Distributed intentionality: A model of intentional behavior in humans

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Is human behavior, and more specifically linguistic behavior, intentional? Some scholars have proposed that action is driven in a top-down manner by one single intention—i.e., one single conscious goal. Others have argued that actions are mostly non-intentional, insofar as often the single goal driving an action is not consciously represented. We intend to claim that both alternatives are unsatisfactory; more specifically, we claim that actions are intentional, but intentionality is distributed across complex goal-directed representations of action, rather than concentrated in single intentions driving action in a top-down manner. These complex representations encompass a multiplicity of goals, together with other components which are not goals themselves, and are the result of a largely automatic dynamic of activation; such an automatic processing, however, does not preclude the involvement of conscious attention, shifting from one component to the other of the overall goal-directed representation.

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1. Introduction

Is human behavior intentional? More specifically, is linguistic behavior intentional? In a shallow sense, it seems clear that it is: for most of our utterances, if not all of them, we would gladly grant that what we have said is actually what we intended to say. However, insofar as we attempt to give the notion of “intention” a precise theoretical meaning, the issue tends to appear much less clear. In accordance with a widely spread definition of intentions, let us assume that behaviors are intentional to the extent that they are consciously goal-directed, that is, voluntarily aimed at pursuing an expected outcome. On the basis of this definition, theoretical views on linguistic
behavior range from the claim that it is intentional in essence to the claim that it is mostly not intentional, since it can be largely automatic and guided by habits rather than prompted by conscious representations of the goals to be pursued. Also in theory of action there is a large body of literature suggesting that human behavior can often be either unconsciously goal-directed or not goal-directed at all—even in cases in which it is not purely reflexive.

Our purpose in this paper is to examine the main theoretical positions offered as answers to our initial questions, in order to assess whether they admit of a synthesis: in other words, we aim to sketch a model of intentional action—with particular reference to linguistic behavior—which does justice both to the intuition that we act intentionally almost all of the time, and to the evidence that there are an enormous amount of automatisms at play in human behavior. Our model makes a couple of general assumptions. First, actions should not be conceived of as single units, with one single intention being consciously attended from the beginning till to the end. Quite on the contrary, actions are complex entities involving an indefinite number of different goals, both hierarchically and heterarchically related, and agents may consciously attend to different goals in the course of one and the same action. Second, in order for actions to be intentional it is not required that action plans are consciously represented and then put into effect in a purely top-down manner. Although explicit planning has a significant role to play in human behavior, in the general case actions are largely the result of automatic processes of activation, integration, and competition between a huge number of goal-related representations.

Given these assumptions, we can account for the seeming contradiction that has been pointed out above. On the one hand, linguistic behaviors are mostly not intentional in that they are not the result of a top-down process stemming from a previous conscious representation of the purpose to be pursued; conscious intentions should rather be conceived of as beams of light temporarily directed towards this or that goal-related component of a largely automatic flow of processing. On the other hand, linguistic behavior is intuitively intentional in essence, for the reason that it never seems to occur without speakers consciously attending this or that component of the complex goal-directed representation involved. In a word, intentionality is better thought of as distributed along the complex goal-directed representation involved in any single action, than concentrated in (the representation of) one single purpose of the action.²

Two qualifications are in order here. First, we want to emphasize that our purpose is more on the side of a positive proposal rather than a criticism of specific positions in the field. We will focus on the weaknesses of Levelt’s (1989) model of speaking as an intentional activity not because it is a particularly bad model, but because it is one of the more advanced attempts at providing an explicit analysis of the widespread, though often implicit, idea that (linguistic) action is driven by top-down processes instigated by one single conscious goal. We argue, nonetheless, that Levelt’s model needs a significant refinement in the light of current evidence; specifically, we refer to the work of Garrod and Pickering (2004, 2007) on automatic components in language production, and to the line of research initiated by Bargh (1989, 1990, 1994).
on automatic goal pursuit. On the other hand, this evidence might somehow encourage the idea that consciousness is not really indispensable for action processing. Again, our main purpose is not to argue against such a position, which is hardly found in the literature in a pure form (with the possible exception of Hassin, Aarts, Eitam, Custers, & Kleiman, 2009, if we understand them correctly); our purpose is rather to find a theoretical point of equilibrium by elaborating a more comprehensive picture of action processing.

