

The Vocabulary of Acts: neuroscience, phenomenology and the mirror-neuron

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If someone sees a smile and does not know it for a smile, does not understand it as such, does he see it differently from someone who understands it? – He mimics it differently, for instance (Wittgenstein, 1958, p. 198).

[This is one amongst] the multiple instances where Wittgenstein suggests that the kind of understanding involved in seeing internal relations is not only conceptual but also sensible and mimetic – or perhaps better said: that the conceptual is at the same time, and sometimes primarily, sensible and mimetic (Krebs, 2010, p. 127).

1. Rizzolatti and the mirror-neuron

In response to the question “What are the neural bases of action understanding?” Giacomo Rizzolatti has been credited with initiating a minor Copernican revolution, with far-reaching significance for physiotherapy, rehabilitation, and education more generally. At the heart of this is a reversal of the schema *perception*→*cognition*→*movement*: rather than visual information being prior, it is mapped onto its existing motor representation in our nervous system, and the construction of this is explained in terms of “mirror-neurons”. This makes the imitation of action crucial for our developing understanding, most obviously of the movements of other living creatures. In fact, Rizzolatti emphasises that, unlike other cognitive capacities, such as object recognition, action understanding has never been a main focus of neuroscience. Hence, the practical importance of his work.

What then are the neurophysiological bases of the ability to understand the actions of others? Rizzolatti and his colleagues draw a distinction between action as a generic term referring to any intentional motor behaviour and a more specific sense in which it denotes “goal-directed behaviours that produce a reward for the individual” (Rizzolatti, Fogassi and Gallese, 2001, p. 601). They suggest two hypotheses to explain how action understanding occurs. According to the “visual hypothesis”, action understanding is based on a visual analysis of the different elements that form an action, with no motor involvement required. When we observe a hand grasping an apple, the association of the elements of the hand, the apple, and the movement are sufficient to allow the observer to understand the action. The “direct-matching hypothesis”, by contrast, holds that we understand actions through mapping the visual representation of the action onto our motor representation of the same action. In one experiment with a

macaque monkey, for example, food is placed on a tray by a human hand, and the monkey grasps the food. The monkey's brain activity on seeing the human hand's placing of the food is similar to the way it would be if the monkey were handling the food. By contrast, when tongs, instead of a human hand, are used to place the food, comparable brain activity does not occur. In its recognition of the action, the monkey's motor system is said to "resonate": the same population of neurons that controls the execution of the grasping movements becomes active in the motor areas of the observer, and it is this that enables the understanding of the observed action. Moreover, as is demonstrated in a further experiment, if the observer-monkey sees only a part of the relevant movement of the hand, its brain "fills in" the rest of that movement, which emphasises the holistic nature of this resonance.

While this is ground-breaking empirical research, Rizzolatti *et al.* acknowledge that such a way of thinking is to be found in the work of certain philosophers – that is, especially, phenomenologists – and, in the paper I cite, they even provide a brief gloss on Husserl, said to be "dedicated to describing the structures of experience as they present themselves to consciousness, without recourse to theory, deduction or assumptions from other disciplines, such as the natural sciences" (p. 667).

The favoured hypothesis emphasises the primacy of a direct matching between the observation and the execution of an action. The authors take the view that the basis of imitation is what has been referred to as "response facilitation"—the automatic tendency to reproduce an observed movement—and this can occur with or without an understanding of the meaning of what has been observed. Examples of response facilitation without understanding include the behaviour of birds. When a dangerous stimulus appears, shore birds flap their wings—first one or a few, then others follow, then the flock flies away. This behaviour does not necessarily require an understanding of the action. Neither does the capacity of newborn babies to imitate manual movements, however much this may contribute to a link between the "observing infant" and the "performing adult" (p. 668). Moreover, there may be a similar role of establishing interpersonal links between subjects in imitative behaviour, such as yawning, laughing, or perhaps crying, as well as in the mildly amusing example raised by Charles Darwin of sports fans mimicking an athlete's movements in order to "help" him, a surprising example perhaps for Rizzolatti *et al.* to cite in this connection, given the fact that there may surely be degrees of understanding in such imitative behaviour. The contrast they wish to draw is with examples of response facilitation where adult human observers imitate movements made by other people and have an understanding of what the other person is doing. It is in relation to this that they elaborate their distinction between motor acts and motor actions. The expression "motor act" refers to "a movement directed towards an object (or the body), which eventually allows "an effective interaction between the used effector and the target of the movement" (*ibid.*). Examples of motor acts are grasping an object, holding it, or bringing it to the mouth. By "motor action", by contrast, they refer to a sequence of motor acts that, at its end, produces a reward for the acting individual. Thus, a motor action might be composed of a sequence of motor acts that allow

feeding (reaching for a piece of food, grasping it, holding it and bringing it to the mouth). The distinction between motor acts and “motor actions” is not only logically motivated: it also corresponds to the way in which the motor system is organized.

