ACTION CONCEPTS

Abstract

The aim of this paper is to propose an analysis of the general form of our concepts of physical actions. I contend that both our general conception of what actions are and the special role played by action concepts in our mental life impose constraints on the content of these concepts. In particular, I argue that the principle of intentionality and the principle of competence that are central to our conception of action should be reflected in our concepts of particular types of action. I also argue that insofar as action concepts are constituents of the content of intentions and plans of action, they have an executive dimension that other concepts lack. I start with an idealized case and consider what our action concepts would be like if all actions were both basic and intentional. I then proceed to show how the proposed account can be generalized.

I

My aim in this paper is not to offer an analysis of our general concept of an action, nor an analysis of the concept of an intentional action. Rather, it is to try and investigate what our concepts of particular types of actions are like, actions such as raising one's arm, starting a car, climbing a mountain, or turning on a computer. More precisely, I shall be concerned with concepts of physical actions, leaving aside what are sometimes called mental actions, such as attending to something or trying to remember the name of a person. Obviously, the analysis one may give of the concept of a particular type of action cannot be totally independent of a given conception of what an action or an intentional action is. The conception of actions I shall draw upon is a version of the causal theory of action. I will here sketch its main claims, but I won't try to defend it. The analysis I will offer of concepts of particular types of actions can only, insofar as it appears satisfactory, constitute an indirect argument in its favor.

Three issues will be of central interest to me in this paper. The first issue concerns the relationship between actions and movements. The problem here is the following. Most actions if not all involve movements of the agent's body. Yet, it seems inadequate to identify an action with a movement or a type of action with a type of movement, even though these movements are caused in a specific way. Often enough, two actions belonging to the same action type can be performed using different movements and movements belonging to the same movement type can be executed in order to perform different actions. Trying to reduce actions to species of movements thus appears unpromising. Yet, it does not seem reasonable either to completely disjoin the notion of an action from that of a movement, since there are very few actions the performance of which does not involve the execution of some movements. In trying to eliminate reference to movements in our action concepts, we might well be throwing the baby out with the bath water. So how are actions and movements related?[1]

Second, action concepts differ from other kinds of concepts in our conceptual repertoire insofar as they play a special role in our mental life. They are important both to the definition of our status as cognizers and to the definition of our status as agents. They

figure not just as constituents of descriptions we may offer of certain events we observe, but also as constituents of the contents of our plans and intentions. Insofar as these can be put to execution, it must be the case that the conceptual content of our plans and intentions be convertible into corresponding motor representations and actions. This we may call the executive dimension of action concepts. The connection between actions and action concepts is therefore twofold. On the one hand, possession by a subject of a particular action concept requires, as does possession of other kinds of concepts, both that he or she knows the conditions of application of the concept and thus be able, at least in some clear-cut cases, to decide whether or not an (observed) event falls under the concept and that he or she be capable of drawing the inferences that the concept licenses. On the other hand, though, possession of action concepts by a subject is also related to his or her status as an agent capable of planning, forming prior intentions and acting in accordance with these intentions and plans. To the extent that we have this capacity for planning and thinking ahead of our future actions, it must be the case that possession of certain action concepts requires not just that we know how to apply these concepts in certain circumstances and can make the inferential transitions they warrant, but also that we know how to act on the basis of certain conceptual representations featuring these concepts. This is not to say that an executability requirement should be made part of the possession conditions of all action concepts. Such a demand would no doubt be excessive for, surely, one can have concepts of actions one doesn't know how to perform. Paralysis may rob one of the capacity to perform certain actions but it does not thereby deplete one's repertoire of action concepts. As the urban legend of the great swimming coach who couldn't swim suggests, one can even be an expert master of certain action concepts without being able to perform actions of the corresponding types. The relationship between the mastery of an action concept and the executability requirement is therefore not straightforward. One main aim of this paper will be to try to shed light on the nature of this relationship.

The third issue I am interested in is closely related to the second issue. It concerns the need for non-conceptual representations of action mediating between conceptual representations and actions and therefore the relationship between conceptual and non-conceptual representations of actions. To what degree if any does our mastery of action concepts depend on their being anchored in a level of non-conceptual content? Certain actions are complex and composed of more elementary actions. For instance, preparing a chocolate cake involves a number of sub-actions. In such cases, the corresponding action concepts seem to be definable in terms of more basic action concepts. Certain actions are performed by performing some other actions. For instance, one can signal for a turn by extending one's arm out the car window, one can turn on the light by flipping the switch, one break a world record by running a 100 meter race in less than 9 seconds.[2] Yet other actions can be regarded as basic. The notion of a basic action admits of several senses. As argued by Hornsby (1980), one should at least distinguish between a causal notion of basicness and an intentional (or teleological) notion of basicness. The notion of basicness that I shall be interested in here is the intentional notion.[3] Hornsby offers the following definition of basic actions in this sense:

The kinds of actions in an agent's repertoire that are basic for him are those which he knows how to do, and knows how to do otherwise than on the basis of knowing how they are done by him (1980: 84)

Three important features of this definition are worth stressing. First, the idea of a basic action is related to that of a know-how. Second, knowing how something is done should not be taken to imply that one possesses theoretical knowledge of how it is done. This know-how should be considered as immediate, that is non-mediated by a theoretical knowledge of how it is done. To put it in a nutshell, it is practical and not theoretical know-how. Third, Hornsby's notion of basic action is relativized to individual agents. Thus, for example, executing a trill may be a basic action for a professional pianist, but not for the novice piano player. To keep things simple, I will at the start of my inquiry consider only actions that are basic for most people. In other words, I shall relativize the notion of a basic action to normal adult human agents (i. e. agents with intact motor abilities). The basic actions I will consider will then be actions that belong to the repertory of actions common to all normal human agents and that the agents know how to do without necessarily being able to theorize this knowledge.

Concepts of basic actions are of special interest for at least two reasons. First, insofar as a basic action is an action one knows how to do without necessarily knowing how one does it, possession of the corresponding action concept need not presuppose possession of other action concepts. Concepts of basic actions are therefore likely to be characterized at least in part in terms of their relations to some level of non-conceptual motor content. Second, insofar as basic actions are those actions that are most directly linked to a know-how, they are also those actions most directly related to the execution of movements. It is therefore at the level of basic actions that the question of the distinction between actions and movements is most pressing. This is why I will focus primarily on basic action concepts.

To this first restriction that involves taking as privileged objects concepts of basic actions, I shall add a second restriction. Among basic actions, I shall consider first only basic actions that are strictly intentional. The first stage of this enquiry will then involve investigating an idealized case. I'll try to answer the following question: What would our action concepts be like if all actions were both basic and strictly intentional? I shall specify below what I mean exactly by a strictly intentional action. In order to be able to do so, I first have to set the stage and give a broad sketch of the version of the causal theory of action I endorse. I will then turn to the problem of the interface between conceptual and non-conceptual representations of actions and will try to show how, by studying the way these non-conceptual representations are structured, one can shed light on the structure of basic action concepts. I will then consider the problem of the relationship between actions and movements. In the final part of the paper, I will try to show how one can lift the restrictions imposed at the beginning of the enquiry and thus generalize the account given of action concepts so that it applies to actions that are not (strictly) intentional, that are complex, or that are not basic.