Second, language production can probably be seen as a prototypical case of intentional behavior, and this is one reason why we believe it is useful to address the issue of intentionality by focusing on language. However, in pragmatic studies it is commonly held that communicative intentions are intentions of a special kind: they are presumed to have a self-referential component, in that the speaker not only intends to transmit a certain information to the hearer (informative intention), she also intends that this first-order intention is fulfilled thanks to the fact that it is recognized by the hearer (communicative intention proper; Sperber & Wilson, 1986). In the present work we are not concerned with this special feature of communicative intentions. We rather intend to focus on the features that linguistic behavior shares with non-linguistic action; for this purpose, the distinction between informative and communicative intention is not relevant. In point of fact, in the psycholinguistic literature the phrase “communicative intention” happens to be used even when what is at issue is the basic informative intention, without any reference to the self-referential component.3 We will adopt here the same use, with the phrase “communicative (or linguistic) intention” referring to the fact that the speaker intends to convey a certain content linguistically.

In practice we will proceed in the following way. In section 2 we will introduce in general terms the alternative between intentional and non-intentional models of action. In section 3, we will focus on an assumption which is often made, at least implicitly, in the debate: the assumption according to which any intentional action is driven by one single intention—i.e., one single conscious goal. It is this assumption, we will argue, that makes it difficult to draw a coherent picture of all the relevant evidence. In section 4, on the basis of ideas which are currently being explored in social and individual psychology and in neurophysiology, we will sketch the general lines of a model where intentionality is distributed across complex goal-directed representations of action, rather than concentrated in single intentions.

2. Intentional and Non-Intentional Models of Action

2.1. Levelt’s Model

Levelt (1989) represents the most comprehensive effort undertaken thus far to address the role of intentions in language production. His general idea is that intentions are the starting point of the process leading to spoken utterances and that this initial component of the process is under conscious control. Put in general terms: “speaking is usually an intentional activity; it serves a purpose the speaker wants
to realize. An intentional activity is, by definition, under central control” (Levelt, 1989, p. 20).

More specifically, according to Levelt what is under central control is conceptualizing, that is, a sum of mental activities subserved by a processing system called “the Conceptualizer.” These activities include “conceiving of an intention, selecting the relevant information to be expressed for the realization of this purpose, ordering this information for expression, keeping track of what was said before, and so on. These activities require the speaker’s constant attention” (Levelt, 1989, p. 9).

In practice, the final output of the Conceptualizer is said to be a preverbal message consisting of conceptual information whose expression is the means for realizing the speaker’s intention. The preverbal message is then fed into the subsequent component of the model, the Formulator, which has to translate its conceptual structure into a linguistic structure, thanks to the operations of two subcomponents, the Grammatical Encoder and the Phonological Encoder. The output of the Formulator is a phonetic plan which is finally fed into the last processing component, the Articulator, which is responsible for its motor execution. While the operations of the Conceptualizer, as we have said, are assumed to be instances of controlled processes, Levelt claims that all the other components are largely automatic: “there is very little executive control over formulating or articulatory procedures” (1989, p. 21).

The operations of the Conceptualizer are further analyzed into two components. The first, which is called “macroplanning,” consists in selecting a communicative goal and expanding it in subgoals, so as to determine which speech act, or sequence of speech acts, should be performed, and which information should be expressed for each speech act in order to satisfy its goal(s). In general terms, macroplanning is supposed to consist in deciding on the information to be expressed and sequentially ordering this information for expression. The second component, called “microplanning,” has to do with putting the information into perspective, by deciding for each speech act what should be expressed as topical, focused, or new information; moreover, the conceptual structure has to be arranged so as to conform to certain language-specific requirements, in order to be ready for grammatical encoding. Levelt deems it unlikely that microplanning requires special attentional effort; therefore, it is macroplanning which would properly consist of controlled processes. Importantly, Levelt attributes another operation to the Conceptualizer: the speaker’s monitoring both of his/her internal and overt speech. We will come back to this issue below.

All in all, Levelt’s model is representative of theories which essentially conceive of intentional behavior in terms of controlled planning. In these theories, action is thought to be caused by the anticipation of desired outcomes. For instance, in Hommel’s Theory of Event Coding (TEC; Hommel, 2003; Hommel, Müßeler, Aschersleben, & Prinz, 2001) action goals are represented as to-be-achieved perceptual effects, which prime stored motor representations to the extent that these have previously proved apt to pursue those effects. To be sure, there is an important difference between TEC and Levelt’s model: the former assumes that there exist fixed patterns of action connecting means and goals; on the contrary, the latter
conceives of communicative intentions as indefinite in number, so that the idea of finite repertoires of linguistic actions with their associated intentions is quite implausible. This is, in fact, one major reason why Levelt thinks that forming communicative intentions require controlled processes:

Clearly, the Conceptualizer involves highly controlled processing. Speakers do not have a small, fixed set of intentions that they have learned to realize in speech. Communicative intentions can vary in infinite ways, and for each of these ways the speaker will have to find new means of expression. This requires much attention. (1989, p. 21)

