

**Original citation:**

Hoerl, Christoph (2002) Reply to Jean Decety : perception of actions and the understanding of agency. In: Dokic, Jérôme and Proust, Joëlle, (eds.) Simulation and Knowledge of Action. Advances in Consciousness Research , 45 . Amsterdam ; Philadelphia, PA: John Benjamins Publishing Company, pp. 73-85. ISBN 9789027251695.

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<http://dx.doi.org/10.1075/aicr.45.07hoe>

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## Perceiving Actions and Understanding Agency A Commentary on Jean Decety

Christoph Hoerl

1. Let me start this commentary by quoting a passage from a paper by Andrew Meltzoff and Keith Moore:

“The human act may be the earliest, most aboriginal parsing of the world into things that bear on the self and those that do not. [...] When a human act is shown to a newborn baby, the act may provide its first ‘aha’ experience. ‘Lo! Something interpretable. That (seen) event is like this (felt) event.’ The fact that infants can recreate the act allows them to give it special meaning” (Meltzoff & Moore 1995, p. 54).

One way of reading this passage is in terms of the claim that our ability to imitate others’ actions holds the key to answering the question as to how we come to understand what it is for others to be like us, and for us to be like them. On closer inspection, however, the precise way in which imitation is supposed to come in here is quite unclear.

On the face of it, it might seem as though the ‘aha’ experience Meltzoff and Moore talk about arises from the ability to interpret what we see others doing as being just like what we can feel ourselves doing. Thus understood, it would seem that we first have to have the required ‘aha’ experience before we can imitate others. Imitation, on this view, would at best be something like the most fundamental way of putting to use our understanding of others as being like us, but it could hardly be said to explain what makes such an understanding possible. Alternatively, we might think that it is simply a brute fact that we feel just the same when we watch someone doing something as when we do it ourselves (or, as we would feel if we did it ourselves), and that this can explain the ‘aha’ experience. On this view, imitation might be seen as a way of greeting a perceived action as familiar by recreating it. Yet, if this is right, what makes the two actions different, what makes the perceived action yours and the imitation of it mine, is in danger of dropping out of the picture.

Meltzoff and Moore are clearly aware of these problems. What I am interested in here is the way they try to solve them. For them, the problem is how our own actions and those of others are represented. Very roughly, the point is as follows. In some sense, our own and others’ actions must be represented the same way, or else it would remain mysterious how we ever come to understand what makes us and others the same.

Yet, in another sense, our own and others' actions must be represented differently, or else it would remain mysterious how we ever come to grasp what makes some actions ours and others those of other people.

What Meltzoff and Moore suggest, in effect, is that we can reconcile these two points by drawing a distinction between two levels at which questions about representations can be addressed.<sup>1</sup> When Meltzoff and Moore talk about the sense in which we can be said to represent our own and others' actions in the same way, they say that they are represented in the same mental code. What this means, I take it, is that imitation does not really require us to forge a link between what we see others doing and what we can do ourselves. The correspondence between the two is written into the causal structure of our brains.<sup>2</sup> By contrast, when Meltzoff and Moore talk about the sense in which we can be said to represent our own and others' actions differently, they say that it is up to us whether we imitate someone or not, that we can correct our imitations, or recognize being imitated by others. Here, it is us who are described as doing certain things, not our brains, and it is with respect to this aspect that our understanding of others as being like us is ultimately a matter of what we can do.

Setting things up in this way suggests a certain division of labour in the empirical study of imitation. On the one hand, we would like neuroscience to give us some idea of what it means to say that actions we see others perform and actions we perform ourselves are represented in the same mental code, by looking at what happens in the brain when we perceive and imitate the actions of others. On the other hand, we would like developmental psychology to provide us with some story as to how children's ability to understand others as being like them, and them as being like others, develops, by charting the growing sophistication of imitative behaviour in children.<sup>3</sup>

2. Jean Decety presents a broad array of behavioural and neurophysiological data which support the idea of a fundamental connection, on the level of the brain, between perceiving actions and carrying out actions oneself. In what follows, I wish to concentrate on two questions: To what extent do these findings support the idea of a

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<sup>1</sup> The distinction that seems to be at work here shares much with the distinction, introduced by Daniel Dennett (1969), between a sub-personal and a personal level of explanation.

<sup>2</sup> See also Prinz 1997.