Mirror neurons are elements that, on the one hand, code motor acts and, on the other, allow imitation to take place. The mechanism of imitation can be divided into three sub-mechanisms: “retrieval of a motor act, construction of a sequence of motor acts, and refinement of the motor act or of the motor sequence” (*ibid.*). Simply observing a motor act typically activates its motor representation, but imitation goes beyond understanding in that the observed act is not only internally represented but also externally manifested. The mechanism that underlies the capacity to imitate a ‘motor action’ (as defined above) is much more complex. The authors borrow the words of R. Byrne, who writes that this involves “reading the letters of action by means of response facilitation, action by action” (*ibid.*), where “letters” are presumably to be taken to stand for those motor acts that, when taken in sequence, constitute the “phrasing” of action. In Rizzolatti’s words elsewhere, the motor neurons seem to contain a *vocabolario d’atti*, which allows the individual not only to copy them but also to “understand” them—that is, to understand them without directly thinking about them (see Cristaldi, 2009; Rizzolatti, 2008).

In conclusion authors make the following remarks:

The mirror system seems to unify in the same neural mechanism a variety of phenomena that range from elementary behaviours, such as response facilitation, to higher cognitive functions, such as imitation learning and action understanding. In addition, the mirror system could underlie other fundamental cognitive functions that have not been dealt with in this article, such as language understanding and mind reading. Although we still lack a satisfactory comprehension of these higher capacities, and the precise role of the mirror system in these functions remains unknown, we think that the mirror system offers a new and very promising heuristic tool for their empirical investigation (Rizzolatti *et al.*, 2001, pp. 668-669).

There is no doubt that these are in many respects impressive findings, and their congruence with armchair phenomenology is gratifying. Rizzolatti’s research has been influential in clinical practice, where, for example, deficiencies in understanding are addressed by motor therapy designed to activate mirror responses – say, by the guiding of the patient’s hand or body. This happens especially in the case of those suffering from disabilities of various kinds, but the wider relevance of this research in education is relatively easy to see. It extends to the understanding of other cultures (see Cristaldi, 2009). Later, and setting aside “mind reading”, I shall revert to the suggestion that the mirror system may underlie language understanding. It will also be helpful to hold in mind the theoretical architecture that is implicit here, involving the “higher”, the “underlying” and the “fundamental”. I shall shortly have something to say about this.

But first let me say why am I pursuing this topic.

2. Depsychologising psychology: the architecture of research and understanding

Psychology has a degree of authority and influence in educational research that has not been matched by the other foundational disciplines. This has been achieved not so much through its consolidation as a discipline but rather through its extension through other, topical aspects of educational research, such as school effectiveness and improvement, and through its dilution and adaptation in popularised versions of, for example, management theory and behavioural therapy. This influence is bought at a price: it has weakened its disciplinary rigour, immunised it against some developments in the parent discipline, and reinforced assumptions about human being that, from a philosophical point of view, now look distinctly *passé*, if not downright confused. (I have in mind the misleading, if not plainly naïve, accounts of subjectivity and objectivity, and of fact and value, in some of the most widely used handbooks of educational research.) Moreover, the rift that emerges in the 20th century between psychology and psychoanalysis is now replicated in differences within educational policy and practice, especially insofar as counselling practices and therapeutic ways of thinking enter into educational institutions (see Smeyers, Smith, and Standish, 2006).

Wittgenstein was drawn to the view that the more we know about ourselves scientifically, the less chance we have of understanding one another or ourselves, and he was notoriously dismissive of psychology. On the very last page of the *Philosophical Investigations* he writes:

The confusion and barrenness of psychology is not to be explained by calling it a “young science”; its state is not comparable with that of physics, for instance, in its beginnings. . . For in psychology there are experimental methods and *conceptual confusion*. . .

