reasoning that requires representational mental states.

The second consequence of denying representational states to non-linguistic organisms is that the Enactive account must give an account of non-linguistic social cognition which does not draw on representational psychological states. Traditional cognitivist accounts of social cognition, like the Theory-theory and Simulation theory, maintain that non-linguistic social interaction is best explained by saying that such organisms are able to have metarepresentational mental states, representational mental states that have as their content the other person's psychological state. On these accounts the interaction between the infant and adult mentioned earlier is best explained by saying that the infant was able to have a metarepresentational mental state of the sort 'I believe that the adult *wants* the toy'. In denying pre-linguistic infants representational, and thus metarepresentational mental states, the Enactive account must give an alternative account of their social interactions.

2.2 Intentional attitudes and natural signs

The Enactive account answers the question of how pre- and non-linguistic interactions come about in the absence of metarepresentational states by introducing the 'natural signs' framework. This section outlines what is meant by a natural sign, and how to characterise an organism's response to such signs, before going on to explain how this framework is meant to work in the case of human interactions.

There are many things in the world which reliably correlate with other things; the number of rings on a tree correlates with its age, as do the rings on a turtle's shell. If a feature of the natural world reliably correlates with some other feature, then we can say that it is a 'natural sign'. A 'natural sign' is not created with the intention to communicate something; it is simply a phenomenon whose occurrence reliably correlates with some other occurrence. The turtle's rings are a natural sign of its age because there is a reliable correlation between the number of

rings on its shell and its age. *X* is a natural sign of *Y* when the occurrence of *X* has a suitably high (that is, statistically significant) correlation with the occurrence of *Y*.

It is also the case that many organisms have developed a sensitivity to natural signs, allowing them to exploit the sign to benefit from the thing it correlates with. Hutto offers the example of bats and the FM waves created by moths (FPN, p.52). The beating of moths' wings produces FM frequencies and bats have echolocation apparatus which can detect these frequencies. The FM frequency is a natural sign of the presence of moths as it reliably occurs with the presence of moths. Bats have echolocation abilities which enable them to detect this natural sign and use it to guide them to the moth. It has been the case for many thousands of years (since the evolution of moths as we know them, in fact) that FM waves of a particular sort have been a natural sign for the presence of moths. We can also envisage an organism evolving an innate sensitivity to this natural sign, provided the correlation between the sign and the occurrence of the other thing remained stable.

Hutto labels the response which an organism has to a natural sign as an 'Action Co-ordination Routine'. Action Co-ordination Routines are a type of intentional attitude, as they are goal-directed activities. The perception of a natural sign causes organisms to enter into an Action Co-ordination Routine which is directed towards the state of affairs the sign correlates with. One should understand the engagement of the Action Co-ordination Routine upon perception of the natural sign to be automatic, analogous to a reflexive movement. Care needs to be taken in how we characterise the success conditions of an Action Co-ordination Routine. An Action Co-ordination Routine is successful when it functions as it was selected to function. For instance, if a bat perceived the signal which corresponds with an insect being 12m to its left, and responds by flying 12m to its left and swallowing whatever is there, then the Action Co-ordination Routine is successful. If, in the same situation, it should transpire that the object emitting the signal is not a moth but a radio mast, then we do not say that the Action Co-ordination Routine was unsuccessful or at fault, because it unfolded as it should have done.

It is crucial to Hutto's view that when an organism perceives a natural sign it does not need to represent the state of affairs which that sign correlates with in order to respond appropriately to that sign. He writes,

> The signs themselves do no declarative work, nor are they interpreted as doing such by organisms or their perceptual mechanisms when they respond to them appropriately in discharging their proper functions. It is not as if one part of the system in any sense **tells** the other that "this is how things stand" in the process.
>
> (FPN, pp.47-48, emphasis in original.)

The bat's cognitive system does not need to represent 'moth at L' when it perceives the sign that triggers the appropriate Action Co-ordination Routine. The bat's motor and cognitive systems have evolved to respond in a particular way to the perception of FM waves, and this response is entirely appropriate given the state of affairs that correlates with this natural sign. Although the Action Co-ordination Routine is

directed towards the source of the FM wave, the bat has no representation of this goal of its activity.

We are now in a position to understand the Enactive account's claim that...

