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Abstract

The purpose of this paper is to examine under what conditions it makes sense to say that we are capable of *perceiving* actions performed by other agents as intentional and, thus, of identifying the intentions governing these actions.

Whether it makes sense to say that intentions can be perceived rather then inferred depends in part on what notion of intention one has in mind. The first step in the paper will therefore involve specifying the notion of intention at stake. Two rather different conceptions of intentions and intentional action should be distinguished: one stresses their relation to reasons, the other their executive dimension. On the former view, to say that someone acts intentionally or with an intention is simply to say that she acts for reasons, i.e., that some appropriate relation obtains between the agent's beliefs and desires and her actions. The latter view stresses the executive dimension of intentions, their role as plans or representations that guide and control the action. On this latter view, an action is intentional if it is caused by representations that guide and control its unfolding. It is also important to stress that, on both views, intentions can form hierarchies: there may be hierarchies of reasons for a given action or it may be that intentions considered as elements of an action plan are themselves hierarchically organized.

I will concentrate on the 'executive' conception of intentions and intentional actions. I will argue that intentional bodily movements have distinctive observable characteristics that set them apart from non-intentional bodily motions. I will also argue that that when we observe an action performed by someone else, the perceptual representations we form contain information about the dynamics of movements and their relations to objects in the scene that can be exploited in order to identify at least the more basic intentions of the agent. In the final part of the paper, I will offer some suggestions as to how this capacity to perceive the actions of other agents as intentional relates to our capacity to recognize our own actions as intentional.

1. Introduction

The purpose of this paper is to examine under what conditions it makes sense to say that we can *perceive* actions performed by other agents as intentional and, thus, in a sense, can perceive intentions. What I propose is therefore a limited foray in the philosophical minefield known as the Problem of Other Minds. It is limited in the sense that I will be concerned only with intentions to the exclusion of other kinds of mental states and that furthermore I will be concerned with intentions understood in a specific way. It is also limited in the sense that although at the end of the paper I will risk a few remarks on what is called the semantic problem of other minds, I will mostly concentrate on the epistemic problem of other minds. I will proceed as follows. I will start with some stage setting and a brief sketch of how the problem of other minds in its common formulation stems from a Cartesian picture of the mind. I will then concentrate on intentions and specify the notion of intention I have in mind. Having done that, I will present evidence for the claim that we can perceive intentions in the sense previously defined. In the final part of the paper, I will offer some tentative remarks on how our capacity to perceive the intentions of other agents may relate to our capacity for knowing our own intentions and on how this might bear on the semantic problem of other minds.

2. Intentions and the problem of other minds

It is commonly held that there is a fundamental asymmetry between the way we know of our own mental states and the way we may come to know the mental states of others. One traditional way of construing this asymmetry is as follows. Knowledge of one's own mental states is said to be both non-observational and non-inferential, whereas knowledge of the mental states of others is thought to be based on observation together with inference. These

supposed differences give rise to two skeptical worries. First, we may worry how the meaning of our mental terms and concepts could ever be univocal if the criteria we appeal to when applying these terms and concepts to ourselves are radically different from the criteria we use when applying them to others. In other words, if it is constitutive of a mental concept or of the meaning of a mental term that they have certain criteria of application, then it may be doubted whether the relation between first-person concepts of mental states and third-person concepts of mental states is anything more than one of mere homonymy. This is what may be called the semantic problem of other minds. Second, we have an epistemic problem. Here, the worry concerns the very possibility of knowledge of other minds, hence whether our claims to knowledge can ever be justified. If our access to the mental states of others is inferentially mediated, if the process through which we make mental attributions to others is one of theoretical inference from an observation of behavior to an attribution of a mental state thought to be its causal antecedent, then it seems in principle possible that the theory upon which the inferences are based is incorrect and therefore that any given attribution of a mental state to others could be false.

As a number of philosophers have remarked[1], this way of conceiving of the problem of other minds is a consequence of a Cartesian picture of the mind and its relation to bodily behavior. According to this picture, the mind is an inner realm and mental states are internal states whose intrinsic mental character is independent of anything external including the subject's body and its behavior. Conversely, human bodies are conceived as merely material objects and their behavior as being intrinsically non-intentional. What confers intentional properties to behavior are its inner mental accompaniments and causes. In other words, nothing intrinsic distinguishes a mere bodily happening from a piece of intentional behavior; the difference is one of causal antecedents and since internal mental causes can't be directly

[1] See, for instance Child, 1994.

observed they must be inferred, thus leaving open the possibility that the inference be incorrect.