II

According to the causal theory of actions, what distinguishes actions from mere happenings is the nature of their causal antecedents. Genuine actions are events with a distinctive mental cause. Among the several versions of the causal theory, some consider that this antecedent is a complex of some of the agent's beliefs and desires, other contend that this antecedent is an intention, where an intention is conceived as irreducible to a belief-desire complex in virtue in part of its self-referential aspect. Moreover, certain philosophers draw a distinction between two types of intentions, variously called

intentions in action vs. prior intentions (Searle, 1983), present-directed vs. future directed intentions (Bratman, 1987), immediate vs. prospective intentions (Brand, 1984), or proximal vs. distal intentions (Mele, 1992). Although not strictly equivalent, these distinctions nevertheless largely overlap and they reflect similar motivations on the part of their proponents. In particular, the distinction between two types of intentions was offered as an answer to a number of difficulties faced by earlier versions of the causal theory, such as the problem of causal deviance, the problem of the status of automatic actions, the problem of accounting for our immediate, non-inferential, awareness of our own actions.

The theory of action I endorse is a version of these dual intention theories. Its specificity lies in its attempt at integrating in an explicit way a number of insights from work in the neuroscience of action. In what follows I shall retain Searle's terminology, even though I disagree with Searle on some points. In my version of the dual intention theory, the prior intention corresponds to a conscious (personal level) representation of the goal of the action prior to the initiation of the action. This representation has conceptual content and is inferentially integrated with the desires and beliefs of the agent. The intention in action is the proximal cause of the physiological chain leading to overt behavior.[4] The content of an intention in action includes a precise perceptual-motor representation of the target of the action and of the bodily movement to be executed. The intention does not terminate with the onset of action but continues until the action is completed. On this view, the intention-in-action does not simply trigger the action, it plays a continuing causal role in shaping the action, guiding and monitoring it until completion. Moreover, although intentions in action can be conscious, that is accompanied by what Searle (1983) calls an 'experience of acting', this needs not always be the case.

According to this view, all actions are caused by intentions in action, but they are not all caused by prior intentions. Thus, for a bit of behavior to qualify as an action, it is both necessary and sufficient that it be caused by an intention in action, and it does not matter whether the latter is accompanied by an experience of acting or whether it is itself caused by a prior intention. However, the presence or the absence of a prior intention is what allows us to account for the distinctions between voluntary or deliberate actions and automatic ones. To my knowledge, most versions of the dual theory of intention offer only a rather cursory characterization of intentions in actions (by whatever name they call them). Admittedly, they insist that an intention in action does not simply trigger an action but plays a causal role in shaping it, guiding and monitoring it until completion. Yet, they do not offer a precise characterization of the content of the intention in action; often enough, they merely point out that this content is more fine-grained than the content of the corresponding prior intention, when there is one. I believe that it is possible to arrive at a more precise characterization of intentions in action and of their contents if one takes into account insights from neurophysiological work on motor representations.

I have attempted to give such a characterization elsewhere (Pacherie, 1997a, 1997b, 2000), taking my inspiration from recent neurophysiological work on the nature of motor intention and imagery and in particular from a very stimulating synthesis of this work offered by Jeannerod (Jeannerod, 1994, 1997). I will here summarize its main points. One important reason for at least a partial assimilation of the philosopher's intentions in action to the neurophysiologist's motor intentions is that they are assigned the same function in their respective models, i. e., they are regarded as the proximal causes of actions and as

playing a continuing causal role in shaping the action, guiding and monitoring it until completion.

Based on neurophysiological evidence, Jeannerod argues in favor of the following three theses. First, he claims that actions are driven by an internal representation of a goal rather than directly by the external world. He warns us against an artificial separation between movement representations, assumed to pertain to a physiological approach and action representations assumed to pertain to a psychological approach. His claim is that there is no such dichotomy:

The system that plans the action and its expected effects is continuous with the executive mechanisms. The representation of the action is therefore distributed at several levels of the action system. (Jeannerod 1994a: 231)

More precisely, there is a hierarchy of motor representations such that the goals and parameters of the actions coded for at the higher levels act as constraints on the lower levels of motor representations

Second, Jeannerod contends that the motor representations that drive the action have a specific content, involving two main aspects: a representation of the body in action as a generator of forces and a representation of a goal of action encoded in a 'pragmatic' mode, distinct from 'semantic' modes of representations. With respect to the first aspect, Jeannerod insists that the motor representation is a representation of the acting self that involves a representation of the body as a generator of acting forces, not just a representation of the effects of these forces on the external world. Experimental studies reviewed by Jeannerod (Decety *et al.* 1993; Gandevia 1982, 1987; Gandevia and McCloskey, 1977; McCloskey *et al.* 1983) suggest that the amount of force needed to produce the desired motor effect is encoded in this component of the representation. Moreover, experiments with completely, or partially, paralyzed patients (Gandevia 1982; Jeannerod 1994b; Scheerer 1987) suggest that the programming of force has a subjective correlate — the sensation of effort. Empirical evidence also suggests that the central representation of action encodes certain parameters of movement execution dictated by kinematic rules (Decety and Michel 1989; Georgopoulos and Massey 1987; Georgopoulos *et al.* 1989; Viviani and McCollum 1983) and biomechanical constraints (Rosenbaum *et al.* 1990; Rosenbaum and Jorgensen 1992; Shiffrar and Freyd 1990).

The second essential aspect of a motor representation is a representation of the goal of action. According to Jeannerod, this representation includes a representation of both the external object toward which it is directed, and the final state of the organism when that object has been reached. In simple, object-oriented actions (i. e., when objects are goals for actions), the visual attributes of those objects are represented in a specific, 'pragmatic' mode used for the selection of appropriate movements and distinct from other modes of representation used for other aspects of object-oriented behavior (categorization, recognition, etc.).[5] Jeannerod suggests that a motor representation of a goal object includes both a visuo-spatial component pertaining to its spatial location and an object-centered component determining how to deal with it. He also suggests that the function of those representations ‘falls between’ a sensory function (extracting from the environment attributes of objects or situations relevant to a given action) and a motor one (encoding certain aspects of that action). In other words, in a pragmatic representation, object attributes are treated in a causally indexical way (Campbell, 1993, 1994), or to use a different terminology as ‘affordances’ (Gibson 1979), activating predetermined motor patterns.

Thirdly, Jeannerod contends that motor representations are involved not only in action preparation, but also in the mental simulation of actions (motor imagery) and in the observation of actions performed by others. In others words, these processes share, at least in part, common structural and functional mechanisms and make use of the same representational format.