<sup>3</sup> To be sure, neuroscience might also have a say on the latter question, by investigating what it is about our brains that allows us to conceive of our own actions as ours and those of others as theirs. Decety, for instance, discusses different mechanisms for discriminating self-produced from observed action as proposed by Frith (1992) and Jeannerod (1999).

common mental code for perceived actions and actions carried out by the subject herself; and, to the extent that they do so, can they also help us make sense of the idea that there may be different levels of sophistication or different steps in the development of our understanding of agency?

The first thing to note, I think, is that the claim that perceived actions and performed actions are represented in the same mental code is more specific than the claim that there is a link, on the level of brain mechanism, between perceiving an action and performing an action.<sup>4</sup> I am thinking here, for instance, of experiments involving so-called Johansson figures (see Johansson, 1973). In those experiments, participants are shown a display in which all that can be seen are a number of point-lights which move in a certain way with respect to each other. The display is actually achieved by filming a person whose body is covered in black cloth against a black background. The point-lights are usually fixed to the person's joints, and their relative movement results from the movements the person carries out. The finding is that participants can make very precise discriminations just from watching this kind of point-light display. The speed at which they can do so depends, to some extent, on the nature of the activity to be recognized, but, basically, it turns out that we judge that there is a person doing certain things on the basis of very limited information about certain patterns of movement.

On the basis of these observations Decety hypothesises that, in the recognition of biological motion, perception and recognition processes are mediated by the implicit knowledge of certain production rules. The question I wish to raise is whether these experiments necessarily show that these rules are the same that underlie production of our own behaviour, as the idea of a common mental code for perception and action (at least according to Meltzoff's and Moore's construal) would seem to demand.

Other animals (including other human animals) are the kinds of things we can often only see bits of. Sometimes all we can see is a particular pattern of motion, without actually seeing the animal itself, as when a snake is slithering through high grass. Yet, what we are dealing with, whether it is friend or foe or food, and what they are up to, can be extremely important for us and our survival. It is therefore not surprising if we find that mechanisms have evolved that are keyed to the recognition of biological motion, and

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<sup>4</sup> Influential accounts of a general connection between perception and action can be found in Sperry (1952) and Gibson (1979). The term 'common mental coding' is also often used in this context. Thus, for instance, it has been argued that perception and action use the same system of egocentric spatial co-ordinates (Evans 1982). Arguably, however, the idea of a common mental code for observed and performed actions, as outlined above, is more than just a specific application of this general idea. In what follows, I shall therefore use the term in the narrow sense intended, for instance, by Meltzoff and Moore.

are linked directly with action. But talking about a direct link, here, is not the same as talking about a common mental code in which both perceived action and appropriate response are represented. For one thing, the appropriate response is rarely of the same kind as the perceived action. Moreover, if what is perceived is the action of an animal of a different species, there may not even be a common motor pattern shared by the action we perceive and any actions we could carry out.<sup>5</sup>

The general point here is that experiments involving Johansson figures may show that we have some kind of implicit knowledge of the principles underlying perceived behaviour. Furthermore, this kind of knowledge may indeed have a crucial role to play in various forms of psychological understanding. Here we might think, for instance, of the kind of practical grasp of the significance of others' behaviour that Niko Frijda describes when he says that "understanding a given reaction as anger may consist of reading oneself for attack" (Frijda 1969, p. 169).<sup>6</sup> However, while this kind of practical grasp requires some causal link between perception and action, it does not require that perceived actions and self-initiated actions are represented in the same mental code.

3. Let me now turn to some of the other findings mentioned by Decety, which appear to provide much firmer footing for the claim that perceived actions and self-initiated actions are represented in the same mental code (e.g., Fadiga et al. 1995, Gallese et al. 1996). What these findings suggest, in effect, is that the actual brain mechanisms involved in perceiving an action and carrying out that action oneself overlap (at least under certain conditions).

Why should such findings be important? I think one reason why research in this area is interesting is because of what it might be able to show us about the difference between the kind of practical grasp of others' activity described in the previous section, on the one hand, and imitation, on the other. Imitation involves more than just responding to the other's action in some appropriate way, where responding in the

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<sup>5</sup> There is some evidence that suggests that the ability to recognize biological motion is, at least in one sense, part of a more general ability to recognize structure from motion, which, for instance, also allows us to infer the shape of inanimate objects in rotation from the relative movements their parts. Thus, for instance, in a patient studied by Vaina et al. (1990), performance on early motion tasks was very poor, but both biological motion and structure from motion perception remained intact. See also Marcar et al., 1997.