The existence of the experimental method makes us think we have the means of solving the problems which trouble us; though problem and method pass one another by (p. 232).

It may be difficult for some not to feel a kind of mischievous thrill at Wittgenstein’s remarks here, and certainly a scepticism towards psychology, often tinged with contempt for its more behaviourist forms, has been familiar enough in philosophy of education. But Wittgenstein was also impressed by aspects of the development of psychiatry, as seen for example in his conversations with Maurice Drury, and he took seriously the work of Freud. More generally, there is no doubting the prominence within his later writings of questions of psychology, and his treatment of these is surely aimed not at dispensing with philosophy of mind but rather at exposing false models of human being. It is in the light of Wittgenstein’s obsessive emphasis on the public nature of language and the outwardness of criteria that Stanley Cavell has suggested that Wittgenstein writes “in service of a vision that false views of the inner and of the outer produce and sustain one another”, and further that “the correct relation between inner and outer,

between the soul and its society, is the theme of the *Investigations* as a whole”: that “this theme provides its moral” (Cavell, 1979, p. 329; see also Cavell and Standish, 2012). This is consistent with the “therapeutic” intent of his work: the therapy we need, so Wittgenstein says, must undo the knots that our thinking has tied us up in. The thinking he has in mind is to be understood in terms of the excesses of theory, and while the most pressing example of this for him is to be found in philosophy itself, there is no doubt that his animus here is directed, albeit in a different way, against psychology. His intention is, as it were, to depsychologise psychology.

Wittgenstein was writing some sixty years ago. Has psychology remained mired in conceptual confusion, or has it moved on? I shall not detail here the ways in which confusion of the kind Wittgenstein described still abounds, for it would be foolish to rest too complacently with this thought and so to miss what has been achieved. In this respect it is worth asking whether the philosopher’s mischievous thrill, which I referred to earlier, itself stands in need of therapy of a kind. Hence, it is in this spirit that I turn to the clearly substantial work of Rizzolatti.

As we saw, Rizzolatti himself acknowledges symmetries between his ideas and the work of some philosophers, and he perhaps most frequently acknowledges Maurice Merleau-Ponty. And as the opening account should have made clear, his work plainly raises questions not just about body and mind but about their connections with culture, all of which resonate with Wittgenstein. But I am interested also because the examples he provides form a basis upon which the relation between different readings of Wittgenstein can be considered. In other words, how is Wittgenstein’s emphasis on behaviour to be understood? On the one hand, there are those more “behaviourist” interpretations (of course far removed anything like Skinnerian behaviourism), whose emphasis tends towards the naturalistic and the developmental, and, on the other, there are those that insist on the omnipresence of culture full-blown, where language is taken to have pervasive importance (see Standish, 2012). I want to show what I take to be at stake in these differences of interpretation in relation to the work Rizzolatti is doing.

In the course of this I hope that the significance of the architectural motif will become more clear. Before saying more about Wittgenstein, then, let me develop this by considering the work of a philosopher who provides an account of perceptual judgement in which the role of bodily movement is central – an account that draws on Immanuel Kant but also, substantially, on Merleau-Ponty: Samuel Todes’ *Body and World* (2001). Let me add in passing that Todes was immensely influential on Hubert Dreyfus, and this is acknowledged richly in Dreyfus’ introductory essay to Todes’ book. The development of his own Heideggerian accounts of being-in-the-world and of the acquisition of competence and understanding, which have themselves been so influential, undoubtedly owe much to this book.

3. Samuel Todes and the umbilical cord of bodily movement

Body and World is a powerful book and in some ways an eccentric one. Its central claim is that the “failure to understand perceptual judgement opens

an unbridgeable gap between knowledge and feeling” (Todes, 2001, p. 261). Let us begin by considering some representative passages from the book, which I propose to quote in some detail.