If one accepts that this characterization of the content of motor representations also applies to the content of intentions in action, what lessons can we draw concerning the specific features of this content? Although for expository purposes I distinguished between two aspects of the content of motor representations, it would be mistaken to assume that they correspond to two separate components of the content. Rather, motor representations as conceived of by Jeannerod should be viewed as relational models, with the body and the goal functioning as the terms of the relation. What the motor representation represents are neither states of the body *per se* nor states of the environment *per se*, but rather dynamic relations between body and goal. As an other way to put it, we could say that the goal is given under a specific mode of presentation, namely the form of a motor process.

The mode of presentation of the content of intentions in action can also be said to be relational and dynamical in a second sense. Motor representations include perceptual information both about the external world (e.g. the position in space and the shape of the object-goal) and about the agent's body (e.g. kinesthetic and proprioceptive information about the position of the limbs). Insofar as motor representations include perceptual representations, they include non-descriptive modes of presentation. Here non-descriptiveness should be taken in both of the two senses distinguished by Recanati (1993). First, the mode of presentation is non-descriptive in the sense that it is iconic, where iconicity can be analyzed in terms of three characteristic properties. Iconicity involves perspectivalness: the object to be acted upon is represented from a certain point of view, namely that of the perceiving subject and, moreover, the way the bodily motions to be performed are represented depends on the initial position of the effectors. It also involves fine-grainedness of content: they are a number of dimensions characterizing an object – distance, direction, shape, size — such that any value on these dimensions may enter the content of an iconic representation. This is the case for instance, for the pragmatic representation of the size of an object to be grasped, as demonstrated by the fact that the size of the amplitude of grip aperture during grip formation covaries with object size (Jeannerod, 1997: 35ff). Finally, iconicity involves informational richness: a pragmatic representation of an object to be acted upon does not just encode information about, say, its shape, it also typically conveys information about its size, distance and direction.[6] Second, the mode of presentation is non-descriptive in the sense that it is a *de re* mode of presentation, where *de re* modes of presentation are construed as mental indexicals that determine the contextual relation that something must bear to a thought to be the object of the thought (Recanati, 1993: 98-103). This gives us the second sense in which we can say that the modes of presentation of the content of intentions in action are relational. They are relational insofar as they include *de re* modes of presentation, that is modes of presentation that involve a certain relation to the reference.

Let us now examine what the second sense is in which the modes of presentation of the content of intentions in action can be said to be dynamical. Recall that it is an essential characteristic of the role of intentions that they are involved in the guiding and monitoring of the action as long as it unfolds. In order for the intention in action to guide

the action, it must anticipate the consequences of the movements. In order to control it, it must allow for adjustments during execution. As a consequence, the content of the intention in action cannot be fully determined prior to the initiation of action. To take a very simple example, if my intention in action is to take a drink from the glass of water in front of me, its content will include that I reach for the glass, that I grasp it and that I lift it. My representation will include estimates as to what the trajectory of my arm should be for it to reach the glass, estimates as to how my hand should be shaped in order to grasp the glass, estimates as to the amount of force needed to lift it. However feedback (be it visual, kinesthetic, or proprioceptive) will be needed to make adjustments. Here the content of the intention is dynamical in the sense both that it gets elaborated over time — it becomes more determinate through feed-back— and that the intention in action is itself responsible for the obtaining of the information that will make the content more determinate. The only way to gain the extra information (the feedback information) is for the intention in action to create the context in which the information will be available. Perhaps we could say here (if one is not already overdosing on indexicality) that an important feature of the content of intentions in action is its dynamical indexicality. Indexicality because the exact value of certain constituents of the representation (amount of force that needs to be programmed, precise shape of the hand, and so on) can only be fixed relative to a context. Dynamical indexicality because the context itself must be brought into existence by the intention in action.

As a last preliminary point before getting to the heart of the matter at hand, I must explain what I take a strictly intentional action to be. Two points are in order. First, as is commonly noted, intentionality is relative to a description. The same action can be intentional under a description and non-intentional under another. By an intentional action (as picked out by a certain description), I do not mean an action preceded and caused by a prior intention that represents it under the same description. To refer to such actions, I speak of premeditated or deliberate actions. Nor is it enough for an action under a description to be intentional that it be caused by an intention in action. If this were a sufficient condition, every action under whatever description would be an intentional action, since, according to the perspective adopted here, what distinguishes actions from non-actions is that the former but not the latter are caused by intentions in action.

Second, one should note that the term 'action' exhibits an ambiguity akin to the well-known process-product ambiguity. What I mean is that the word ‘action’ is sometimes used to refer to the process of acting more or less independently of the result it yields and sometimes used to refer to the process together with its result. This ambiguity carries over to the notion of an intentional action. When one says that a given action was intentional, one can either mean that the process was intentional or one can mean that result yielded by this process was intended. If one uses the process reading, it makes sense to distinguish between successful and failed intentional actions, where what makes an action intentional is the intentional nature of the process and what makes it successful or failed is the nature of the product yielded by the process. In contrast, distinguishing between failed and successful intentional actions makes no sense if one uses the process-cum-product reading of the word. Both readings are certainly legitimate provided one makes it clear which reading one intends. Yet, given that the project at hand is not to offer an analysis of the general concept of an action, but rather to investigate the nature of our concepts of particular types of actions, the process-cum-product reading is perhaps more appropriate. To a large extent we describe and taxonomize actions according to

their results. Indeed, a large majority of action verbs are success verbs. For instance, we would not say that John hurt Mary unsuccessfully if what we wanted to describe was an instance where John threw a stone at Mary's head but missed. Rather we would say that John tried to hurt Mary but failed.

Therefore, in the two definitions that follow, action is taken in the process-cum-product sense. I shall say that an action (process-cum-product) as picked out by a certain description is **intentional** if and only if: (1) its result corresponds either to the final state represented as the goal in the intention in action that caused it or to an intermediary state represented as a step towards the goal in the intention in action that is causing the action and (2) its success is not accidental[7]. I shall say that an action (process-cum-product) is **strictly intentional** if and only if (1) its result corresponds to the final state represented as the goal in the intention in action that caused it and (2) its success is not accidental.[8] Actions that fail to meet one of the conditions of intentional actions will be said to be non-intentional. (As an aside, it should be noted that, depending on which conditions are not satisfied, one may distinguish different kinds of non-intentional actions or different degrees in non-intentionality.)[9] As an illustration of this terminological choice, if I intend to drink from the glass of water in front of me, the action of drinking caused by this intention in action will be said to be strictly intentional, the action of reaching for the glass will be said to be intentional but not strictly intentional, and the action of spilling some of the content of the glass on my neighbor if I am clumsy, will be said to be non-intentional.