Of course, the Cartesian picture of the mind is not the only game in town. One possible alternative, outlined by McDowell[2], is that the concept of a 'human being' should be viewed as basic, 'as a seamless whole of whose unity we ought not to have allowed ourselves to lose sight in the first place' (McDowell, 1982: 470). One consequence of this view is that behavior and mentality are much more integrated than the Cartesian picture suggests and that, in favorable circumstances at least, the fact that someone else is in some mental state can itself be an object of one's experience, that is be available to awareness in its own right and not merely through behavioral proxies.

My purpose here is to offer a limited defense of this alternative approach, one restricted to intentions. The claim I want to defend is that intentions can be, at least in some circumstances, transparent in behavior, that they can be directly observed and don't have to be inferred on the basis of behavioral proxies. Let me label this claim the transparency thesis. Note that my referring to McDowell in relation to this position should not be taken to imply that my defense of the transparency thesis will go along the same lines as his defense of it. Indeed, I will have very little to say about the space of reasons. My approach will be much more down to earth. I will focus rather on the close links between perception and action and will present some empirical evidence that intentions can be perceived.

3. An executive conception of intentions

One further thing I must do before laying out my defense of the Transparency Thesis is make it clear what notion of 'intention' I will be working with. As remarked by Velleman (1989), in the theory of action literature one finds two rather different conceptions of

[2] Note that according to McDowell this was also Wittgenstein's view. The idea that the notion of a 'human being' or a 'person' should be taken as primitive is also present in Strawson (1959).

intentions and intentional action: one stresses their relation to reasons, the other their executive dimension. On the former view, to say that someone acts intentionally or with an intention is simply to say that she acts for reasons, i.e., that some appropriate relation obtains between the agent's beliefs and desires and her actions. Here, an intention is the reason or motivation one has for acting in a certain way. The latter view stresses the executive dimension of intentions, their role as plans or representations that guide and control the action. On this latter view, an action is intentional if it is caused by representations that guide and control its unfolding. It is also important to stress that, on both views, intentions can form hierarchies: there may be hierarchies of reasons for a given action or it may be that intentions considered as elements of an action plan are themselves hierarchically organized. One way to contrast the two approaches is to say that although both appeal to the notion of a goal, the former one is essentially interested in how this goal finds its inscription in the space of reasons, in how it relates to beliefs and desires, whereas the latter is interested in how the goal shapes and controls behavior, how it relates to know-how. The former approach is thus essentially backward-looking, whereas the latter is forward-looking. This difference of emphasis has consequences for which actions will be considered intentional. Take, for instance, the following example adapted from Mele (1994). Tom, who has never handled a gun before but is offered a large prize for hitting the bull's-eye on a distant target, aims carefully, fires and hits the bull's-eye. Does he do it intentionally? Here, proponents of the backward-looking view might answer positively. Tom's action was intentional insofar as his action was done for a reason — Tom wanted the prize money and thought that to win it he had to hit the bull's-eye — and thus he acted with the intention to hit the bull's-eye. On the other hand, advocates of the forward-looking approach would probably deny that the action is intentional, insisting that hitting the bull's eye is not sufficiently within the control

of the agent because he lacks sufficient skill and because there is therefore an important element of luck involved in the action resulting in success or failure.

The notion of intention I am going to focus on is the one privileged by the forward-looking approach, i.e. intentions considered as plan-states rather then as reasons or motivations. More precisely I will be interested in the ultimate, most basic elements in plans. Plans involve both orienting beliefs, beliefs about the circumstances one is in, and instrumental beliefs, i.e., beliefs concerning means and preliminary steps. These instrumental beliefs may be said to incorporate knowledge as to how to bring about a certain desired result. However, as Israel, Perry and Tutiya (1993) have argued, when the agent's orienting instrumental beliefs are correct, what ultimately accounts for the success or failure of an intended action are the bodily movements performed. Thus, a full explanation of action must incorporate more than just orienting and instrumental beliefs. What must ultimately be accounted for are the bodily movements performed by the agent. These authors suggest that in order to account for these movements, we must introduce the notion of a belief-how. A belief-how concerns the relations between movements and action. It is a belief that performing a movement of a certain kind in certain circumstances is a way of bringing about a certain result (hence of performing a certain action) in those circumstances. Moreover, for an agent to have such a belief-how, not just any idea of the type of movement in question will do, the agent must have an executable idea of it. That is, he must know or think he knows how to perform movements of this type. Beliefs-how are thus the ultimate elements in a hierarchical plan for action.