> ...both infants and adults are directly responsive to the psychological situation of others because they are informationally sensitive to a special class of natural signs – the expressions of intentional and affective attitudes, as revealed in another's gaze, gesture, facial comportment and so on.
>
> (FPN pp. 116-117).

The natural signs in question are people's behaviours, and the state of affairs which they correlate with is a particular intentional attitude. When a pre-linguistic infant perceives a behaviour that is a natural sign for an intentional attitude it causes her to enter into an Action Co-ordination Routine. This Action Co-ordination Routine is an intentional attitude which is directed towards the intentional attitude of the acting adult. As organisms do not in any way represent the state of affairs that correlates with the natural sign they perceive, this explains how the infant can respond to the adult's intentional attitude without representing or knowing about it in any way. Her response is nevertheless appropriate to the adult's intentional attitude, because the adult's behaviour reliably correlates with his intentional attitude, in much the same way as an FM wave correlates with the presence of a moth at a certain location. Because the infant's own response is an intentional attitude, (in the form of the Action Co-ordination Routine), she does not need to represent what she is directed towards, meaning that she does not need to represent the adult's intentional attitude. On the Enactive account, infants have ''no conceptual understanding of, or any capacity to *represent* what they are tracking as mental states *as such* or, indeed, *as* anything at all.' (Hutto, forthcoming, ms. p.13).

3. Problems for the Enactive account

The architectural commitments of the Enactive account lead it to make the startling claim that pre-linguistic social interactions can be described as responses to natural signs, where the natural signs in question are behaviours and the state of affairs that they correlate with is the intentional attitude of the other. This account of pre-linguistic interaction faces a critical problem, however, concerning how one should characterise 'natural signs'. This section examines this problem before introducing another, namely, how to explain infants' responses when the behaviour they perceive could be a natural sign for more than one intentional attitude. This second problem is an artefact of the first, which serves to put more pressure on the natural signs framework.

3.1 What counts as a natural sign?

The importance of defining a natural sign can be illustrated through the results of an elegant experiment conducted by György Gergely and colleagues (2002). 14 month

old infants watched as an experimenter turned on a light by touching it with her head. In one condition ('hands free' condition) the experimenter had both of her hands on the table, before leaning to turn on the light with her head. In another condition ('hands occupied' condition) the experimenter shivered and wrapped a shawl around her shoulders, thus covering her hands. She then leant forward and turned on the light with her head. The light was then pushed across the table to the infant. 69% of infants who had observed the 'hands free' condition responded by turning on the light using their head; whilst only 21% of infants who had observed the 'hands occupied' condition turned on the light using their head. These results suggest that the infants were able to distinguish two separate goals from the behaviours: infants in the 'hands free' condition infants responded to the goal of 'turning on the light with the head', whereas infants in the 'hands occupied' condition responded to the goal of 'turning on the light, simpliciter'.

In each trial the experimenter's behaviour can be described in a variety of ways. One could say that she is illuminating the light, that she is moving her head at a particular speed, that she is smiling, that she is touching the light, that she is touching the light with her head, etc. All of these descriptions could be true for the behavioural sequence observed. Each of these descriptions picks out an aspect of the behaviour. One focuses on its speed, the other on the contact with the light, etc. Each aspect of the behaviour can also be understood as a natural sign for a particular intentional attitude. For instance, the speed of the movement is the natural sign for the intentional attitude of wanting to contact the light with a particular force;[5] touching the light is the natural sign for the intentional attitude of wanting to make contact with the light; touching the light with one's head is the natural sign for the intentional attitude of wanting to touch the light with a particular part of the body. In any behavioural sequence there will be an indefinite number of aspects to that behaviour, some of which will be natural signs for the actor's intentional attitudes, and some of which won't correlate with a particular intentional attitude.

One of these aspects of the behaviour will be the natural sign for what we consider to be the 'appropriate' intentional attitude in that situation. The appropriate intentional attitude is the one we expect the infant to respond to: in the case when the experimenter's hands are free the appropriate intentional attitude is 'wanting to turn on the light with the head'. There is an aspect of the behaviour that is the natural sign for this intentional attitude. The crucial question is how the infant picks out the aspect of the behaviour that is the natural sign for that intentional attitude. It is clear that the infant does respond to the natural sign for what we would term the 'appropriate' intentional attitude, but how she picks that sign out from the variety with which she is presented is puzzling. The puzzle deepens when one takes into account that the infant is not able to have any knowledge of the

[5] This is not an accurate description of the intentional attitude, as 'I want to contact the light with a certain force' is a representational mental state. However, as there is no way of transcribing intentional attitudes into linguistic terms this must suffice for present purposes.

experimenter's intentional attitudes. What could the criteria be for choosing the most appropriate natural sign to respond to, where 'most appropriate' is the natural sign that corresponds with the relevant intentional attitude for this situation? This is a serious challenge for the Enactive account.