Our being in the world involves, according to Todes, first of all a skilled bodily comportment, through which we, for example, move to sit in a chair or switch on a light. There is a natural “fit” between things and our bodies, between body and world, and this is realized in perceptual judgement of this kind, through “the umbilical cord of bodily movement” (p. 53). Todes uses the term “poise”, which he contrasts with the will, to capture “the *perfect fit* of me in my circumstances” (p. 70). It is only in moments of breakdown – say, where the light-switch fails to work – that we become cognitively aware of what is happening: “Thus, when one fails in what he is attempting to do, one necessarily loses his poise and is, at least, momentarily, thrown off balance, however quickly one may recover his balance and poise. To be poised is to be *self*-possessed by being in touch with one’s circumstances” (p. 66). The effect of the intrinsically habit-forming character of perception is to stabilize our experience (p. 80): “Our poise is sensuous proof that the perceptual experience of our immediate future conforms to that of our immediate past, and without poise no determinate perception is possible” (p. 79).

The structuring indicated in this and similar statements is elaborated in architectural terms: Todes refers recurrently to the natural philosophy of the body as providing a first floor for the development of understanding concerning higher levels of experience – “I will attempt to show that there are no ‘pure’ forms of conceptual imagination by showing that the whole *level* of our conceptual imagination (form as well as content) makes sense only in terms of a primordial level of perceptual experience” (p. 156). The inactively regarded object is derivative from the object that is actively felt: “The human body is the material subject of the world” (p. 88).

This much, I believe, is powerful enough, but further dimensions of the picture need to be revealed. A critical factor in this account is its ethical naturalism, in which desire finds fulfilment in satisfaction: “The human body is first prompted to be a moving body at all, and thus to generate the spatiotemporal field of appearances (which is the apparent world of our needs), only by its needs that, literally, move the body to find pleasure (satisfaction of its needs), and to avoid pain (dissatisfaction of its needs)” (p. 73). In fact, the vocabulary of fulfilment, harmonising with the elaboration of the “fit” between body and world, which is the ground floor of our experience, is strongly evident throughout the book: “Satisfaction involves a relation not just between ourselves and the satisfying object, but also between both of these and the world of experience that is to some extent closed and completed in the satisfaction. . . . To be satisfied is to be content; it is to be full-filled with the given content of the world of our experience, so that our world no longer seems open, empty, still-to-be-satisfactorily-filled” (p. 59). This naturalism is more or less pervasive: “A degree of pleasure and of pain, of satisfaction and of dissatisfaction, thus pervades every possible experience in virtue of its being in the world of experience” (p. 73). The moderation of pleasure and pain, understood in terms of needs, suggests a kind of homeostasis in which a certain conception of health is modelled.

This brief excursion into the eloquent language of this text may well prompt a sense of the proximity of these thoughts to the phenomenological analyses developed in Heidegger's *Being and Time*. While the central claim regarding perceptual judgement provides a sound thematic basis for the argument, and while the detail of the analysis is fascinating, I am less persuaded than Dreyfus of its originality, and there are central aspects of the position that is advanced that remain unconvincing. On the strength of these doubts, I shall in what follows raise questions for Todes' account, concerning, first, the relation of perception to the social world, and, second, the prominence of the idea of satisfaction.

In his own introduction to *Body and World*, Todes makes clear what he is not setting out to do. This is not a study in the social philosophy of the human body (concerning the body's role in our knowledge of persons), and in this respect his project diverges from Rizzolatti's research. Nor is this a study in what he calls the human body's theology (concerning our sense of death and intimations of mortality). It is a study in the natural philosophy of the human body. Todes concedes that the social questions are both more obvious and of more general interest than the natural ones, but their solution, he claims, turns out to presuppose a solution to the natural ones, and the theological issues in turn depend on the natural and the social questions. As we saw above, Todes refers recurrently to the natural philosophy of the body as providing a first floor for the development of understanding concerning higher levels of experience.

While it seems correct to say that the social philosophy of the human body (say, concerning gender roles or our relation to childhood, or in the construction of the idea of disability) depends upon the natural philosophy of the human body, there are problems with the suggestion that there could be such a natural philosophy, especially where this concerns perceptual *knowledge*, in the absence of acknowledgement of the social world. In the context of the *social* world it is indeed possible to provide an account of the ongoing satisfaction of the anticipations of poised perceptions. The absence of an attempt even to consider this in Todes' account is remarkable, for without it the claim that ongoing coping gives us perceptual knowledge is hard to sustain. In short, there can be no account of driving a car or dribbling a basketball or sitting on a chair or picking up a box in the absence of rule-following. Todes' discussion of rule-following is tied very much to his notion of habit and to what makes the world "habit-able". But the crucial point, if Wittgenstein is right, is that rule-following presupposes the existence of a social world. Wittgenstein's so-called Private Language Argument depends upon the idea that rules logically presuppose the possibility of mistakes, and mistakes presuppose the possibility of correction, which in turn requires the existence of norms of practice within a social group. Moreover, it is not just that the practices cited here are particularly complex social practices: in human activity rule-following goes all the way down.