What I want to further suggest is that in order to be in a position to account for the specific conditions of success of an action, we need to appeal to very detailed executable representations of goal-oriented bodily movements. But then it becomes implausible to ask that these representations should be fully specified before the onset of action, for requiring

that an agent form a very detailed representation of the movement before its execution threatens to impose on him an excessive cognitive burden, especially if the movement is somewhat complex. However, nothing forces to assume that all the representational work has to be done and be over with before the execution starts. Representations do not just trigger the action; they also guide and control it until its completion. One way to account for the specific conditions of success of a given action, while avoiding the problem of cognitive overload, is to consider that the representations that guide and control the movement are not fully specified before its onset but are dynamical and relational and serve to adjust the movement to the changing context in which it unfolds. As another way to put it, the degree of specification of the bodily movements depends on the degree of specification of the circumstances. It is implausible to suppose that an agent represents the circumstances in all their fine-grained detail in advance of the action. Very specific and transitory circumstances don't have to be represented in advance of action because they will be represented as the need arises in the motor representations that will guide the action. My suggestion is that the variable circumstances that have to be represented for an action to be executed divide into macro-circumstances, represented in advance of action and into micro-circumstances that are represented as the action proceeds through a dynamical sensorimotor loop.

My general point here is that if we take seriously an executive approach to intentions, one that leads us to deny that an action is intentional if the agent doesn't have a reliable plan or sufficient skill, then an intention shouldn't be conceived as a purely mental antecedent of the action, as a trigger whose work is over once execution starts. To use some of Searle's terminology, for some piece of behavior to quality as intentional it is not enough that it be caused by a prior intention, rather the intention should ultimately get deployed in the action itself as an actualization of motor know-how.

My further point is that if we look more closely at what motor know-how consists in, then it becomes apparent that intentional behavior bears its status on its sleeve. I can't even begin to give a systematic discussion of the fast growing empirical literature on motor representations[3], but I will mention some general characteristics of these representations. Motor representations involve rapid sensorimotor transformations. They code simultaneously for situation, goal and means. The situation is coded in terms of a goal it affords and the goal itself is coded in terms of the means — i.e. the bodily movements — towards its achievement. Three related characteristics of motor representations are worth stressing. First, perception for action yields representations with a specific content. Attributes of objects and situations are represented in a specific, pragmatic mode used for the selection of appropriate patterns of action. Or, to use a philosophical terminology introduced by John Campbell (1994), they are represented in a causally indexical way, in terms of their immediate implications for action. The visual scene is therefore pragmatically organized in terms of the dynamics of a goal-directed behavior. Thus, for instance, if one wants to pick up an object, its location will be represented in terms of the kinds of movements necessary for reaching it and its shape and size in terms of the kind of grip they afford. Second, the representations of the movements to be effected also reflect an implicit knowledge of the biomechanical constraints and kinematic rules the body is subjected to. Third, motor representation normally code for transitive movements, where the goal of the action determines the organization of the whole movement as well as the perceived organization of the scene around the agent. Usually, a situation offers not just one but several possibilities for actions and can in principle be pragmatically organized in many different ways. The presence of a goal has the effect of making one such organization more salient than the others. Thus, for instance, the movements of the arm in reaching for grasping

[3] See Jeannerod (1997, 1999) for an overview and synthesis of recent work in the cognitive neuroscience of action.

and in reaching for hitting have different kinematic patterns (Marteniuk et al., 1987) or, to take a different example, the type of grip chosen for grasping an object is made according to the subsequent use of the object so that awkward or uncomfortable hand positions are avoided and the time spent in extreme joint angles is minimized (Rosenbaum *et al.*, 1990; Rosenbaum and Jorgensen, 1992).

Intentional bodily movements therefore have very distinctive properties, they are simultaneously constrained by the agent's goal, by the attributes of the situation and by a set of kinematic and biomechanical rules that jointly shape its dynamics. In other words, the relational properties of an intentional bodily movement are not purely extrinsic to it, they are so to speak internalized and reflected in its organization. Intentional bodily behavior therefore has observable characteristics that set it apart from the non-intentional behavior of material objects, including passive bodily movements. Its kinematics is distinctive and its dynamics is contingent on both the goal of the agent and the features of the situation.