This argument presupposes that communicative intentions are not to be identified with general features of utterances such as, for example, the illocutionary acts they are instances of, or other features which do not vary in infinite ways and, therefore, could in principle be learned one by one through repeated experiences. To elaborate on an example of Levelt’s (1989): if, when a speaker says that Wubbo is an astronaut, the communicative intention were to be identified with the illocutionary intention of informing in general (in opposition to, let us say, making a request, etc.), then there would be no argument to the effect that communicative intentions require controlled processing. The argument depends on the assumption that the specific content of the illocutionary act—here, the proposition conveyed by the sentence “Wubbo is an astronaut”—is somehow part of the communicative intention as well, so that communicative intentions always change from one situation to the other as a consequence of the infinite number of possible propositions. As it seems, Levelt then conceives of communicative intentions as complex entities encompassing both the illocutionary act and its propositional content; in our example, the complete communicative intention is to inform that Wubbo is an astronaut. This suggests how one should not intend the claim that the first two stages of language production are (1) selecting a communicative goal and (2) expanding this goal into subgoals. Since communicative intentions always change with the circumstances, they cannot be equated with generic goals whose subgoals must be subsequently settled with regard to specific circumstances. On the contrary, a communicative intention must be specific enough to straightforwardly determine the subgoals to be pursued in the given situation. In Levelt’s general approach, this makes perfect sense: if a single intention has to control and drive the subsequent action in a substantially top-down manner, we must expect that the intention implicitly contains in itself the whole behavioral program to be executed. In short, the communicative intention does not merely concern some generic goal to be pursued, it rather prescribes a specific plan of communicative action.

2.2. Automaticity Versus Control

However, the idea that actions stem from top-down processes driven by intentions has been recently challenged, both with regard to human behavior in general and linguistic processing in particular. For instance, Garrod and Pickering (2004, 2007) have proposed a general account of linguistic processing where automatisms play a
major role, mainly as a consequence of a mechanism they call “interactive alignment.” The basic idea is that conversation is a joint activity in which interlocutors tend to align their situation models, that is, they tend to form “representations containing [the same] information about space, time, causality, intentionality, and currently relevant individuals” (Garrod & Pickering, 2004, p. 8). In fact, communication can be successful only if interlocutors represent the same elements within their respective situation models. This “parity of representations used in production and comprehension,” is essentially accomplished through “priming of representations between speakers and listeners” (Garrod & Pickering, 2004, p. 9). In other words, the speaker’s utterances automatically activate a variety of representations in the listener, at all levels of linguistic processing. As a consequence, those representations are ready for being exploited at further stages of the interaction, thus accounting for the fact that “interlocutors tend to produce the words they have just heard, to assume that ambiguous words have meanings that they have recently given to those words, to use grammatical constructions they have recently used, and so on” (Garrod & Pickering, 2007, p. 11).

Interactive alignment is thus conceived of as a largely automatic and unconscious process, based on spreading activation and priming. Garrod and Pickering (2007) explicitly address the issue of the extent to which the model of language production proposed by Levelt (1989) is compatible with their own view. They make essentially two claims. First, automaticity and control should not be thought of as all-or-none phenomena, and therefore Levelt’s distinction between automatic and controlled components should be reassessed accordingly. Second, one should pay greater attention than Levelt has done to how dialogue differs from monologue, in that the former condition makes language production more automatic than the latter does.

Let us start from the first point. Garrod and Pickering (2007) observe that the traditional view according to which there is a sharp boundary between automatic and controlled processes has been challenged, either because automaticity has been explained in terms of properties which vary gradually (Cohen, Dunbar, & McClelland, 1990), or because automaticity has been analyzed in components which can, but need not, be present together. The latter line of thought has been pursued by Bargh (1994): in his view, a process is automatic to the extent that it is unaware, mandatory, efficient, and non-interruptible. However, since those features do not always covary, there may be different degrees of automaticity as a function of the number of features involved. If one reanalyzes language production in the light of these considerations, Levelt’s distinction between controlled and automatic components appears less firm than it did at first sight.

On the one hand, while in Levelt’s framework processes at the instigation of speaking are thought to be more controlled than those downstream (e.g., syntactic formulation and articulation), it should be emphasized that “even for these lower-level processes, not everything is automatic” (Garrod & Pickering, 2007, p. 9). In particular, Garrod and Pickering insist on the fact that monitoring may affect any level of representation constructed during speech. To be sure, Levelt acknowledges that monitoring is a controlled process which can operate on (the outcomes of)
automatic components. However, from considerations about monitoring Garrod and Pickering draw the conclusion that the alleged automatic components are less automatic than Levelt assumes: in principle a monitored process can be interrupted; therefore, following Bargh (1994), they claim that it lacks at least one distinctive feature of automaticity (non-interruptibility).