<sup>6</sup> This example was brought to my attention by Johannes Roessler.

appropriate way just happens to consist in reproducing the same action.<sup>7</sup> And what I wish to suggest is that the idea of a common mental code can make intelligible a sense in which it does so. In short, I wish to argue that there is a connection between the idea of a common mental code involved in perceiving and performing the same action, as something that can be studied empirically, and our common sense understanding of what imitation is.

I think there are important parallels between this issue and an issue which stands at the heart of so-called ‘architecturalist’ theories of the mind (cf. Davies 1991). One of the questions these theories try to address may be illustrated as follows. In what way must Paris be represented in my belief ‘Paris is the capital of France’ and my belief ‘The Louvre is in Paris’, if I am to be able to draw the conclusion that the Louvre is in the capital of France? What we need to explain, in short, is the sense in which my arriving at the conclusion is more than the result of a mere association of ideas which just happen to be about the same city. Talking about people as drawing inferences, the argument goes, is in part a matter of casting what they do in a causal explanatory framework. If I am to be said to be able to draw the required inference, there must be a common causal factor in my thinking about Paris as the capital of France and my thinking that the Louvre is in Paris. Talk about this common causal factor is part of an explanation as to what makes it transparent to me that the city in question is one and the same, what it means to say that I am thinking about that city in the same way in both premisses, and can therefore arrive at that conclusion.

What I want to suggest, in short, is that talking about someone imitating somebody else is similarly in part a matter of casting what they do in a causal explanatory framework. Here, the question may be put as follows: in what way must what I see others doing and what I can do myself, respectively, be represented if I am to be capable of imitating what others are doing? And part of the answer is that there must be a common causal element to a subject’s perception of the action performed by the other and her own production of that action, which explains why it is that action which is performed. Again, appeal to such a common causal factor is necessary to explain what makes it transparent to the subject how an observed action is to be replicated, how the subject can just read off from other’s behaviour what to do. This, I take it, is the real force behind saying that perceived and performed actions are represented in the same mental code. However, it is also precisely the kind of claim to which those neurophysiological studies may be thought to lend support in which perception of

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<sup>7</sup> One way in which this point can be brought out is that talk of an individual as imitating another individual also has specific counterfactual implications, viz. that the individual doing the imitating would have done the same as the individual who was being imitated, even if the latter had done something different.

others' actions selectively activates those brain areas also activated when the very same actions are carried out by the subject herself (see also Rizzolatti et al. 1996).

4. It is tempting to move from the idea of a common mental code, i.e. from the idea that perceived actions and performed actions are represented in the same way, to the idea that imitation involves thinking about others' actions in the same way as thinking about one's own actions. In my view, however, there are various grounds for finding such a move suspicious, or at least we have to be careful about how the notion of 'thinking about actions' is to be spelled out in this context.

Consider the case of deferred imitation. In experiments carried out by Meltzoff (1990), children saw an adult touching the top of a box with his forehead, whereupon a light came on inside the box. They saw this action only once, and the box was removed as soon as the adult had performed the action, without giving the child the chance to touch the box herself. What Meltzoff found was that 14 month olds, when re-introduced to the box after one week's delay, reproduced the action they had seen the adult perform. Information about what the adult had done, it seems, was retained in such a way that it translated directly into doing the same thing.

One of the reasons why Meltzoff is interested in the outcome of this experiment is because he thinks it has important implications for theories of children's memory capacities. In this, I think, he is correct. What I think is not correct is to assume, as he does, that these studies provide evidence for a developing capacity for episodic memory, i.e. that the children can be said to remember the adult's action as a particular event in the past. What I wish to suggest, instead, is that the children remember something about the box, something they have been let in on by the adult, but something that they can remember without, say, having a concept of actions as individuated by the time at which they happen or by the person who carries them out. Imitation, here, is in the service of dealing with the world rather than dealing with others or oneself. In other words, the fact that it is someone else's act which is imitated need not enter into the intentions of the subject who is doing the imitating.

By saying this I do not wish to imply that there aren't serious questions to be asked about the kind of psychological understanding involved in deferred imitation. For instance, it may be argued that the capacity for deferred imitation develops together with a grasp of certain enabling conditions for actions, such as the fact that one must attend to the object and recognize that it affords a certain action. People, it might be said, must thus be understood as being different from other things in virtue of the fact that they possess particular causal powers needed to actualize certain affordances in objects. Similarly, it might be said that this understanding of people in general carries in it the seeds for a distinction between me and others. In this context, it might, for instance, be interesting to look more closely at the developmental stage at which the fact that

somebody else does what the child is already capable of doing for herself becomes a source of frustration for children.