One might object that the infant has perceived others turning on lights before, and that this prior knowledge enables the infant to pick out the relevant natural sign here. But this does not help the Enactive account. Although infants will have seen adults turning on lights before, they will have witnessed the most common way of doing so, namely, flipping a switch on the wall. In this situation they perceive someone illuminating a light by touching it with their head. The behaviours which serve as a natural sign for the intentional attitude of 'wanting to turn on the light' are very different across these two instances. It is thus not clear how the infant's prior experience of 'light illuminating' behaviour would help her pick out the appropriate natural sign in this instance.

Noam Chomsky ran a similar argument in 1959 against Frank Skinner's behaviourist account of verbal behaviour (1957). Chomsky's concern was that the 'stimulus' which Skinner claimed caused a particular behaviour could be one of an indefinite number of properties in the environment. One doesn't know which property of the environment is going to 'count' as the stimulus for the organism's behaviour until one sees what the organism responds to. Chomsky offers the example of showing someone a painting and asking for their opinion. One doesn't know which aspect of the painting the subject will comment on until they make their comment. Thus the subject could answer with any one of ''Clashes with the wall-paper, I thought you liked abstract work, Never saw it before, tilted, hanging too low, beautiful, hideous, remember our camping trip last summer?' (1959, p. 31). On a behaviourist approach each of these responses must be caused by a different property in the painting and its surroundings, where each different property is the 'stimulus' for a given response. But this, as Chomsky points out, makes a nonsense of the concept of a 'stimulus', for a stimulus is no longer an objective property in the environment. It is whatever the subject chooses to respond to, and as there are an indefinite number of properties in the situation, one cannot predict what the subject will choose as their 'stimulus' until you hear their response.

Although Chomsky was criticising an account of how very complex behaviours come about, in contrast to the more basic ones the Enactive account is dealing with, I believe a parallel argument afflicts the Enactive account's portrayal of pre-linguistic interactions as consisting in responses to natural signs. 'Natural signs' for intentional attitudes are not an objective feature of our social environment. Instead, one could pick out any property or aspect of a behaviour and say that it is a natural sign for a particular intentional attitude. Natural signs, like properties, are 'free for the asking' (Chomsky, 1959, p. 32). One doesn't know which natural sign, and therefore which intentional attitude, an infant will respond to until she makes her response. It doesn't make sense to say that there is one natural sign 'out there' in the environment for the infant to perceive; rather, there are indefinitely many natural signs reliably correlating with an indefinite number of intentional attitudes

for the infant to perceive. Only one set of these natural signs will correlate with the appropriate intentional attitude for the infant to respond to. The question is, how does the infant pick out those features of the environment which are the natural sign for the appropriate intentional attitude in this instance? The natural signs framework will only succeed if the Enactive account can deliver a more careful account of what a natural sign is, and how an infant chooses the right one to respond to.

In response, the Enactive account could question the assumption that infants have no way of choosing which natural signs to respond to. Rather, the infant has a host of innate sensitivities to particular aspects of social interactions, which make those aspects more salient to them. For instance, it has been demonstrated that pre-linguistic infants are attuned to those movements and behaviours which are normally caused by intentional mental states, paying more attention to them than to those which are involuntary or random (Johnson, 2000; 2003). It has also been found that 9 month old infants will follow another's head movements, whilst 10-12 month infants have the slightly more sophisticated ability to follow another's eye-movements (Meltzoff & Brooks, 2007). These, and a host of other findings concerning infants' attentional capacities, suggest that infants are drawn to salient aspects of a social situation, which facilitates their perception of the relevant natural sign. Natural signs may be 'free for the asking', but an infant's cognitive capacities ensure that she attends only to those signs which are relevant to the particular situation. Once the sign is noticed, she can engage her response to it.