What I will now argue is that it is the distinctiveness of intentional behavior that makes it possible to claim that we can perceive intentional action as such and hence in a sense perceive intentions. More precisely, the claim will be that the motor know-how that ultimately allows us to act intentionally is also the know-how that allows us to perceive intentions in the actions of other agents.

There remains however an important obstacle to the idea that intentions are perceptible as such. Resistance to this idea can be traced back to an implicit (or explicit) acceptance of what Susan Hurley (1998) has called the Classical Sandwich Model, the view that perception and action are separate and peripheral, one an input system the other an output system, whereas cognition is central and separate from processing of perception and action.[4] On this view, perception and action systems are conceived as separate modules, each with

[4] See also Brewer (1993) for a critique of this classical model.

their proprietary codes and processing rules. The principles according to which visual coding and motor coding group token visual patterns and motor response patterns respectively into types are completely different. Their respective classifications, dimensions of similarity and variations are thus disparate and the links between them arbitrary. One consequence of this view is that the extraction of the significance of visual patterns for action requires a complex translation between different types of contents. A further consequence is that when we are visually presented with an action performed by some other agent, the way this visual pattern will be typed by our perceptual system will bear no direct relation to the motor type the seen behavior is a token of. Thus, adherence to the Classical Sandwich Model implies that intentions cannot be directly perceived.

What we have said about the kind of visual processing involved in motor preparation shows that this model cannot be fully correct. The existence of what is called pragmatic processing of visual information suggests that the motor significance of visual input can be directly extracted and the visual scene organized in terms of the patterns of motor activity it affords. However, even if one acknowledges the existence of visual pragmatic processing, there is one possible line of retreat that retains enough of the Classical Sandwich Model to maintain the conclusion that intentions are not perceptible. This consists in conceiving vision for action and vision for identification and semantic purposes as two separate modules using altogether different ways of coding visual information, with the former system activated only when an agent intends to act and the latter the default mode of visual processing. If this were the case, the significance of a visual pattern for one's own action could be directly extracted, but it could be maintained that in the absence of an intention to act on the part of a subject, perceptual information about the behavior of other agents would be processed by her semantic system, yielding a different coding of visual information, allowing for no immediate reading of the intentional character of the observed behavior. As we will now see,

there are good empirical reasons, however, to claim that this compromise view cannot be correct and that vision for action is not restricted to vision for one's own actions.

4. Evidence for the perception of intentions

Evidence from psychological, neuropsychological, and neuroimaging studies indicates that the same kind of sensorimotor processing that takes place when one prepares for action also takes place when one is observing actions performed by others. Let me here briefly mention some of this evidence. Perception of biological motion has been extensively studied by psychologists using the point-light technique developed by Johansson (1973), where an actor is filmed in a dark room with lights attached to his main joints and where as a consequence only kinematic information is available to the perceiver. Johansson's (1973) pioneering studies showed that filmed movement patterns of walking, cycling, climbing, and dancing by the point-light stimulus agents were not identified when lights were stationary but were quickly and reliably recognized as soon as the lights were moving. Using the same experimental paradigm, other investigators further demonstrated that subjects were able to identify friends by their gait (Cutting and Koslowsky, 1977) as well as the gender of walking person (Koslowsky and Cutting, 1977) and that people can recognize themselves more easily than others (Beardsworth and Buckner, 1981). Furthermore, perceptual sensitivity to human motion seems to be innate or to develop very early. Bertenthal, Proffit and Cutting (1984) have shown that infants aged between 3 and 5 months are capable of distinguishing upright presentations of dynamic point-light stimuli of a person walking from upside-down presentations of the same stimuli as well as of discriminating coherent arrangements of light-points from incoherent or scrambled ones. These results suggest that visual perception of actions is influenced by implicit knowledge of the motor rules involved in their production. Other studies have also shown that this knowledge can be exploited by

the visual system not just for the recognition of action, but also for the recognition of intentions. Thus, in a series of experiments using the point-light technique, Runeson and Frykholm (1983) have investigated the perception of intentions in object-oriented actions. For instance, when an agent has to lift a box, her expectations regarding the weight of the box lead her to make specific anticipatory postural adjustments; when the weight is not as expected postural readjustments take place. These investigators have shown that subjects observing point-like displays of such actions are able to determine what the actor expects the weight to be and whether her expectations are correct. Furthermore, they are able to detect attempts at deception. If an actor pretends, say, that a suitcase he is carrying is heavier than it actually is, his movements will have a non-natural kinematics that can be detected by observers. Another series of experiments (Orliaguet et al., 1997; Kandel et al., 2000) investigated motor anticipation in the perception of handwriting gestures. For instance, when writing an l, the kinematics of the graphic production is influenced by anticipation of the next letter to be written and will differ according to whether the l is to be followed by another l, an i or a n. It was shown that the visual system can exploit these differences to predict the second letter.