The main point I wish to stress here is that deferred imitation, inasmuch as it involves an understanding of others as psychological subjects, may not as yet involve a full understanding of their subjectivity, for instance in the sense that they may have desires that I don't share. For one thing, what drives the imitation, here, is the fact that what has been perceived had an outcome which, for the individual who imitates it, was desirable. It is difficult to see how an understanding of others' actions as potentially driven by desires that the individual herself does not share should develop from this basis.

5. Some theorists have argued that an important requirement for a full understanding of others' actions is the ability to imagine performing those actions (see, e.g., Baresi & Moore 1996). I think we can now see why imagination should be deemed important in this context. In imagination I can go through an action in my mind without the goal of that action being a goal that I desire. Perhaps it is by way of imagining doing what we see others doing that we come to have an understanding of them as agents like us, and yet agents whose subjective point of view is potentially different from ours.

One of the most interesting things shown by some of Decety's studies is that there is a very robust sense in which people can be said to go through an action in their minds when they imagine performing that action. Specifically, what we find is that, when someone imagines an action, the same brain areas are activated as when they actually carry out that action (Decety & Ingvar 1990, Decety 1996). We even find that changes in heart rate, respiratory rate, ventilation and blood pressure occur, which correspond to changes we would see if the action were actually carried out (Decety et al. 1993).

One thought that is sometimes put forward in this context is that imagination might provide me with an idea of what it would be like for me to perform the imagined action, such that, if I see someone else performing that action, I can somehow extrapolate from my own case to theirs. Imagination provides me, so to speak, with the subjective view that I would have if I were the agent, which I then impute to the other. This line of thought has obvious affinities with the approach to the problem of other minds suggested by the 'argument from analogy', and I think it faces the same sorts of problems as that approach. Very roughly speaking, if imagination revealed only what is true of my own case, it would be hard to see what could justify the thought that what is thus revealed to me might equally apply to someone else, or how I might even make sense of such an idea.

However, I believe that there is an alternative way of spelling out a role for imagination in the understanding of actions which avoids the pitfalls associated with the idea of an extrapolation from one's own case. Put bluntly, the suggestion would be that



when I imagine performing the other's action, the question of what she is up to is somewhat beside the point. I am not so much after an understanding of what is going on with her, or what would be going on with me if I did the same thing as her. What I am after is an understanding of what it is to do it (I hope to make clearer what I mean by this in a moment).

There is one set of studies Decety reports on which I think is particularly interesting in this context (cf. Decety et al. 1997, Grèzes et al. 1998). In these studies, positron emission tomography was carried out on participants under two different subjective conditions. They were instructed to watch pantomimes, and in some cases they were told that they would be asked to recognize those pantomimes later, while in other cases they were told they would be asked to imitate them later. If I understood the data about the brain regions activated under these two conditions correctly, and the way in which they fit together with Decety's other studies, the results are consistent with the idea that participants in the imitation-condition actually imagined performing the action while they saw it, whereas participants in the recognition-condition typically didn't.

If this is correct, we have to ask just how imagination may be thought to come in here. Imagination is subject to certain causal constraints.<sup>8</sup> Consider a case in which I imagine performing an action that I have observed someone else performing. I think it is plausible to say that I can only be said to perform that action if my imaginative exercise is suitably causally related to what I have seen. There might not be such a causal connection, but then the best I could be said to be doing is imagining performing an action of a certain sort, where that sort of action just happens to be the same as the sort of action I have seen the other perform.

But there is also a further set of causal constraints that my imaginative exercise is subject to. This comes out when we consider the following kind of case. Suppose the person I am watching is a contortionist, bending her limbs in a manner far beyond my own physical capabilities. In this case, I might be able to bring myself to visualize what I might look like if my body was being contorted in the same way, or even imagine certain sensations I would have, such as a tension in my leg, or the feeling in my toes as they touch my hair. But, arguably, this falls short of imagining performing the action that the contortionist performs. In general, it seems that I can only be said to imagine performing a particular action if my imaginative exercise is suitably causally related to my own ability actually to perform that action. I might be able to push the limit somewhat, and imagine doing something that is not quite within the range of my current abilities, but beyond a certain point imagination simply gives out.<sup>9</sup>

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<sup>8</sup> In what follows, I draw heavily on Williams, 1973, and Peacocke, 1998.