It should be noted that Mindreading views such as Theory-theory and Simulation theory agree that these attentional capacities in young infants play an important role in their early interactions. The difference between these views and the Enactive account discussed here is that Mindreading views argue that this capacity needs to be supplemented by the attribution of some kind of goal or other psychological state in order for the infant to respond appropriately. On the Enactive account, the infant's innate sensitivities attune her to the relevant natural sign, and she responds to the sign with the appropriate behaviour. It seems like the Enactive account offers the more parsimonious explanation, as it does away with the step of attributing a psychological state to the other.

Whether innate sensitivities are sufficient to guide and infant's response to a natural sign, and whether the Enactive account is indeed more parsimonious than Mindreading ones are questions that require further discussion.[6] My aim here has simply been to point out that the problem of determining what counts as a natural sign is a significant one for the Enactive account, and if innate attentional sensitivities are to do the relevant work, then more explanation of how this could be the case and why we should consider them sufficient to do the job is required. However, there remain more significant problems for the Enactive account to counter, and these are what we turn to now.

[6] Fitzpatrick (2009) offers an excellent discussion of the role of parsimony in the mindreading debates.

3.2 One behaviour, many intentional attitudes

Another question facing the Enactive account is 'how do infants track the appropriate intentional attitude when one natural sign could correlate with a number of different intentional attitudes?' When the experimenter pushes the light towards the infant, this behaviour could be the natural sign for the intentional attitude of 'wanting the light away from me' or 'wanting to give the light to you', or 'wanting to put the light in a neutral area'. The same goes for the behaviour of turning on the light with the head. In some cases this behaviour correlates with the intentional attitude of 'turning on the light with my head' and in others with the intentional attitude of 'turning on the light, simpliciter'. Somehow the infant responds to the appropriate intentional attitude in this situation, even though the natural sign of the behaviour correlates with several. The infant cannot know that, even though behaviour *B* is the natural sign for intentional attitudes *X*, *Y*, and *Z*, the appropriate intentional attitude to respond to in this situation is intentional attitude *X*, because this kind of knowledge cannot exist on the Enactive account. So how does the Enactive account explain the fact that infants are able to respond to the appropriate intentional attitude when the natural sign they perceive corresponds with several?[7]

One response available to the Enactive account is to deny that there are behaviours which could be natural signs for a variety of intentional attitudes. There is a one-to-one mapping of behaviour to intentional attitude. What the above argument fails to appreciate is that the behaviour which correlates with an intentional attitude must be specified clearly. It is not the case that 'touching the light with your head' could be the natural sign for the intentional attitudes of either 'wanting to touch the light with your head' or 'wanting to touch the light, simpliciter'. Rather, the description of the natural sign as 'touching the light with the head' is misleading. Instead, one should say that the behaviour of 'touching the light with one's head whilst one's hands are occupied' is the natural sign for the intentional attitude of turning on the light simpliciter, while the behaviour of 'touching the light with one's head whilst one's hands are free' is the natural sign for the intentional attitude of 'turning on the light with one's head'. A more careful description of the behaviour shows that there is a one-to-one mapping between a behaviour and an intentional attitude.

But this does not help the Enactive account, for this response then runs up against the problem discussed earlier, namely, that of how the infant picks out which

[7] One might argue that infants gradually learn how to respond to a behaviour which correlates with more than one intentional attitude through trial and error (I'm grateful to a reviewer for pointing out this possibility). But trial and error cannot explain why a statistically significant percentage of infants in Gergeley's study succeed in responding to the 'right' intentional attitude in a novel situation. How often infants (and non-human animals) are able to respond to the appropriate intentional attitude in novel situations is an empirical question, and further analysis of the empirical literature is needed to address this issue further.

aspect of the behaviour should be the natural sign in a particular instance. For what this response entails is that the infant notices the position of the experimenter's hands as part of the 'natural sign' behaviour that she should respond to. And the question then becomes 'how does the infant make this discrimination?' How does she know that in this case the natural sign she is looking for consists in both a behaviour of touching the light, and a behaviour involving the position of the experimenter's hands? On what grounds does the infant take these features of the behaviour to be the natural sign to which she should respond, rather than a different collection of features of the behaviour? Innate sensitivities alone do not seem up to the explanatory task here, as we must show how they enable the infant to recognise subtle cues and differences between situations. On the other hand, the view that infants can recognise the other's goal, and has some grasp of a principle of directness, can explain the infants' responses. The Enactive account once again faces the problem of explaining how infants pick out the relevant natural sign in the situation they are presented with, reiterating how significant this problem is for the account.