In the absence of the acknowledgement of the social world on the same "floor" of the building, as it were (indeed in the same rooms), Todes' perceptual knowledge claim looks decidedly unsteady, if it does not smack of anthropomorphism. The claim would be anthropomorphic to the extent that

the account of perceptual knowledge depends upon full-blown human nature in ways that it is not prepared to acknowledge. He guards against some of the difficulties here with the use of inverted commas – for example, in referring to non-conceptual perceptual “beliefs” – but one wonders to what extent this textual device merely serves to hide the problem. Todes’ architecture persistently gives the impression that there can be perceptual knowledge in a human being in the absence of initiation into the social world. So the following questions arise: Does such knowledge extend to the experience of animals? If not, why not? And does it extend to infants? Wittgenstein’s account of something like the primordial, of “forms of life”, seems in part to draw attention to differences between cultural practices, but it is important to emphasize the greater prominence it gives to the bodily aspects of human beings – to the ways in which forms of life develop in relation to physiological needs. The idea of a form of life is closely tied to what Wittgenstein calls “agreement in judgements”. With this phrase, he has in mind not the kind of agreement that might be reached as the result of a debate, say, but rather the fact that human bodies condition people to find things the same – for example, that some things are edible and some not, or that a particular atmospheric temperature range is tolerable. His enigmatic remark, “If a lion could speak, we could not understand him” (Wittgenstein, 1958, p. 223), testifies to the essential role of the *human* body in the nature of our thought. If a macaque could speak, we would probably not do much better – but the similarities between a macaque’s hand and a human hand understandably cause in us a sense of the uncanny, and in this there is a greater sense of what we can similarly grasp. These remarks demonstrate not only the ways in which human thought is tied to the particular configuration of the bodily features of human beings, a point that Todes richly develops, but also the fact that such thought is not generated by the individual alone, a point to which Todes seems blind. None of this is intended to defend the idea that Todes is attacking: that ongoing successful coping must involve conceptual identification. On the contrary, Todes is right to say that such (smooth, ongoing) coping excludes cognitive activity of this kind. But it is to emphasize that coping cannot be understood in the absence of the background of the social world. An essential feature of this social world is language, which in human experience also goes “all the way down”. To recognize that this is so is to foreground not abstract conceptual thought but rather human activity understood as rule-following practices. (Wittgenstein will speak of language-games, of course.) While there are forms of human activity that do not directly involve language, they are nevertheless characterized by a background that is linguistic. It is in the light of that background that it does indeed become plausible enough to speak of non-conceptual perceptual knowledge. But a further point follows from this to the effect that while the infant has the same bodily configuration as the adult, any claims to perceptual knowledge on her part must be severely constrained by the fact that she is not (yet) a participant in the linguistic practice that is the condition for such knowledge. In other words, perceptual knowledge in its mature forms cannot develop in advance of social and linguistic initiation, and so to speak of the perceptions of the infant does indeed involve a degree of anthropomorphism. This is not to say

that language must come first: there are no firsts; light dawns gradually over the whole. But Todes' argument seems to proceed as if the linguistic turn had never happened. In sum, this brings me to the conclusion that Todes' account of this first floor of our experience cannot stand up in the absence of the acknowledgement of the social world.

The second, more qualified question that I raise has to do with how far Todes' thought is constrained by the limitations of the economies of satisfaction that are central to his argument. I referred to these above in terms of his ethical naturalism. How far do these fail to do justice to the body and to perception? Todes draws a distinction between objective and subjective satisfaction. A sentence such as "I am satisfied that she is dead" is ambiguous, in the absence of any determining context, between my having evidence that she is dead and my being pleased or relieved by this fact. In the former case, I am satisfied *that* something is so, while in the latter I am satisfied *by* its being so. In other words, objective satisfaction relates primarily to conditions of truth, while subjective satisfaction refers to conditions of desire. This economy has a bearing on how truth and desire are conceived. Thus in objective satisfaction, it becomes apparent that truth is understood in terms of correctness (or adequation) and not *aletheia* (that is, truth as revealing). (Of course, the vocabulary of correctness belongs to propositional rather than perceptual knowledge, but I am suggesting that in the account of perceptual satisfaction it comes to shape the understanding of perception also.) How, it needs to be asked, might an account of perceptual knowledge that derived from notions of *aletheia* be different? In subjective satisfaction, desire is understood in relation to lack. Hence both are tied to economies of thought that, on certain arguments (say, those of Deleuze or Levinas, or Kierkegaard or Nietzsche, or for that matter Heidegger himself), close off possibilities of understanding the human condition – mind and body – and that constrain the ways in which the possibilities of life might be conceived. Ethical naturalism along these lines amounts to a constriction of ethics itself.