III

Although I have distinguished between conceptual and non-conceptual representations of actions, I haven't yet said much about what the distinction amounts to. Obviously, this omission should be repaired before attempting to give an account of action concepts. So what are the constraints that a representation should satisfy in order to qualify as a conceptual representation? I would like to stress two main constraints that apply to concepts generally. The first is Evans' Generality Constraint. The **Generality Constraint** states that for a thinker to be said to possess a concept *F*, it must be possible for him or her to entertain the thoughts *Fa*, *Fb*, *Fc*, etc. where *a*, *b*, *c* belong to a range of individuals of which the concept can significantly be said to be true or false. Whether one construes actions as temporal properties of individuals, as Goldman (1970) or Israel, Perry and Tutiya (1997) do, or as a specific variety of events that essentially involve an agent (Davidson, 1980; Kim, 1976; Brand, 1984), a concept of an action should have places for at least two arguments: an agent and a time. As a consequence, the Generality Constraint doubly applies to action concepts. For a subject to be said to possess the concept of an action *A*, he or she must be capable not only of entertaining the thought that *A* (a,t_1) with *a* denoting an agent and t_1 a time, but also of entertaining the thoughts *A* (b,t_1) and *A* (a,t_2), where *b* denotes an agent different from *a*, and t_2 a time different from t_1. From this it follows that for an individual to be said to possess a concept of a given kind of action, it is not enough that she be able to think of herself as performing actions of this kind on different occasions, she must also be able to think of other agents as performing actions of the same kind.

The second general constraint on concepts is an **amodality constraint**. By this I mean that it must be possible for concepts to feature as constituents of thoughts with different modes. In other words, it should be possible for our concepts in general and our action

concepts in particular to feature as constituents of the content of beliefs, desires, memories, intentions, plans, and so on. This constraint is closely linked to the idea that concepts are the inferentially relevant constituents of intentional states, that they are elements in a common representational format allowing for the possibility of some form of global coherence, at the personal level, among our desires, beliefs, intentions, and other propositional attitude states. The notion of amodality should be taken here in a strong sense. Conceptual amodality is not only distinct from modal specificity in the sense in which, for instance, a given sensory modality could represent information in its own proprietary format; it is also distinct from intermodality in the sense of a format shared by two or more cognitive subsystems and allowing them to exchange information. In this sense, endorsing for instance the common coding hypothesis of perceptual and motor information does not amount to endorsing the claim that this shared format is a conceptual format. This common coding presumably insures some form of local, perceptual-motor, coherence, but the coherence that conceptual representations are responsible for is a global coherence of the cognitive system at the personal level. From this perspective, one may maintain that there exists an essential link between the possession of action concepts and the capacity for rational planning of our future actions. As pointed out by Bratman (1984), this capacity for rational planning involves both some form of internal consistency and some form of external consistency. The actions that are the constituents of an action plan must be mutually consistent for it to be possible to execute the entire plan. They must also be consistent with my beliefs about the world in order that the entire plan may be carried on successfully, given that my beliefs are true. For this latter form of coherence to be achieved, my action plans and my beliefs must be inferentially integrated.

To these two general constraints on concepts one should add a third constraint specific to action concepts, that may be called the **executability constraint**. Our action concepts figure as constituents in our plans and our prior intentions. Insofar as these can be put to execution — that is cause intentions in action which in turn will cause actions —, it is necessary that the conceptual contents of our plans and prior intentions be convertible[10] into the non-conceptual content of our intentions in action and thus executable. For this conversion to be possible, it must be the case that action concepts get anchored, directly or indirectly, in non-conceptual content. Hence my concern with basic actions, since basic actions are those actions that agents know how to do without necessarily having theoretical knowledge on how they do them, and, in particular, without necessarily being able to describe their know-how using other action concepts.

The view I shall try to defend is that insofar as an agent possesses a concept of a basic action kind, this concept is a demonstrative concept. To do *A*, is to act like this, where 'this' is meant to denote not an actually executed action, but rather a property made accessible to the agent by the motor representations he is able to form. To anticipate a bit on what will follow, I think that what the demonstrative components in our action concepts capture are, ultimately, certain aspects of our motor dispositions. However, they do it indirectly, either via occurrent motor representations that are exercises of these dispositions or, even more indirectly, via actual action tokens, which are themselves sustained by occurrent motor representations. Trying to teach someone else the concept of an action, by demonstrating the action is an instance of the latter case. Our problem will then be to elucidate the nature of the properties selected by the demonstrative as well as the nature of the similarity relation involved. Insofar as the demonstrative is used to

pick out what defines an action type and not simply to pick out a particular token of a given action type, it cannot refer to the content of the motor representation taken in all its fine-grained detail. On the contrary it is used to select certain aspects of this content, aspects that are shared by various action tokens and that account for the fact that they fall under the same type.

Let's assume that catching a ball is a basic action[11], that is something we know how to do. On one occasion, I am sitting, a small red ball is thrown at me at eye level from a distance of ten feet and I catch it with my right hand; on another occasion, I am standing, the ball is a basket ball thrown at me at chest level from a distance of ten yards and I catch it with both hands. Since, by hypothesis, the action of catching a ball is for me a basic action, my concept of it is a demonstrative concept. What can the demonstrative in the concept refer to that allows me to take these two actions as falling under the same concept 'catching a ball'? The contents of my intentions in action in each occasion differed in important ways. The perceptual representations I had of the ball and its trajectory were different, the initial bodily postures were different, as well as the movements to be performed and the final states. What is left that is common to both actions? In both cases, I had a similar goal, I aimed at a certain result, namely holding a ball in my hands. As I have already remarked, we very often characterize actions in terms of their result or type of result and one important commonality between the two actions is indeed their similar result. But a result is not enough to define an action. If someone had placed a ball in my hands, the result would be the same, but I would not have caught the ball. Actually, I would not have acted at all. Assuming even that someone reading in my thoughts and seeing that I was forming the intention in action to catch the ball, had immediately placed it in my hands, one wouldn't say that I have caught the ball, even though my intention in action did, in a sense, cause the result. Thus, in a demonstrative concept of an action, the 'like this' cannot merely refer to a result.

In the preceding section, I stressed the fact that the content of intentions in action is relational in at least two ways. First, what motor representations represent are neither bodily states taken in themselves nor states of the environment, but dynamic relations between the two kinds of states. Second, motor representations include perceptual information both on the external environment (for instance the position in space and the shape of the target object) and on the agent's body (for instance, visual, proprioceptive and kinesthetic information on the position of the limbs). Thus, they are also relational in the sense that their content depends in part on the relations that hold between the agent and a particular context. The relational aspect in the first sense — i. e. the relation between body and goal — depends for its complete determination on the relational aspect in the second sense — i. e. on the context, both internal and external, of the intention in action. What I would like to suggest is that the 'this' of the demonstrative action concept refers to the general form of the relation in the first sense, apart from its particularization by a specific context. In other words, our 'like this' refers not only to a goal state but also to a given function that, to this goal and a given context (both internal and external) associates movements that, normally, will permit the achievement of the goal. For the sake of brevity, I will henceforth call this function a **selection function**.[12]

To say that I know how to catch a ball, that this is for me a basic action, implies that, in a large variety of contexts, I know what movements to perform in order to achieve the desired goal. In other words, an action is basic for an agent, if, for her, the function associating to a goal a movement conducive to its achievement is defined over a large

variety of contexts, that is, to put it briefly, if the selection function is robust. When I say that the function is if not completely defined at least defined in a large variety of contexts, I mean that it is defined in what we could call a practical way. In a number of different circumstances, the agent knows how to proceed to achieve this goal. That the agent knows how to do something does not imply that she knows how she does it. Once again, one should distinguish a practical know-how from a theoretical knowledge of how what is done is done. As another way to put it, the function is defined in the sense that it is implemented in the motor system of the agent — he has at his disposal the relevant motor schemata. But it is not needed that the function be theoretically defined in the sense that the agent would be capable of giving a description of it.