On the other hand, the claim that the processes at the instigation of speaking are basically controlled is debatable. Garrod and Pickering observe that “even deciding what to talk about has some automatic component” (2007, p. 5), principally as a consequence of associations between ideas occurring spontaneously. Moreover, “there is a considerable difference between situations where a speaker’s decision about what to say is not obviously driven by any external stimulus and situations where the speaker responds to a particular stimulus” (Garrod & Pickering, 2007, p. 5). In practice, the suggestion is made that both spontaneous associations between ideas and associations triggered by external stimuli might automatically affect the processes at the instigation of speaking, although not to the same extent: responding to external stimuli might have a more coercive impact on the speaker’s decision about what to say.

2.3. Dialogue and Routines

This brings us to the second point: the difference between monologue and dialogue. As Garrod and Pickering observe:

In dialogue, what one interlocutor says imposes constraints on what her partner can say next. For example, a question usually requires an answer. This means that, to a certain extent, message planning is distributed between interlocutors. Such distributed planning may make production more automatic. (2007, p. 10)

That is, in dialogue the most relevant external stimuli are previous utterances, which tend to automatically determine aspects of subsequent linguistic behaviors. This occurs mainly as a consequence of past regularities in our experience: pieces of linguistic behavior which are frequently part of the same sequence (e.g., at an abstract level, the question-answer sequence) become linked by association, and thus get automatized.

A similar claim has been made in the field of psychology of action. Individual behavior appears to be largely affected by exposure to routines, which are an important source of automatisms due to the formation of habits. Habits can be thought of as behavioral patterns stored in long term memory, where behaviors, contexts, and outcomes which covary regularly get associated into functionally coherent wholes. The main point for our purposes is that habits are maintained to establish a direct connection between contextual inputs and behaviors, so that a behavior which is apt to deliver a given outcome may be activated as an automatic response to contextual inputs. In other words, habitual actions do not require that the representation of expected outcomes is activated in advance in order to instigate the execution of behavioral means. Routinization of goal-directed actions thus yield “the effective delegation of (part of) action control to the external environment and
its stimuli, so that its effective functioning resembles a stimulus-response reflex, which is much less demanding than attentional control” (Pezzulo & Castelfranchi, 2009, p. 568). Similar conclusions have been drawn in the context of a comparison between animal and human studies. de Wit and Dickinson (2009), in order to account for a number of results in animal studies, draw a complex model where two different routes interact in the selection of action. One route is based on an outcome-response mechanism, where the representation of the expected outcome triggers the response, while the other route leans on a response-outcome mechanism, where the expectation of the outcome follows the response rather than preceding it. These scholars suggest that this model could apply to human cognition as well, and that the response-outcome route might prevail when humans are involved in routinized activities:

Continued reinforcement should strengthen the $S \rightarrow R$ [stimulus-response] association in the habit memory to such a degree that the presentation of the stimulus can reliably trigger the motor unit for the response before the longer feedback pathway through the associative memory can evaluate whether the outcome is currently a goal for the animal. (de Wit & Dickinson, 2009, p. 471)

In other words, at the moment that behavior is initiated the outcome might not be represented at all; or, at least, the representation of the outcome might not be the reason why the behavior is initiated, since the subject has not yet evaluated whether the expected outcome is one of his/her goals. These considerations also apply to linguistic behavior, insofar as linguistic behavior is embedded in social routines, as well. In fact, everyone would agree that “stock phrases, idioms and some clichés are routines” (Garrod & Pickering, 2007, p. 14). However, Garrod and Pickering maintain that the notion of “routine” has a wider application than this, in the domain of linguistic facts: “other expressions can be less extreme form of routines, as for example, if they contain some fixed elements and some elements that vary (…sing/dance/drink your way through the day/evening)” (2007, p. 14). This means that linguistic habits may abstract away from this or that specific linguistic item so as to grasp higher-level regularities. As a limiting case of abstraction, Garrod and Pickering suggest that even communicative moves—such as asking a question and giving the answer—may form routines.