It will be recalled that Todes insists that his concern is not with the theology of the human body. He uses this phrase, let it be remembered, to refer not to matters of theistic belief but to our sense of death and intimations of mortality. What is noticeable, however, is that there are points in Todes' text at which something seems to break through, something beyond any simple economy of need and satisfaction. Todes acknowledges that satiation, like apathy and frustration, can make one "incapable of responding to anything through felt want" (p. 69). And recognizing the role of affect in both subjective and objective forms of satisfaction, he draws attention to an interesting asymmetry between the way that the former tends to be characterized by relief from distress, or the gratification of desire, and the way that the latter encompasses not only some sense of relief but also a positive pleasure at the original stimulation – a pleasure prompting us to similar exertion in the future, making us keener for experience and heightening our sensitivity. In the light of Todes' valuable observation here, I want to draw attention also to a perhaps muted but nevertheless welcome irruptive element in his language. He speaks more than once in almost Dionysian terms of the "clamorous chorus" of needs (p.

67); the boy who looks up at the hills of the valley in which he has grown up finds the “beckoning” horizon, calling him to give what lies beyond it, “the determination of place” (p. 57); more bleakly he acknowledges Auschwitz as a “break-out-from the world” (p. 62). It is language such as this that intimates momentarily something beyond or other than the satisfaction of needs, though the extent of the importance of this for Todes is difficult to fathom. Moments of insight these may be, but the significance of the present discussion remains very much with the question of the kind of place that is given to ongoing skilled coping in the living of our lives and, hence, in the understanding of body and mind. Todes’ architecture gives it foundational importance.¹

4. Objects and things, habitats and worlds

It is not surprising that Rizzolatti and others have emphasised the importance of the mirror system not only in “elementary behaviours” but in “higher cognitive functions, such as imitation and action understanding” (Rizzolatti *et al.*, 2001, pp. 668-669). The conceptual architecture is such that motor acts are taken to be the foundation stones of thought. But I want to question the way motor acts are understood in relation to language, referred to in these lines both as fundamental and as a higher capacity. And this puts pressure on Rizzolatti’s readiness to speak of a vocabulary of acts. How far do those acts depend upon a vocalisation of some kind? How far is this just a turn of phrase? One senses, of course, that it is the latter, a mere image, and this reinforces the impression that the architecture here is naturalistic and developmental: a first floor of motor acts provides the basis for the later construction of language, in parallel to the way that for Todes, it is the first floor natural philosophy of the body that provides the basis for its social philosophy and subsequent theology.

Of course, there are important differences between Rizzolatti and Todes. Todes’ first floor natural philosophy is concerned with the relation of the body to the world, its natural fit with things, and this is understood to be in some sense pre-social. Rizzolatti differentiates his own research from neuroscience concerned with object recognition, affirming that his field is the understanding of the actions of others. And yet it would be wrong to think of Todes as providing an account of object recognition or even comportment towards objects. He is concerned with the relation of the human body to *things*. The reproach here is targeted similarly to Wittgenstein’s reprimand about the misunderstanding of psychological concepts (seeing, hearing, thinking, understanding): “Psychological concepts are just everyday concepts. They are not newly fashioned by science for its own purpose, as are the concepts of physics and chemistry. Psychological concepts are related to those of the exact sciences as the concepts of the science of medicine are to those of old women who spend their time nursing the sick” (Wittgenstein, 1980, #62). The relation to things is an everyday relation. Whereas an object is abstracted and neutralised, and only contingently invested with meaning, a thing is already perceived within a framework of significance – that is, within a world. We can ask also: Is the human being’s relation to the morsel of food the same as the macaque’s?