When I say that in a demonstrative concept of a basic intentional action, the 'like this' refers to a selection function that is at least partially defined, I mean that it refers to the function itself and not to the particular value the function may take in a given context. To have a concept of a basic action is to have not just an idea of a type of result or goal aimed at by the agent, but also an idea of a selection function realized in the agent and associating to a desired result and a given context a movement of a certain type.

In a slightly less informal way, an agent *a* that performs at time *t* a movement *m* yielding a result *r* performs (strictly) intentionally an action of type *A*, characterized by a result of type *R* and a selection function of type $F(C, R) = M$ iff:

(1) *a* has available to him a selection function of type $F(C, R) = M$ at least partially defined;

(2) *a* has the intention in action to produce result *r* at *t*;

(3) As a consequence of (1) and (2), *a* executes a movement *m* yielding a result *r*;

(4) *r* belongs to type *R*;

(5) *m* is a value of the function $F(c_t, r)$, where c_t is the context at time *t*.

Condition (1) is needed in order to attribute to *a* the capacity to intentionally perform actions of type A; conditions (3)-(5) are needed in order for the event considered (a movement *m* yielding a result *r*) to be taken as an instance of action type *A*; condition (2) is needed for this particular action to qualify as strictly intentional. I contend that in order to be said to possess a concept of a strictly intentional basic action, a subject must grasp all five conditions, although this does not mean that he must be able to conceptualize the selection function $F(C, R)$ other than demonstratively. I do not mean to suggest that mastery of this concept requires a subject to be able to explicitly spell out these conditions. This would surely be an implausibly strong demand. Nor do I suggest that in ordinary applications of this concept, a competent user of the concept will systematically check that all five conditions are met. Psychologists and philosophers alike have rightly insisted on the distinction between what defines a concept and what cues are commonly used to determine the concept under which an object falls.[13] What I mean, though, is that a competent user of the concept, if provided with evidence that one of the five conditions is not fulfilled, should take this evidence as a reason to deny that the particular action at stake qualifies as strictly intentional. For instance, if provided with evidence that the free throw he witnessed was my one successful shot out of a hundred failed attempts, this would give him reason to doubt that condition (1) is satisfied, hence that what he witnessed was a strictly intentional action of mine.

The conditions required for the possession of concepts of basic actions are very stringent. We will have to weaken these requirements if we want to be able to extend our analysis to cover the possession of action concepts in general. I shall indicate below how I think

we could proceed. But first let me offer some remarks on the relationship between actions and movements and between action concepts and movement concepts. Although one may take the selection functions (of form *F (C, R) = M*) that are involved in action concepts as defining equivalence classes of movements, the principles governing the taxonomies of movements relevant for action are quite different from the principles governing taxonomies of movements considered independently of their results. In a taxonomy of movements taken as such, movements are grouped together on the basis of criteria such as the effectors or effector systems involved in their production, the dynamics of muscular contraction patterns or the kinematics of the resulting bodily movements. One may want to say that the principles of individuation and categorization are non-relational or intrinsic in the sense that they do not take into account the environmental effects of the movements. By contrast, the taxonomies of movements that are relevant for action are doubly relational: they classify movements both as a function of their context of production and as a function of their environmental effects. It follows that the two types of taxonomies are orthogonal to one another: they cross-classify movements. The taxonomy relevant to action is not a refinement of an 'intrinsic' taxonomy of movements that would further subdivide already defined types of movements with regards to their environmental effects. In two different contexts, two tokens of the same movement type (in the sense of an intrinsic taxonomy of movements) may have vastly different environmental effects and thus may not belong to the same 'actional' equivalence class. One may be tempted to think that in this regard certain actions constitute exceptions to the rule. What I have in mind here are the actions called executions by Israel, Perry and Tutiya (1997) and basic actions (in a sense different from the one used in this paper) by Goldman (1970). These are actions such as raising one's arm, dancing, or running, that seem to be defined solely by the types of movements executed. Here the equivalence class of movements as defined by the function attached to the action concept corresponds to the class of movements as defined by intrinsic criteria. Should we say then that such action types can be characterized solely in terms of the bodily movements executed by those who perform them? No, for an action concept refers not only to a given function, but also to a goal. 'Executions' are simply a limiting case where the goal reduces to the production of a movement. In other words, a movement is a movement, whatever its goal and whether it has a goal or not; an 'execution', viewed as an intentional action is a movement aimed at a certain result, namely the production of the movement itself.

IV

It is obvious that a theory of action concepts whose application were in principle limited to strictly intentional basic actions could not be deemed satisfactory. To be of any interest, the theory must be capable of generalization and the restrictions hitherto imposed must be lifted. One might want to say that these restrictions, even if considered as provisional, are incongruous and unwarranted. As regards the restriction to strictly intentional actions, one might object that the dimension of intentionality is not immediately relevant to our ordinary use of action concepts. Not that it doesn't matter to us whether an action is intentional or not — on the contrary, this issue has extremely important moral and legal consequences —, but because we ordinarily identify an action as belonging to this or that type prior to determining whether it is intentional or not. It may seem reasonable to assume that in order to decide whether an action is intentional or not, one must first have identified the event at stake as an action. With respect to the

restriction to basic actions, one might also object that our capacity to build concepts of action types is independent of our capacity to perform actions of that type. Knitting, ice-skating, soldering are actions one can have concepts of, even though one has never handled knitting needles, worn ice-skates or used a soldering iron. Given these two objections, one might be tempted to claim that neither an idea of a goal nor a reference to a selection function are necessary ingredients of action concepts, since action concepts may be applied in cases where the agent does not act intentionally and since one may possess and apply action concepts without knowing how to perform the actions that fall under those concepts.

It is certainly legitimate to claim that action concepts apply to non-intentional as well as to intentional actions and to claim that in order to possess an action concept it is not necessary that one be capable of actions falling under the concept. Yet it would be mistaken to conclude that neither the notion of a goal nor the notion of a selection function are crucial components of action concepts. Strictly intentional basic actions appear prototypical in that they exemplify in the most direct way two principles that hold for all action types. Other actions can be viewed as deviating from these prototypes in one or several ways. Thus, in order to generalize our account of action concepts, we will have to relax certain constraints in order to make room for these deviations.

What are those two principles I just alluded to? The first may be called the **principle of intentionality** and may be stated as follows: something cannot be an action, if it cannot be a strictly intentional action. What I mean by this is that a description of an event could not qualify as an action-designator unless there are events that this description applies to and the events thus described qualify as intentional actions. For instance, I can bump into someone involuntarily, but bumping into someone would not be an action if it were not possible to intentionally bump into someone. I think that this principle underlies the intuitive distinction we operate between things we do and things that happen to us, even when the latter depend essentially on ourselves, our bodily states and physiological processes. We sweat, we sneeze, we digest, our hair grows, our heart rate slows down or goes up, but these events are not actions. These are not things we can do intentionally.