This is interesting because, in Levelt’s model, communicative moves (i.e., illocutionary acts) are at the core of intentional planning of utterances:

People generally talk for some purpose. They intend to inform an interlocutor, or they want to be informed; they wish the other party to take some action; they want to share feelings of sympathy, sorrow, or happiness; they want to commit themselves to some action; and so on. This communicative intention of an utterance is called its “illocutionary force” (Austin, 1962). An utterance with an illocutionary force is called a “speech act”; it is an intentional action performed by means of an utterance. (Levelt, 1989, p. 58)

According to Levelt, the conscious representation of the communicative moves to be executed is the primary task of the Conceptualizer, which afterwards expands the
communicative goal into subgoals driving the selection of linguistic items. Instead, in Garrod and Pickering’s view, the selection of both communicative moves and linguistic items may be accomplished in the same way, that is, by way of automatic and effortless processes based on behavioral routines. In other words, the representation of communicative goals seems to have no privileged status over the representation of linguistic means: the former is not required for the instigation and conscious control of the latter. To be sure, there is another important difference to consider. In Levelt’s account the communicative intention—and the illocutionary force which is a key component of it—is conceived of as a conceptual (i.e., a preverbal) representation. In other words, the crucial distinction is between the thought to be expressed and its linguistic expression: the communicative intention has a privileged status over (the representation of) linguistic means, insofar as the former is a thought that has to be expressed by the latter. Instead, in Garrod and Pickering’s account communicative moves and linguistic items are both pieces of linguistic behavior at different levels of abstraction. Garrod and Pickering do not explicitly consider the possibility that a communicative intention conceived of as a thought may precede and drive linguistic behavior in dialogue. However, their general approach is clearly committed to the idea that actual linguistic behaviors may be triggered by external stimuli (including previous linguistic behaviors), without any need that the goal to be pursued is consciously represented—be this representation a preverbal thought, or whatever.

Actions, then, can be non-intentional in the sense that behavioral means are triggered before, and independently from, any representation of intended goals. This leaves open the possibility that conscious representations of goals are activated after the activation of behavioral responses, as in the response-outcome route described by de Wit and Dickinson (2009). However, it has also been claimed that at least in some cases habits may wholly dispense with any representation of goals (e.g., Neal & Wood, 2009).

2.4. Unconscious Goal-Directed Behavior

However, actions can also be conceived as non-intentional in the sense that they are driven by goals which are represented but remain non-conscious throughout. This line of thought has been pioneered by Bargh (1989, 1990). His notion of “automatic” or “non-conscious goal pursuit” has challenged the traditional view, which conceived goal pursuit as a conscious and effortful process. The last decade has witnessed a number of empirical demonstrations of Bargh’s ideas (for recent reviews see Ferguson, Hassin, & Bargh, 2007; Hassin et al., 2009). The thesis of non-conscious goal pursuit is based again on the notion of habit, with habits conceived of as “associative networks that include contexts, goals that are regularly pursued in these contexts, and means that one usually uses to attain these goals…. These networks are shaped by one’s history, and they allow for goal pursuit via spreading of activation” (Hassin et al., 2009, pp. 550–551).
Given this conception of habits as associative networks, it seems an obvious consequence that the activation of a component may spread to other components of the network, and this has been largely confirmed by experiments based on priming. In particular, priming of goals appears to affect subsequent representations and behaviors in many ways. For instance, when an action is regularly selected and performed in order to obtain a goal (for instance, taking the bicycle instead of the bus to go to the university), “priming these goals automatically activates behavior representation and resultant action according to an ‘if-then’ rule, enabling the goal-directed behavior to occur directly and independent of conscious intentions” (Dijksterhuis, Chartrand, & Aarts, 2007, p. 105). Of particular interest is the fact that similar results have also been obtained through unobtrusive or unconscious priming. For instance, Bargh, Gollwitzer, Lee-Chai, Barndollar, and Troetschel (2001) unobtrusively exposed subjects to words such as ‘strive’ and ‘succeed’ to prime the achievement goal, and then tested their performances in an anagram puzzle task: participants primed with the achievement goal outperformed those who were not primed with the goal. Similar effects may also be obtained in more indirect ways: for instance, priming the names of significant others may lead to the automatic adoption of the goals associated with them; or, for another example, thinking of a good friend may enhance the disposition to participate in a subsequent task as a possible means to help (Dijksterhuis et al., 2007, pp. 101–102).

In short, as evidence from social psychology seems to show, representations of goals can be efficient in producing associated behaviors even when those representations are unconscious or unattended. Summarizing the two non-intentional perspectives we have considered above, conscious representations of goals do not seem to be required in order to initiate goal-directed actions, since actions can be triggered either by situational cues or by non-conscious goal representations. Does this mean that human actions are non-intentional in essence? In the next sections, we will defend a different position according to which human actions are mostly intentional, although not in the sense intended by Levelt. As a first step in this direction, we will call into question the widespread implicit assumption that action is typically subserved by one single intention.