Neuropsychological studies of apraxia also give evidence of the involvement of motor knowledge in the perception of action. Neuropsychological data from patients suffering from ideomototor apraxia show that these patients can be impaired not just in the execution of action but also in the recognition of actions either mimed or actually executed by other agents, while showing no deficit in the visual recognition of objects (Heilman et al., 1982; Rothi et al., 1985).

Finally, recent neuroimaging studies have yielded two sets of important results. In the last decade, a large body of neuroimaging experiments have investigated the neural networks engaged during action generation, action simulation and perception of actions performed by

others agents[5]. Their findings reveal the existence of an important overlap in the cerebral areas activated in these three types of conditions (in particular, the SMA, the dorsal premotor cortex, the supramarginal gyrus and the superior parietal lobe). These results have been interpreted as supporting the idea that there exists a form of functional and structural equivalence among execution, simulation, and observation of actions, all sharing the same system of motor representations. Finally, some recent neuroimaging studies (Grafton *et al.*, 1997, Grèzes and Decety, 2002) have explored the existence of an automatic link between the visual perception of an object and the detection of the actions it affords. Cerebral activation was compared during the perception of visually presented objects with different tasks (judgment of the vertical orientation, motor imagery, silent generation of the name or of the corresponding action verb). The set of cortical regions involved in all these conditions provides strong evidence that the perception of objects automatically potentiates components of the actions they afford, even in the absence of an intention to act.

All these empirical results converge to undermine even the watered-down version of the Classical Sandwich Model that concedes that a special vision for action system is activated when one intends to act, but maintains that when one observes someone else acting there is not direct commensurability between the perceptual categories used for coding the visual input and the motor categories necessary to identify intentional behavior as such. When one sees someone else acting, one has visual information both about the kinematics of the agent's bodily movements and about the affordances for action that the scene and its objects present. We have empirical evidence that both kinds of information are automatically processed during perception. Even in cases where a situation affords more than one possible action, information about the kinematics of the agent's bodily movements will make it clear which action is intended. There is, therefore, no reason to maintain that intentional actions cannot

[5] For a review and a meta-analysis of these results, see Grèzes and Decety (2001).

be directly perceived. Contra the Cartesian Picture then, intentional bodily behavior is not intrinsically indistinguishable from non-intentional bodily behavior. It has distinctive observable properties, a distinctive kinematics and a dynamics that bears systematic relations to features of the situation in a way that non-intentional behavior does not. Contra the Classical Sandwich Model, perceptual and motor categories are not heterogeneous categories bearing only arbitrary relations to one another. Perception and action are closely integrated and when we visually perceive actions, we seem to be immediately sensitive to the distinctive properties of intentional behavior.

These data undermine one form of skepticism about knowledge of other minds, skepticism that stems from the idea that this knowledge can only be inferential. The need for inferential mediation is taken to be the consequence of the existence of a gap. In the Cartesian Picture, the gap is an ontological as well as a logical gap between mental states and physical behavior. If physical behavior has an intentional character, it is only in virtue of its inner causes, and since only the behavior can be observed, inference is needed to go beyond the observable in search of its mental causes. A proponent of the Classical Sandwich Model, on the other hand, need not accept the Cartesian Picture and can indeed agree that intentional behavior has distinctive intrinsic characteristics. Nevertheless, the Classical Sandwich Model posits a gap between perceptual and motor categories. These are thought to be only arbitrarily related and therefore a theory is needed to effect the complex translation between the two codes. What I have tried to argue so far is that in the case of intentions and intentional behavior at least, neither the existence of a physical-mental gap, nor the existence of a perceptual-motor gap should be accepted. As a result, we have no reason to maintain that intentions are undetectable by direct experience and must be inferred on the basis of behavior.