The second principle is a **principle of competence** that can be expressed by the following motto: "no intentional action without know-how", where the know-how in question is required of the target agent. This principle is in a way subordinate to the first principle and it spells out one necessary condition on intentional action. For an action to be strictly intentional, its result must match the goal intended by the agent. But this condition is not sufficient. It is also necessary that this match does not happen by coincidence or by accident (Mele & Moser, 1994). Our second principle "No intentional action without know-how", underlies, I think, our intuitions concerning lucky strikes and accidental success. Typically, one would not say that John, handling a gun for the first time in his life, and hitting the bull of a designated target, did it intentionally, even though he was indeed trying to hit the target. This intuition will be strengthened if he completely misses the target on his next twenty attempts. Certainly, one can say that John intentionally tried to hit the target, but not that he did it intentionally, for his success on his first attempt looks too much like an accident. What distinguishes John from a sharpshooter who almost always hits her targets is that John does not have a robust selection function that would allow him to program the exact movements needed to achieve his goal. In other words, it is an accident that the movement executed by John

when he first shot and hit the target corresponded to the value that the selection function associated with this action type would yield in the same circumstances.

We should certainly allow that, in order to apply a concept of a type of action, say *A*, to a given event (the production by an agent of a movement *m* leading to a result *r*), it is not necessary to attribute to the presumed author of this action the intention to carry it out or the possession of a robust selection function for actions of this type. Yet it follows from the principle of intentionality and the principle of competence that for the event at stake to be conceptualizable as an action of type *A*, it is nevertheless necessary that, in the case of certain events belonging to the same type, it be possible to attribute to the agent the intention to do *A* and the possession of the selection function *F (C, R)* attached to actions of type *A*. This is the reason why strictly intentional basic actions appear as prototypical actions.

Let us see now how we can relax the constraints on action concepts in order to allow their application to non-basic and/or non-intentional actions. First, let us lift the restriction to strictly intentional actions. Recall that according to the characterization given above, an action (in the process-cum-product sense) is not strictly intentional if its result does not correspond to the final state represented as the goal in the intention in action that causes it and/or if the movement executed is not the output of a robust selection function realized by the agent. One should note, however, that all actions, whether intentional or not, are caused by intentions in action and that their being thus caused is what sets them apart from non-actions. In order to make room for non strictly intentional actions I suggest that the conditions previously stated be modified in the following way:

An agent *a* that performs at time *t* a movement *m* yielding a result *r* performs an action of type *A*, characterized by a result of type *R* and a selection function of type *F (C, R) = M* iff:

(1') There exists a selection function of type *F′ (C, R′) = M′* available to *a* in a more or less robust form;

(2') There exists a result *r′* of type *R′* such that *a* has the intention in action to produce *r′* at *t*;

(3') As a consequence of (1') and (2'), *a* executes a movement *m* yielding a result *r*;

(4') *r* belongs to type *R*;

(5') *m* is a value of the function $F(c_t, r)$, where c_t is the context at time *t*.

By replacing (1)-(3) with (1')-(3'), we preserve the idea that every action is caused by an intention in action, while getting rid of two constraints, namely the constraint that the result achieved be the result aimed at and the constraint that the movement yielding this result be selected by the selection function typically associated with the production of results of this type. By renouncing these two constraints, we have arrived at an analysis that holds for all basic actions, whether or not they are strictly intentional. Suppose, for instance, I am once again trying to score a basket but throw the ball too high so that it goes over the basket board. Here throwing the ball over the basket board is an action of type *A* associated with the selection function *F*, the movement I made was of type *M* and the result of type *R*, but what I intended to do was scoring a basket, namely the action associated with function *F′*. Therefore my action was not strictly intentional. For a basic action to be strictly intentional, one more condition will have to be satisfied, namely:

(6') *r′ = r* and *F′ (C, R′) = F (C, R)*.

In other words, my action of throwing the ball over the basket ball would have been strictly intentional if I had had the intention of action to produce result *r* through

executing movement *m*. One should note that conditions (1') and (2') involve an existential quantification and not, as did the conditions (1) and (2) that they are replacing, a reference to a particular selection function and a reference to a particular intention in action. These modifications are introduced in order to account for the fact that in order to attribute an action to an agent, one needs to attribute to the agent a certain intention in action and a certain motor competence, but not to identify the exact intention in action that causes the action nor the exact nature of the motor competence involved (i. e. the selection function involved). By contrast, condition (5') remains the same as condition (5) and it makes reference to a specific selection function; this reflects the fact that for a subject (the interpreter, not the agent) to be credited with mastery of a basic action concept, he must have some idea of the selection function associated with actions of this type, even though he may not be able to conceptualize it in any other way than demonstratively.

Let us now lift the restriction to basic actions. Recall that I contrasted above basic action with complex actions and that I relativized the notion of a basic action to normal human agents, where basic actions are actions that belong to the repertory of actions common to all normal human agents and that the agents know how to do without necessarily being able to theorize this knowledge. Thus there are in fact two restrictions to be lifted. Let me start with complex actions. A complex action can be characterized as an action whose intended result can only be achieved by coordinating two or more basic actions. Knowing how to perform a complex action of a certain type, say baking a chocolate cake, requires that one be able to assemble in an appropriate way a set of more basic actions. One may characterize this competence by saying that an agent who knows how to do a complex action of a certain type possesses an appropriate action script. Here an action script can be defined as a compound selection function that, to a context and a result, associates an ordered series of more basic actions and thus a sequence of intermediary movements and results. In simple cases, the compound function will take the following form:

$CF\ (C, R) = \langle F_1\ (C_1, R_1), F_2\ (C_2, R_2), \ldots, F_n\ (C_n, R) \rangle = \langle (M_1, R_1), (M_2, R_2), \ldots, (M_n, R) \rangle$

One should note however that there are more complex cases where the more basic actions are only partially ordered. For instance, when preparing a chocolate cake, one should melt the chocolate before beating it with the egg yolks, but it doesn't matter whether one pours sugar or flour first in the mixing bowl. Moreover, there often are several ways of achieving the same goal. For instance, I know of at least three different procedures for turning off my computer. Thus, the compound function will sometimes take a more complicated form. I think we can generalize the analysis offered to complex actions by introducing in our conditions the notion of a compound selection function in the following way.