3. Multiple Goals

In Levelt (1989), it is easy to find assertions like the following:

In planning an utterance, there is an initial phase in which the speaker decides on a purpose for [emphasis added] his next move. (1989, p. 3)

This first step in planning an utterance is the conception of a communicative intention [emphasis added]. (1989, p. 4)

The speaker’s elaboration of a communicative intention [emphasis added] by selecting the information whose expression may realize the communicative goals will be called macroplanning in this book. (1989, p. 5)
In each of these quotes, Levelt is assuming that one single purpose or communicative intention is what drives the process of speaking. To be sure, in the last quote Levelt also speaks of “communicative goals” in the plural. However, this expression clearly refers to the subgoals into which—in Levelt’s view—a single communicative intention has to be expanded.

The assumption that one single goal instigates speaking makes Levelt’s account liable to the arguments of radically non-intentional perspectives. For if it can be shown, for instance, that the single goal driving an action is not consciously represented, then one would be justified in claiming that the action is not intentional at all. Given the rich evidence that unobtrusive or unconscious priming of goals may instigate associated actions, it is tempting to conclude that the majority of human actions are wholly not intentional. In this vein, Hassin et al. claim that “much of our behavior is determined by nonconscious goal pursuit” (2009, p. 549).

However, it is far from clear that such a conclusion can be drawn on the basis of the existing evidence. Let us recall, for instance, the experiment of Bargh et al. (2001) where subjects who had been unobtrusively exposed to words such as “strive” and “succeed” outperformed those who were not primed with the achievement goal in an anagram puzzle task. To be sure, in this experiment unobtrusive word priming appears to influence subjects with regard to what is called an “achievement goal.” But the conceptual point that needs to be addressed is whether this is the goal of the performed action: only to this extent, in fact, the conclusion that the action is not intentional is warranted. A more natural account requires us to attribute two different goals: all the subjects of the experiment have a common, conscious goal, that is, solving an anagram puzzle, while the subjects exposed to priming have in addition the goal to perform well in the task. By this account, it could hardly be said that the goal of the action was not consciously represented, insofar as the subjects consciously pursued the goal of solving the anagram puzzle.

For another example, Bargh et al. (2001) report an experiment where subjects played fisherman, and they had to decide how many fish they would throw back to the lake and how many they would keep to themselves, thus balancing between competing with another participant and cooperating with him/her in order to preserve the fish population. Half of the participants were primed with a cooperation goal, and this resulted in a more cooperative behavior and longer decision times. This seems to show, as the authors claim, that unconscious priming may affect the decision about how many fish to throw back, by way of a manipulation of the high-level goal of cooperating. However, it is not clear what conclusion should be drawn for a theory of action. What is the action at issue here? Presumably, it is throwing fish back to the lake. But what is the goal of this action? While being cooperative is a possible answer to the question, it seems reasonable to say that this high-level goal is pursued indirectly, by pursuing the goal of preserving the fish population—a goal that in the experiment was explicitly considered. In sum, this sort of evidence does not seem to support the conclusion that actions are mainly not intentional: it only shows that some of the goals involved in a given action may be manipulated unconsciously.
Importantly, we are not claiming that non-conscious goal pursuit only applies to peripheral goals, while some more central goal must be conscious at the moment the action is initiated. This is what seems to occur in the above examples, but it clearly depends on how the experiments are arranged. In other cases, it could be different: in particular, as we have suggested in the previous section, actions could be triggered by situational cues before any goal is consciously represented. What we really want to claim is that most of our actions have a multiplicity of goals; consequently, it is misleading both to assume that one single (conscious) goal suffices to drive action and to argue that actions are non-intentional based on the mere fact that they are affected by this or that non-conscious goal.

Even Levelt occasionally acknowledges that multiple goals are normally involved in speaking, as in the following lines:

One speech act can realize several communicative intentions at the same time. When Marcia asks Seth whether he met Harry recently, Seth may answer “I saw the bastard in Florence.” This answer communicates to Marcia both a commitment to the factuality of Seth’s having seen Harry in Florence and a commitment to an opinion about the character of Harry. (1989, p. 123)

Elsewhere in the book, Levelt speaks in this sense of “side intentions” co-occurring with the main communicative intention; he also speaks of “non-communicative intentions” embedded in speech acts, “such as to appear knowledgeable, pleasant as a conversant, etc.” (1989, p. 137). However, even leaving aside Levelt’s disputable assumption that instigation of speaking requires a conscious communicative intention, one might wonder whether this sort of consideration about a plurality of goals does not call into question his overall view based on the conscious selection of one single communicative intention.