5. First-person vs. third-person knowledge of intentions

However, as I mentioned earlier, the supposedly inferential character of knowledge of other minds is not the only potential source of skepticism. According to the Cartesian Picture, the asymmetry between first-person and third-person mental knowledge is twofold. Knowledge of the mental states of others is inferential whereas knowledge of one's own mental states is not and, furthermore, knowledge of others is based on observation whereas self-knowledge is based on introspection. This second difference is thought to give rise not just to an epistemic problem but also to a semantic problem. How could our mental terms and concepts ever be univocal if the criteria we appeal to when applying these terms and concepts to ourselves are radically different from the criteria we use when applying them to others? In particular, how can these concepts ever be applied to others if they get their meaning from our relating them to our first-person subjective experiences?

I obviously can't go now into a detailed discussion of this further issue, but let me offer as a conclusion some tentative thoughts regarding this asymmetry. Once more, I will focus exclusively on intentions considered as plan-states. I will not contest the existence of some form of asymmetry between first-person access and third-person access, but I will offer some reasons to think that the asymmetry may not be as profound as philosophers in the grip of the Cartesian Picture have taken it to be. I have argued that when we observe other agents acting we can perceive at least their immediate intentions. Even if observing the behavior of others give us perceptual access to their intentions, it seems that typically we don't need to observe ourselves acting to know what our intentions are — although there may be exceptions as when we are engaged in automatic or routine behavior. But how true is that? The claim may perhaps be sustained if what we have in mind are intentions considered as mere motivational states, as reasons for acting. But the notion of intention I have been concentrating on is more demanding. According to this more demanding notion, for one to

be attributed a genuine intention to *A* and thus to be said to A intentionally when *A*-ing, it is not enough that one be motivated to *A*, one must also have a reliable plan for *A*-ing and this in turn implies that one must know how to perform the elementary actions that are the ultimate constituents of the plan. Thus, genuine intentions require know-how and knowledge that we have a genuine intention rather than a mere seeming-intention requires knowledge that we have the appropriate know-how. But it seems quite implausible to claim that knowledge about know-how could be purely introspective knowledge. Originally at least, it is through our interactions with the world around us that we become aware of what we can and cannot do. Even if we are endowed with an innate motor repertoire and thus know how to do certain things without having to learn how to do them, we may not become aware of these capacities before we exert them. This does not mean that to know that we can do something we must actually have done it. If the story I have been telling about vision for action is true, it may be enough that we are capable of perceiving the world as pragmatically organized in a certain way, as affording certain actions. In other words, our awareness that we know how to act in a certain way may initially be a form of perceptual awareness. Our awareness that we can do certain things and our awareness of the world as pragmatically organized in a certain way are but the two sides of the same coin. This should not be taken to imply that we as seasoned agents can only know what we genuinely intend to do or whether we genuinely intend to do what we seem to intend when we are confronted with the actual situation in which to act and are capable of perceiving it in a pragmatically appropriate way. Instead we can resort to simulation, imagine the situation and run a mental simulation of the action or, in cases of well-practiced actions, we may simply rely on our memory of past performances. The tentative proposal I have just sketched should not be taken to imply either that the having of a genuine intention is incompatible with the failure of the intended action. To say that an action can only be intentional if we have sufficient control over it is

not the same as saying that it must be within our sole control. As Perry (1986)[6] says, ultimately we must always leave it in part to the benevolence of Mother Nature whether or not an action succeeds.

So to conclude, knowing that one genuinely intends to do something requires knowing that one knows how to do it. This knowledge is in turn perceptual or based on perception. To know that one knows how to act is to know that we capable of perceiving situations as pragmatically organized in a certain way. Thus, knowledge of our intentions is in part perceptual. There is indeed an asymmetry between first-person and third-person knowledge of intentions. To perceive someone else as having an intention it is not enough that one perceive the situation he is in as pragmatically organized in a certain way, one must also perceive his motor behavior as conforming to this organization. But the difference here is merely a difference in the amount of perceptual information needed. Surely, this is not enough to warrant skepticism as to the univocity of our concept of intention in its first-person and third-person uses.

[6] However, I disagree with Perry as to how much we must leave to the benevolence of Mother Nature. To my mind, Perry (1986) leaves to it much more than is strictly necessary.

References

Beardsworth, T., & Buckner, T. (1981). The ability to recognize oneself from a video-recording of one's movements without seeing one's body. *Bulletin of the Psychonomic Society*, 18: 19-22.

Bertenthal, B. I., Profitt, D. R., & Cutting, J. E. (1984). Infant sensitivity to figural coherence in biomechanical motions. Journal of Experimental Child Psychology, 37: 213-230.