Yes and no. Both pick up food with their hands and put it in their mouths, and both must do this to survive; both can delight in this and to some extent share in that delight. But for the human this happens in a world of meaning, whereas we might, following Heidegger, say that the macaque is world-less, having only a habitat. What is it to have a world?

In an interview Rizzolatti offers the following example. Imagine that we enter a bar and see a man with a cup in his hand. Instinctively we know that he is drinking coffee: we recognise his movements and understand his intentions, and we do this without thinking about it. We can do this because beyond having the evidence before our eyes, we have it in our heads. Rizzolatti's explanation is provocative and, I think, convincing. But what, I want to ask, is it that we see or have in our heads? We are given the holistic picture of a man drinking coffee. But what coffee is this, and where? Because this is Rizzolatti, I guess we are in Italy, and so I imagine that this is a small white cup and the coffee to be espresso. Perhaps "Lavazza" is written on the saucer. Perhaps the man is sitting at a table looking onto the sunlit street, *Corriere Della Sera* spread across the table. And what, after all, is coffee? How was it that Jim Jarmusch could make the film *Coffee and Cigarettes*? Could a macaque see this? The point is not that all this detail is explicitly entertained: we do not directly consider any of this, but this is the texture of experience, of the world, within which seeing occurs. The innocence of "seeing a man with a cup in his hand" belies the fact that genuinely to see this is to open a world. Of course, we can progressively abstract from this – "seeing a human being holding an object", etc. – and that is what science sometimes does, but it is not what Todes seeks to do, nor Wittgenstein, nor Heidegger. And doesn't Rizzolatti's account point away from abstraction too – in spite of the vocabulary of laboratory experimentation he inevitably adopts, and as is perhaps revealed more than he intends in his "vocabulary of acts", in "letters of action"?

The naturalistic and developmental aspects of Rizzolatti's research, and the architecture that structures this, are compatible with the more "behaviourist" readings of Wittgenstein, but they are at odds with interpretations that emphasise the omnipresence of culture and language as pervasive. And as my criticism of Todes and my discussion of coffee are intended to show, it is the latter that I think are the more convincing. If this is right, it does not necessarily undermine Rizzolatti's project, nor lessen the interest of his findings. Rather it suggests that the holistic nature of his account of the functioning of mirror-neurons needs expansion. The abstracted laboratory example of the macaque's observation of a hand placing food on a tray is expanded to the everyday one of seeing someone holding a coffee-cup. The laboratory hides the world; coffee opens it up. Hence, there is reason here for a richer, more holistic account of what is going on, and neuroscience as pursued by Rizzolatti can perhaps benefit from this.

I commented at the start on the considerable significance of mirror-neuron research for rehabilitative therapy, specifically, and for education, more generally, and indeed practical applications have developed in various ways. Rizzolatti acknowledges the significance of phenomenology for his own work, and this further demonstrates what can be achieved without recourse

to laboratory experimentation. Should we, however, also entertain the somewhat negative thought that perhaps what has been discovered here is, in practical terms, no more than what good sports coaches and physiotherapists, not to mention teachers of music and dance, have long known?² If there is some truth to this, it remains the case that the discovery of the mirror system provides a scientific endorsement for what such practitioners intuitively know. But there is evidence also for ways in which the research has prompted approaches that would perhaps not otherwise have been considered ([examples. . .]). In sum, it does seem that, in neuroscience, Rizzolatti's work moves us away from "false views of the inner and of the outer [that] produce and sustain one another". And to the extent that it is (cognitive?) capacities in relation to things, and not to objects, that needs to be understood, and to the extent that things cannot be understood in the absence of those holistic meaningful contexts in which the social and the "theological" are already present, his work may have a more far-reaching importance for neuroscience than is currently acknowledged. Perhaps then, within a different architecture, it might also gesture towards "the correct relation between inner and outer, between the soul and its society".³

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¹ Dreyfus is also inclined to speak in terms of a comparable architecture. Thus, he criticises John McDowell for being preoccupied with 'the conceptual upper floors of the edifice of knowledge' and indifferent to 'the embodied coping going on the ground floor' (Dreyfus, 2005, p. 47).

² This may also be evident in religious practices where a disciplining of the body is understood as internal to the kind of thinking that is sought. See also perhaps Naoki Sakai's accounts of foreign language learning in 18th Century Japan (Sakai, 1992).

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