The issue of the plurality of goals involved in any action is long-familiar both in philosophy and psychology. In philosophy it has been largely addressed by Searle (1983), who has analyzed what he calls the “accordion effect”: when we move from very simple actions such as moving one’s arm to more complex ones, we impinge on complex intentions whose number of components is seemingly indefinite.

Consider Gavrilo Princip and his murder of Archduke Franz Ferdinand in Sarajevo. Of Princip we say that he:

- pulled the trigger
- fired the gun
- shot the Archduke
- killed the Archduke
- struck a blow against Austria
- avenged Serbia.

Furthermore, each member of this list is systematically related to those preceding and succeeding it: Princip, for example, fired the gun by means of pulling the trigger and he shot the Archduke by means of firing the gun. Some but not all of these relations are causal. (Searle, 1983, p. 98)
Of course, it is one thing to imagine how many intentions could lie behind an action, it is quite another to attribute them to the agent as his/her conscious goals. However, that most of these and other potential goals have been actually represented by Princip—although not necessarily in a conscious way—is at the very least highly plausible. The thesis of a plurality of actually represented goals is widely spread in research on action.

To begin with, both in philosophy and neurophysiology an important distinction has been drawn between two different kinds of intentions which might be simultaneously present in a single action: the motor intention, that is, the intention to move our body in a certain way, which is of primary interest to neurophysiology; and the variety of prior intentions which can be fulfilled by means of that motor action. In the example, Princip must have moved his finger in a certain way in order to pull the trigger, fire the gun, and so on. We should emphasize in passing that in this area “intention” is used without any commitment to the idea that goals are consciously attended. Whether in point of fact any of the goals involved in a motor action like the one executed by Princip is consciously attended or not, is an empirical matter which should be assessed case by case.

Another factor of multiplicity lies in the hierarchical structure of actions. Hierarchical arrangement of goals is a well established issue in a wide area of research encompassing neurophysiology, theory of action and other fields. In neurophysiological models, goal-directed motor actions are thought to have a hierarchical structure, with superordinate goals being implemented by sequences of lower-level goals. These levels of representation are supposed to correlate with specific neurological regions (Grafton & Hamilton, 2007; Koechlin & Jubault, 2006; Tettamanti & Weniger, 2006). On the other hand, psychologists have dealt with the “parsing problem,” which, starting from early childhood, observers of intentional actions have to face: “they must discover units within the continuous action stream that are relevant to discerning intentions” (Baldwin & Baird, 2001, p. 172). This discovery appears to be made by processing continuous action streams in terms of hierarchical relations that link smaller-level intentions (e.g., in a kitchen cleaning up scenario: intending to grasp a dish, turn on the water, pass the dish under the water) with intentions at higher levels (intending to wash a dish or clean a kitchen). (Baldwin & Baird, 2001, p. 172)

As we have seen, Levelt also acknowledges that communicative intention is typically articulated in a number of subgoals. However, two points should be emphasized. First, in Levelt’s view communicative intentions are thought to determine subgoals in a top-down manner; instead, our previous considerations on automatic instigation of action suggest that lower-level goals can be activated by simple bottom-up processing, independently of higher-level ones. Second, Levelt only takes into account the relationship between communicative intention and its subgoals, while he pays no attention to how communicative intentions are related to superordinate goals. For instance, speech acts are mostly embedded in socio-cultural
practices endowed with their own goals; any speech act, then, pursues a subgoal with respect to the general goal of the practice it belongs to (Levinson, 1992).

Moreover, as far as social actions are concerned, we should consider that agents need to represent the others’ goals and somehow incorporate them into their own plans.11 This may occur both when the agents are cooperative and when they compete with each other. At a higher level, even cooperation and competition may themselves become an agent’s goals, together with other metacognitive goals which concern ways to perform an action rather than actions proper. Metacognitive goals of this sort are manipulated in the experiments of Bargh et al. (2001) considered above.

For all these reasons, it is misleading to claim that actions in general, and linguistic actions in particular, are driven by a single goal, be it conscious or unconscious.

4. The Distributed-Intentionality Model

As we have seen in the previous sections, there is good evidence against Levelt’s assumption that (linguistic) actions are generally instigated by conscious intentions; besides, the very idea that actions are driven by one single goal, be it conscious or unconscious, is disputable as well. However, we claim that a different model of intentional action can account for the evidence and the arguments we have considered above. In the model we propose, actions involve complex goal-directed representations encompassing a multiplicity of goals, together with some goal-related components which are not goals themselves. These complex goal-directed representations are the result of a largely automatic dynamic of activation, integration, and competition between simpler representations. Such an automatic processing, however, does not preclude the involvement of conscious attention, which ordinarily shifts from one component to the other of the overall goal-directed representation. This is the sense in which we speak of “distributed-intentionality.” In other words, we propose to go beyond what could be called a “local-intentionality” view, that is, the view according to which an action is necessarily driven by top-down, controlled processes, instigated by a determinate intention—i.e., a conscious representation of the goal to be pursued. We claim instead that actions are generally the result of a largely automatic dynamic delivering a complex goal-directed representation, and consciousness may focus on this or that component of the representation, so that controlled processes may interact with automatic processing at different stages. In this view, intentionality is distributed in many senses: first, there is no single goal guiding the overall process; second, consciousness is not necessarily confined to one single content within the complex representation involved in action; finally, conscious control is not confined to the initial stage of action instigation. Consciousness may rather focus on a variety of goals and other represented components of action, at different stages of processing.