Brewer, B. (1993). The integration of spatial vision and action. In Eilan, N., McCarthy, R. & B. Brewer, *Spatial Representation*, Oxford: Blackwell, pp. 294-316.

Campbell, J. (1994). *Past, space and self*. Cambridge, MA.: MIT Press.

Child, W. (1994). *Causality, interpretation and the Mind*. Oxford: Oxford University Press.

Cutting, J. E. and Koslowski, L. T. (1977). Recognizing friends by their walk: Gait perception without familiarity cues. *Bulletin of the Psychonomic Society*, 9: 353-356.

Grafton, S. T., Fadiga, L, Arbib, M. A., Rizzolatti, G. (1997). Premotor cortex activation during observation and naming of familiar tools. *Neuroimage*, 6: 231-236.

Grèzes, J. and Decety, J. (2001). Functional anatomy of execution, mental simulation, observation and verb generation of actions: a meta-analysis. *Human Brain Mapping*, 12: 1-19.

Grèzes, J. & Decety, J. (2002). Does visual perception afford action? Evidence from a neuroimaging study. *Neuropsychologia,* 40 (2): 212 - 222.

Heilman, K. M., Rothi, L. J., & Valenstein, E. (1982). Two forms of ideomotor apraxia. *Neurology*, 32: 342-346.

Hurley, S. (1998). *Consciousness in Action*, Cambridge, Mass.:Harvard University Press.

Israel, D., Perry, J. & Tutiya, S. (1993). Executions, Motivations and Accomplishments. *The Philosophical Review* 102: 515-540.

Jeannerod, M. (1997). *The cognitive neuroscience of action*, Oxford, Blackwell.

Jeannerod, M. (1999). The 25th Bartlett lectures; To act or not to act - Perspectives on the representation of actions. *Quarterly Journal of Experimental Psychology*, 52A, 1, 1-29.

Johansson, G. (1973). Visual perception of biological motion and a model for its analysis. *Perception and Psychophysics*, 14: 201-211.

Kandel, S., Orliaguet, J. P., & Viviani, P. (2000). Perceptual anticipation in handwriting: the role of implicit motor competence. *Perception and Psychophysics*, 62, 4: 706-716.

Koslowski, L. T. and Cutting J. E. (1977). Recognizing the sex of a walker from a dynamic point-light display. *Perception and Psychophysics* 21: 575-580.

Marteniuk, R.G., MacKenzie, C.L., Jeannerod, M., Athenes, S., & Dugas, C. (1987). Constraints on human arm movement trajectories. *Canadian Journal of Psychology*, 41: 365-378.

McDowell, J. (1982). Criteria, Defeasibility and Knowledge, *Proceedings of the British Academy*, 68, 455-79

Mele, A.E. (1994). *The Philosophy of Action*. Oxford: Oxford University Press.

Orliaguet, J. P., Kandel, S., & Böe, L. J. (1997). Visual perception of motor anticipation in cursive hand writing: influence of spatial and movement information on the prediction of forthcoming letters. *Perception*, 26, 7: 905-912.

Perry, J. (1986). Circumstantial Attitudes and Benevolent Cognition", in J. ButterField (ed.). *Language, Mind and Logic*, Cambridge, Cambridge University Press, pp. 123-34.

Rosenbaum, D. A., & Jorgensen, M. J. (1992). Planning macroscopic aspects of manual control. *Human Movement Science*, 11: 61-69.

Rosenbaum, D. A., Marchak, F., Barnes, H. J., Vaughan, J., Slotta, J. D., & Jorgensen, M. J. (1990). Constraints for action selection. Overhand versus underhand grips. In M. Jeannerod (ed.), *Attention and Performance XIII: Motor representation and control*, Hillsdale, N.-J.: Lawrence Erlbaum.

Rothi, L. J., Heilman, K. M. and Watson, R. T. (1985). Pantomime comprehension and ideomotor apraxia. *Journal of Neurology, Neurosurgery, and Psychiatry*, 48: 207-210.

Runeson, S. & Frykholm, G. (1983). Kinematic specification of dynamics as an informational basis for person-and-action perception: expectation, gender, recognition, and deceptive intention. *Journal of Experimental Psychology - General*, 112: 585-615.

Strawson, P. F. (1959). *Individuals*. London: Routledge.

Velleman, J.D. (1989). *Practical Reflection*. Princeton: Princeton University Press.