An agent *a* that performs at time *t* a series of movements yielding a series of results performs a complex action of type *A*, characterized by a result of type R and a selection function of type $CF\ (C, R) = \langle F_1\ (C_1, R_1), F_2\ (C_2, R_2), \ldots, F_n\ (C_n, R) \rangle = \langle (M_1, R_1), (M_2, R_2), \ldots, (M_n, R) \rangle$ iff:

(1") there exists a selection function of type $CF'\ (C, R') = \langle (M'_1, R'_1), (M'_2, R'_2), \ldots, (M'_n, R') \rangle$ available to *a* in a more or less robust form;

(2") There exists a result r' of type R' such that *a* has the intention in action to produce r' at *t*;

(3") As a consequence of (1") and (2"), *a* executes a series of movements yielding a series of results $\langle (m_1, r_1), (m_2, r_2), \ldots, (m_n, r) \rangle$;

(4") *r* belongs to type *R*;
(5") $<(m_1, r_1), (m_2, r_2), \ldots, (m_n, r)>$ is a value of the function $CF\ (c_t, r)$, where c_t is the context at time *t*.
One should note that these conditions apply both to intentional and to non-intentional complex actions. One should also note that basic actions can be treated as a limiting case of complex actions. In order to possess a concept of a given type of complex action, a subject must know conditions (1")-(5"). In particular, it is not enough that he have concepts of the basic action types that are constituents of the complex action, he must also know how to combine these basic actions; in other words, he must have an idea of the compound function characteristic of complex actions of this type.
Let us now try to get rid of last restriction and extend our analysis to actions that are not necessarily among the shared repertoire of normal human agents. One the one hand, some of us know how to perform certain actions, such as knitting, doing a cartwheel or playing a trill on the piano that others are not able to perform and but can nevertheless have concepts of. On the other hand, we attribute actions to animals without the way they perform these actions corresponding to the way we ourselves carry them out. My cat just jumped on my desk. With some practice and motivation for it, I am sure I could also jump on my desk. I greatly doubt that even after intensive training on my part, my cat and I would come to realize the same selection function. Yet, when jumping on the desk, both my cat and I are executing an action of the same type.
The two cases just mentioned are somewhat different. Let us start with the actions that some human agents know how to do, others not. Actions that are not basic in the sense that they do not belong to the repertoire of actions common to all normal human agents are actions that must be assembled from more basic ones. Paul, who is a pianist, executes quite effortlessly trills and has the concept corresponding to the action of executing a trill. He has an idea of a certain type of result — a certain type of sound event — and he has a demonstrative concept of a certain compound selection function available to him and allowing him to program adequately the finger movements necessary for the production of a trill. What is it that makes him different from Janet, who doesn't play the piano, but nevertheless has a concept of 'playing a trill'? Janet has not learned to play trills: she has not learned how to combine the basic actions necessary for the production of trills. Thus she does not have a demonstrative concept of the compound selection function corresponding to the action of playing a trill. Insofar as she has the concept 'playing a trill', she nevertheless has an idea of a certain type of result — a certain type of sound event — and she has a descriptive concept of the type of combination of basic actions that constitutes playing a trill. In other words, what distinguishes the conceptual representations we have of actions we know how to do from the conceptual representations we have of actions that we don't know how to do is the way in which, in each case, we represent to ourselves the selection function tied to this action. In the first type of case, we can use a demonstrative concept; in the second, we only have a descriptive concept of the selection function.
Finally, what of the action concepts applicable not only to the actions of human agents but also to the actions of other creatures? My cat jumps on the desk; for the sake of philosophical enquiry, I proceed to do the same thing. What allows us to conceptualize the two actions as belonging to the same type? Admittedly, provided I don't break a leg in the process, the final result is of the same type. In both cases, the agent who was initially standing on the floor is now standing on the desk. But the movements through which my

cat achieved this result are not values of the selection function I myself associate to this result. The selection functions associated to a given result vary as a function of the motor organization of the creature concerned and the motor system of cats is not identical to the motor system of human beings. I remarked earlier that in order to give an account of action concepts conceived of as demonstrative concepts — acting like this —, we had to accomplish two tasks: first, elucidate the nature of the properties selected by the demonstrative 'this' and, second, elucidate the nature of the similarity relation hinted at by the work 'like'. We are now at the point where the second task becomes pressing. I suggest that in order to be able to extend our action concepts to non-human animals, we have to introduce the notion of homologous selection functions. Two selection functions will be said to be homologous if the differences between the movements they allow to be selected in order to attain a similar goal can be accounted for in terms of differences in the motor organization of the creatures that realize those functions. For it to be permissible to describe an event involving my cat as an action of jumping on my desk, it must be the case not only that my cat eventually stands on the desk, but also that the movement that yielded this result be a value of a selection function that is the counterpart for cats of the selection function I myself associate with jumping on the desk.[14] To account for this extension of the application of action concepts, we can replace (5") by (5'''):

(5''') $<(m_1, r_1), (m_2, r_2), ..., (m_n, r)>$ is a value of a function $CF_h\ (c_t, r)$, homologous to the function $CF\ (c_t, r)$ where c_t is the context at time t.

The identity between functions will then be a limiting case of homology between functions.

As a conclusion, let me briefly summarize what I attempted to do in this paper. I tried to develop the idea that our general conception of what actions are imposes constraints on the content of our concepts of particular action types. I stressed three essential aspects of this general conception. First, what distinguishes actions from non-actions is that they are caused by intentions in action. Second, our conception of actions is governed by a principle of intentionality according to which for an event under a given description to be characterizable as an action it must in principle be possible that some events that this description would also apply to be intentional actions. Finally, underlying the notion of an intentional action is a principle of competence that states that an action cannot be considered as fully intentional unless the agent responsible for the action knows how to perform actions of this type and is capable of successful performance in normal circumstances. I claimed that these general constraints on actions had to be reflected in our concepts of particular types of actions and I tried to show how this could be done. I started with an idealized case and asked what our action concepts would be made of if all actions where strictly intentional basic actions. From this idealization, I extracted the idea of a result as the goal of the intention in action causing the action and that of the movement as a value of the selection function associated to the production of results of this type. I then tried to show that, when the initial constraints are relaxed, the three features brought out — the idea of an intention in action as a proximate cause, the idea of the result as the goal represented in the intention in action, the idea of the movement as a value of a selection function — remain core ingredients of all concepts of actions. In other words, these three features are not specific to strictly intentional basic actions. What

gives strictly intentional basic actions their specific character is rather the particularly tight way in which they require these three features to be connected.
As a last remark, I would like to point out one important consequence of the proposed analysis. In order give an account of concepts of complex actions and of concepts of actions applicable to non-human agents, I introduced the notions of a compound selection function and of a homologous selection function, respectively. Both notions are defined in terms of the more primitive notion of a basic selection function. I stressed the fact that our grasp of basic selection functions is essentially demonstrative. In other words our concepts of basic selection functions are at heart demonstrative concepts. This implies, I think, that our capacity to entertain action concepts is closely linked to our capacity for action. An essentially apraxic thinking being would not have action concepts.

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NOTES

[1] Hornsby (1980) explains that the notion of a bodily movement is ambiguous. She traces back the ambiguity to the fact that the English verb 'move' belongs to a class of verbs that can be used both transitively (as in 'He moved his arm') and intransitively (as in 'His arm moved). She also contends that the thesis that actions are bodily movements can only make sense if the phrase 'bodily movement' is understood in the transitive sense. One contention of the present paper is that, in the general case, action types should not be identified with movement types, whether movements are understood transitively or intransitively.