<sup>9</sup> Decety & Jeannerod (1996) report interesting evidence which suggests that subjects need not conceptualize the constraints their imaginative project is answerable to in order

If these considerations are along the right lines, how do they bear on the question as to what the participants in Decety's imitation-condition are trying to work out by using their imagination? As I have already indicated, my suggestion is that what they are trying to work out is what it is to perform the action in question. Now, if what I have been saying is correct, their imagination can only make available such knowledge in as far as they possess the abilities required for actually performing that action themselves, because the success of the imaginative project is dependent on those abilities being in place. But that is just as it should be. After all, their knowledge ought to answer to what it is to perform the action, and it is difficult to see how imagination unfettered by ability could secure this.

What I have in mind by talking of knowledge as to what it is to perform a certain action is thus a species of knowledge 'from the inside', at least in the sense that it can't be acquired purely by observation, but presupposes certain physical capabilities on the part of the subject herself. But we must be careful not to conflate talking about knowledge 'from the inside', in this sense, with talking about knowledge pertaining only to me. While it is true that imagining performing an action presents that action from a subjective point of view, just like imagining seeing something presents what I imagine to see from a subjective point of view, it does not follow that this subjective view is presented to me as mine. What is presented is what it is (or would be) to perform a certain action or to see a certain scene, but not necessarily in such a way that I first understand these things for my own case and then extrapolate to that of others.

6. What I have done so far is talk about various ways in which we can be said to be responsive to others' actions, learn from them how to do things, or imagine actions, which do not seem to require the ability to individuate actions in terms of the agent by whom they are carried out. I wish to conclude with a speculation on the kind of context I believe we need to look at if we want to find out what it takes to have a concept of agency that involves conceiving of me as the author of some actions, and of others as the authors of other actions.

Take, for instance, the case of language acquisition. Without doubt, the ability to imitate others' utterances plays an important role in learning how to use language. But saying this tells us little about just how deep the connection goes. One idea here might

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to be sensitive to such constraints in going through the imaginative exercise. They demonstrated that participants who were instructed to imagine walking through a gate presented at a certain distance from them performed differently depending on the width of the gate. Their responses were found to accord with Fitt's law, according to which there is a tradeoff between speed and accuracy in action. Yet, it is unlikely that participants knew about this law.

simply be that speaking a language is a skill one can only learn by practising, like riding a bicycle. But, possibly in contrast to riding a bicycle, it is not a skill we could work out for ourselves. The only way we can acquire the relevant skill is by picking it up from others. Hence the importance of imitation. The basic thought here would be that language acquisition is a matter of acquiring a skill that involves following a convention, somewhat akin to learning to follow the highway code. Basically, we must grasp that communication can only succeed in so far as we and others abide by the same rules. It is possible to argue, however, that this view of language doesn't go quite deeply enough.

What is left underdetermined by pointing out the conventional nature of language, it may be said, is the extent to which mature linguistic communication requires a grasp of others as language users like myself. It is one thing to understand that communication is a means of doing certain things which relies on others' co-operation. It is another thing to understand that communication is a means of doing certain things that can only succeed in so far as it is also at the other's disposal.

That there is a difference here might come out more clearly when we consider the difference between imperatives and declaratives. The latter difference seems to turn, in part on the grasp of others as language users that is involved in using imperatives and declaratives, respectively. Arguably, it is from others that we must first learn the use of both imperatives and declaratives. At its most primitive, however, the actual use of an imperative does not seem to require grasp of the other as a potential issuer of imperatives himself. When I am using an imperative, I might be interested in what the other can or can't do only to the extent that I am interested in what I can make them do. In some ways, I treat the other like an extension of myself. In using a declarative, by contrast, what the other can or can't do seems to enter into my reasoning in a stronger sense. Put crudely, what I must grasp is that I need to choose the same words that the other would use to refer to the things that I am trying to tell them about. In other words, when using declaratives, I must be sensitive to the fact that the success of my project is not just dependent on what I can make the other do, but also on what they can do independently of me.

The more general suggestion I wish to put forward is that a mature grasp of oneself and others as agents is interdependent with grasp of the communicative use of action and imitation. Admittedly, this is as yet extremely vague, and much more would need to be said about how this suggestion is to be spelled out in detail. The basic point I wish to make here is that, in as far as communication in this sense requires the ability to imitate, to do what we have seen others doing, what we are considering here is not just a new kind of context, different from the ones discussed previously, in which imitation is used. We are also considering a new kind of imitation. If what I have been saying is right, imitation, in the sense required here, is not just a matter of doing what we have seen others doing (where the fact that we have seen them doing it causally explains our

capacity to do it), it is also a manifestation of our grasp that what we are doing is something they are capable of doing themselves.

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