4. The flexibility of human behaviour

The problem of discriminating natural signs in human behaviour is one of two substantive problems for the Enactive account. The second concerns how it explains the flexibility of pre-linguistic behaviour, and indeed of non-human behaviour such as that of bats. This problem stems from the architectural commitments of the Enactive account. If intentional attitudes do not have the correct structure for entering into inferential relations, it is not obvious how the Enactive account explains how the intentional attitude an organism is currently in can affect its response to a natural sign.

As the Enactive account characterises the interaction, a bat perceives an FM wave and responds by flying in a particular direction for a certain distance, and swallowing whatever it finds at that location. One can predict how the bat's behaviour will change as the variables of the strength of FM wave, its distance and direction, alter. But it is misleading to say that 'whenever a bat perceives an FM wave it will engage in "flying towards the source of that wave" behaviour'. If the bat is fleeing a predator it is unlikely to respond to the FM wave in this way; if the bat is full of food it won't engage in this response; likewise if the bat is injured and trying to return to its roost. There are many more variables besides the features of the FM wave that will affect the bat's behaviour, and one needs to account for their effects in an explanation of the bat's behaviour.

The problem is compounded in the human case, for how you respond to another's behaviour depends on the kinds of psychological state you are currently in yourself. Let's take an interaction between an infant and her father, where the father is reaching for a ball that is between them. Her father has the intentional attitude of 'wanting the ball', but according to the Enactive account the infant cannot know that; she can only respond to his behaviour that correlates with that

intentional attitude. In one situation, the infant has the intentional attitude of wanting the ball for herself. In this situation, when she perceives her father's behaviour of reaching for the ball, she responds to the natural sign that is his behaviour by grabbing the ball and moving it towards herself. But in another situation, the infant has the intentional attitude of wanting to assist her father. When she perceives his movement towards the ball, she responds by pushing the ball towards him. What this example is intended to illustrate is that the infant's response to her father's behaviour will vary depending on what her intentional attitude happens to be. What the Enactive approach needs to explain is how the infant can respond to her Father's intentional attitude in a way that concords with her own intentional attitude, whilst being unaware of what his intentional attitude is. Whilst the perception of a natural sign is meant to be sufficient for an infant to engage in an action co-ordination routine, which action co-ordination routine it is appropriate to engage in will depend on what the infant's intentional attitude is when the natural sign is perceived. And it seems to be the case that there are a significantly large number of intentional attitudes the infant could be in, each of which would generate a different response to the natural sign.

The Enactive account could explain the fact that the infant's response to the natural signs she perceives will vary according to her own intentional attitudes by positing a cognitive mechanism which operates in something like the following way (where O^A stands for the perceived 'acting organism' – in this case the father, and '*behaviour B*' is a natural sign for a particular intentional attitude in O^A):

> *If behaviour B is perceived in* O^A *and you are in intentional attitude* $\alpha \rightarrow$ *go into intentional attitude C.*
>
> *If behaviour B is perceived in* O^A *and you are in intentional attitude* $\beta \rightarrow$ *go into intentional attitude D.*
>
> *If behaviour B is perceived in* O^A *and you are in intentional attitude* $\chi \rightarrow$ *go into intentional attitude E...* Etc.

In this way the infant's cognitive system does not need to recognise her father's intentional attitude, but she is still able to respond to his behaviour in a way that is appropriate given her own intentional attitudes. All that is required is that her cognitive system registers what her current intentional attitude is, and what effect that intentional attitude should have on her response to her father. Thus, the infant still responds appropriately to another's intentional attitude without ever representing what that intentional attitude is.

But unpacking what would be required for something like the above story to work proves tricky. One way of doing so would be to say that her cognitive processes contain a series of rules that determine which intentional attitude she should enter on perceiving *B,* with a different rule for each intentional attitude she could be in when perceiving *B*. This clearly won't work, for there is an indefinite number of intentional attitudes the infant could be in when she perceives *B*, and her cognitive system cannot store an indefinite number of rules. Attempt one fails.