[2] Much philosophical effort has been put into analyzing the 'by' locution. See, for instance, Danto, 1973; Goldman, 1970; Hornsby, 1980, Israel, Perry, and Tutiya, 1993; Thalberg, 1977, Thomson, 1971. As the examples I gave suggest, an analysis of 'by' as standing for a causal relation cannot account for all the cases. It is doubtful whether 'by' is really univocal. Goldman (1970), for instance, distinguishes three relations that 'by' may express, what he calls causal generation of which turning on the light by flipping the switch is an example, conventional generation, where the possibility of doing something by doing something else depends on the existence of a convention as in signaling for a turn by extending one's arm and finally simple generation, where performing an action ensures the performance of another action in virtue of the existence of certain circumstances (running the race in less than 9 seconds count as breaking a world records only in circumstances where nobody has yet run this distance in less than that time.

[3] Hornsby offers the following definition of causal basicness: "A description *d* of a particular action *a* is a more basic_C description than another description *d'* if the effect that is introduced by $<d, a>$ causes the effect that is introduced by $<d', a>$." (1980: 71). One important reason for drawing a distinction between two notions of basicness is that causal basicness and intentional basicness do not always go hand in hand. For instance, if a man raises his right arm, 'contracting such and such muscles' will be a description of his action that is causally more basic than 'raising his arm', but, unless perhaps the man is a yogi, contracting his muscles is not something on which he will have direct voluntary control and thus the description of his action as 'raising his arm' will be intentionally more basic than the description 'contracting such and such muscles'. Note also that neither the notion of causal basicness nor the notion of intentional basicness is strictly equivalent to Goldman's (1970) notion of basicness.

[4] There has been some controversy as to whether the label 'intention-in-action' was really appropriate. Mele (1992), for instance, sees this label as misleading and contends that Searle's intentions in action' are best seen as a species of trying. One reason on might be wary of using the term 'intention' is that Searle sees intentions in action not as antecedents of actions but as proper parts of them. In his view, intentions in action cause bodily movements and together with the bodily movements they cause they constitute actions. My own suggestion is that 'intention in action' be considered as a placeholder for whatever it is that makes an action intentional.

[5] Jeannerod (1977) distinguishes between two visual processing systems, what he calls the "what" system that derives semantic representations used for identification, categorization and recognition tasks and what he calls the "how" system that derives 'pragmatic' representations encoding information about objects used for visually guided action. Milner and Goodale (1993) proposed a general distinction between two visual processing systems very similar to Jeannerod's, though different in detail. Their account was further elaborated in Milner and Goodale (1995) and Milner (1997).

[6] The characterization of iconicity just given differs slightly from Recanati's (1993: 113) own characterization that is more specifically tuned to visual representations. His characterization of iconicity is in terms of perspectivalness, significant degree of isomorphism between the representation and what it represent and analog encoding of information. I have avoided speaking of iconic representations as analog representations due to the inconsistent uses of the term 'analog' in the literature. Note though that what Peacocke (1992: 68) calls the analog character of content closely corresponds to what I call fine-grainedness and that what Dretske (1981: 135ff) means by an analogic representation what I call the

informational richness of a representation is also very close to what I call the informational richness of a representation.

[7] Accidentalness is notoriously difficult to define. See for instance discussions in Bratman, 1987, especially chapter 8, and Mele and Moser, 1994. I will not attempt here to give a precise characterization of accidentalness, but I want to distinguish two forms of accidentalness both of which I want to exclude. One notion of accidentalness is closely linked to what Brand (1984) calls consequential waywardness, where the connection between an action and its consequences involves a deviant causal chain. Thus, the following case, borrowed from Davidson is an instance of consequential waywardness: "A man may try to kill someone by shooting at him. Suppose the killer misses his victim by a mile, but the shot stampedes a herd of wild pigs that trample the intended victim to death" (Davidson, 1980: 78). If bringing in a herd of wild pigs seems too far-fetched, just imagine that the bullet kills the victim by first ricocheting on a tree. Here the agent acts, the intended result obtains as a consequence of the action, yet the success is accidental insofar as the result is not brought about in the way intended by the agent. The second form of accidentalness I have in mind does not involve causal deviancy but skill or, rather, lack of it. Suppose that I, who have never played basketball in my life, am given a basket ball and asked to shoot a free throw from the foul line. I have no idea how exactly this should be done, but I try nevertheless and succeed. Here there is no need to bring in deviant causal chains to explain the success, I just happened to do the right thing in the right way. Yet, I want to call the success accidental insofar as I really don't know how to shoot a free throw, it was luck that made me do the right thing. Asked to repeat the performance, I may well fail miserably in my next twenty trials. This is not to say that a success is not accidental only if the level of skill of the performer is such that he will always succeed or even succeed more often than fail. Some tasks are so difficult that even very skilled agents may not succeed on more than say 40% of their trials. Yet, when they succeed, their success is not accidental insofar as it not merely a matter of luck but depends on their considerable level of skill.

[8] Note that if one wants to stick with the process reading of the word ‘action’, one can simply replace ‘intentional action’ with ‘successful intentional action’ and ‘strictly intentional action’ with ‘successful strictly intentional action’ in these two definitions.

[9] Note that by distinguishing between action as process and action as process-cum-product, one can without contradiction claim both that someone was acting intentionally (process reading) and that his action was non-intentional (process cum product reading). For instance, John was acting intentionally when he hurt his father with a stone (he was trying to hurt Mary, but missed), but his action of hurting his father was non-intentional.

[10] By talking of a convertibility relation between conceptual and non-conceptual content, I do not mean to imply that this relation should be a one-one relation. Indeed, context plays an important role in determining how the conversion should go and in different contexts the same conceptual content may be converted in different ways. This is taken into account in the analysis offered below.

[11] Let me repeat here that I do not use 'basic action' in the sense defined by Goldman, for whom only bodily movements can be basic actions, but in the sense of intentionally basic action, as defined by Hornsby. Note that this intentional notion of basicness allows for the possibility that one action may become basic as a result of learning and automatization. Thus, shifting gears may be a basic action for experienced drivers but not for learners who still have to mentally rehearse the several steps involved in shifting gears. Similarly, it may be that catching a ball becomes a basic action only after a certain amount of practice.

[12] My selection functions are akin to the action schemata postulated in the model developed by Norman and Shallice (1986; see also Shallice, 1988, chapter 14). Shallice and Norman distinguish between two broad levels of action schemata. Lower-order schemata directly place a particular pattern of demands on a mosaic of functionally specific subsystems. Thus, the schema that control catching a ball requires visuo-spatial and manual processing systems. Higher-level schemata, also called scripts or source-schemata by Shallice, are structures that control complex actions and are composed of more simple component schemata. One important characteristic of lower-level schemata and of well-entrenched higher-level schemata is that once triggered they can unfold automatically without the need for conscious control or the use attentional resources. What I call basic actions are actions associated with lower-level action schemata.

[13] See, for instance, Putnam (1975) or Gelman (1990).

[14] It should be noted here that in attributing selection functions to animals, I am also committed to attributing them a capacity to have goals and to represent certain results as their goals.