Attempt two at unpacking the story is to posit a general rule in the infant's cognitive organisation along the lines of 'if in intentional attitude of type *X* and *B* is perceived, then go into intentional attitude α; but if in intentional attitude of type *Y,* then go into intentional attitude β. But this too is problematic, for it would require pre-linguistic organisms to have the kind of cognitive architecture the Enactive account denies them. Intentional attitudes cannot enter into inferential relations (FPN, p.60), but in order for this story to work they must be able to, as classifying the intentional attitudes as being of one type or another requires that they enter into such relations. Neither of these attempts to unpack the above solution are workable, and no others appear forthcoming. It therefore looks like the suggested response does not work, leaving the Enactive account stuck with the problem of how to explain the flexibility of pre-linguistic social interactions. Non-linguistic organisms are clearly able to alter their responses to others in line with their own psychological states, and if the Enactive account is to be a viable account of social cognition it must explain this phenomenon.

One might suggest that instead of positing explicit rules, we can explain the infant's behaviours simply by reference to a large number of 'mappings' existing between an infant's intentional attitude and how this should affect her response to the behaviour perceived. In this way we can give an account of the infant's reactions without positing a representational cognitive architecture. But this simply brings us back to the fact that there must be an indefinitely large number of mappings stored. The advantage of a rule-based story is that instead of possessing a large number of discrete mappings, the infant instead possesses a small number of generative rules. Not only does this offer a more parsimonious explanation of infants' internal cognitive architecture, but it also has the potential to explain infants' success in responding appropriate to another in novel situations. If the rules are generative and enable the infants to recognise types of intentional attitudes in others, then the infant has the resources to respond to new behaviours in an appropriate way. Once again, further empirical work detailing infants' responses in novel social situations can be used to distinguish between a rule-based account and a trial and error one (see note 7). As things currently stand, the only available explanation for the flexibility of infants' behaviour that is open to the Enactive account is to posit a large number of discrete mappings between all the possible intentional attitudes the infant could have, and how they should affect her response to the behaviour perceived. But it is not clear what the account would gain from such an admission, nor why it is a more parsimonious than that offered by a rule-based account.

5. Conclusion

Daniel Hutto's Enactive account makes two bold claims: first, that pre- and non-linguistic organisms cannot have representational mental states, but only intentional attitudes; and second, that pre- and non-linguistic social interactions are best understood as responses to natural signs. This paper discussed two types of problem with the Enactive account. The first concerns the nature of natural signs.

When it comes to human behaviour, there is an indefinite number of natural signs correlating with intentional attitudes, any of which the infant could respond to. The Enactive account must explain how the infant notices the 'right' natural sign, whilst having no knowledge of the actor's intentional attitude. The Enactive account can counter this criticism by pointing to innate sensitivities that infants have, which cause them to pay attention to salient features of a social interaction. But this does not seem sufficient to explain how infants can pick out relatively complex features of novel natural signs, such as the position of the experimenter's hands in Gergely's study. The Enactive account needs to provide a more detailed explanation for how innate sensitivities can explain infants' success at responding to natural signs in novel situations, and where the natural sign involved is more complex than a head turn, or a reach.

The second type of argument concerns the open-ended nature of human responses. Your own psychological states clearly have an effect on your responses to other's behaviour, but in maintaining that pre- and non-linguistic infants cannot represent another's intentional attitude, the Enactive account has trouble explaining this phenomenon. The only available possibility is to maintain that infants possess an indefinitely large number of 'mappings' which determine, in a non-representational way, how she should respond to another's behaviour given her own intentional attitude. But the question then arises as to why this provides a better explanation for the phenomenon than claiming the infant has a few rule-based generalisations which guide her behaviour. The explanatory advantage of the Enactive account's position is not clear.

In conclusion, the problem of how infants can recognise the appropriate natural sign to respond to from the large number they are presented with, is significant for the Enactive account, but there are some ways it can be countered through appeal to the innate attentional sensitivities of infants. But there remains the problem of offering a satisfactory explanation for the flexibility of infants responses, and I have argued that positing a large number of discrete 'mappings' between an intentional attitude and behaviours perceived is not an adequate explanation. As things currently stand, Hutto's Enactive account does not provide a viable alternative to traditional accounts of social cognition.

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