As far as we can tell, such a view has good grounds in psychological and neuroscientific literature. We now propose to briefly flesh out our model by
separately examining these three aspects: the complexity of goal-directed representations involved in intentional action; how those complex representations are activated, and recruited, by largely automatic processes; the shifting of conscious attention in the course of actions.

4.1. Complex Goal-Directed Representations

Representations involved in action are complex in more than one way. To start with, they rely on different kinds of information and, consequently, have different formats. First, they include “sensorimotor associations between the perceptual codes of particular action features and the motor program realizing them”; besides, they include “pointers to action-relevant stimuli and stimulus dimensions” (Hommel & Elsner, 2009, p. 382). In other words, goal-directed representations include both sensory and motor representations of actions, together with perceptual representations of environmental stimuli for action. As we saw above with regard to the notion of habit, goals (i.e., as a first approximation, perceptually represented end-states) are presumably part of associative networks which also include the representation of both the behavioral means usually employed to attain those goals and the usual contexts in which those goals are regularly pursued. Representations of goals, contexts and means can be expected to work together in online representations of action as well (Mazzone, forthcoming). Second, representations of goals may also include “links to verbal labels,” which are important in order to “acquire, communicate, and exchange action plans” (Hommel & Elsner, 2009, p. 382). Third, we should also consider the contribution of affective components granting to goals their subjective values (Hommel & Elsner, 2009, pp. 380–381; see also Carver & Scheier, 2009): if neural circuits for assigning subjective values to mere representations of end-states are not included in the picture, it may be doubted that we have to do with goals/intentions proper (Mazzone, forthcoming).

When focusing on representation of goals in themselves, it must be emphasized that goal-directed representations appear to have both a hierarchical and a heterarchical structure: as we have already seen, goals may be instrumental in pursuing other goals, but they may also compete or converge with other goals. In this line, Kruglanski et al. (2002) have proposed the “goal systems theory” according to which “goals form a hierarchical network with superordinate goals associatively linked both to subordinate goals (i.e., means) and to competing or complementary goals and superordinate goals” ( Förster, Liberman, & Friedman, 2009, p. 185). Within the same action, then, there is a multiplicity of goals which need to be evaluated with regard to their means-ends relationships, but also to their coherence or balancing. Such a multiplicity of goals imposes upon agents a compromise: given the fact that “people have multiple simultaneous concerns [they] typically do not optimize their outcome on any of them but rather ‘satisfice’ (Simon, 1953)” (Carver & Scheier, 2009, p. 308).

Finally, goal-directed representations should also engage the neural circuits for conscious control, insofar as intentions are conceived of as consciously attended
goals licensing top-down control of action. This point might have a connection with the issue of hierarchical representation of goals. In fact, an interesting hypothesis is that at the highest level of the hierarchy—the level of the “most abstract and enduring” representations—action plans are encoded in the prefrontal cortex (PFC; Morsella, 2009, p. 9; see also Fuster, 2003; Grafman and Krueger, 2009). It is widely held that PFC has a major role in planning behavior: it would be the seat of goal-oriented controlled processes involving inhibition of automatic processes, attention and working memory (Fuster, 2001). Recently, however, it has been explicitly proposed that PFC, apart from strategically selecting and maintaining information in working memory in the service of action, could permanently store abstract goal-oriented schemas of behavior (Huey, Krueger, & Grafman, 2006; Miller, Freedman, & Wallis, 2002; Wood & Grafman, 2003). This “representational,” as opposed to “processing” approach to PFC suggests that this area could be the bridge between automatic and controlled processing of action. On the one hand, PFC would just be “the highest level of the cortical hierarchy dedicated to the representation and execution of actions” (Fuster, 2001, p. 319); in other words, the functioning of PFC would not be different in principle from that of other levels of goal-directed representations. More explicitly, even representations in PFC would obey to the simple associative dynamics which is key to low-level cognitive processing. On the other hand, PFC is thought to be a crucial component of the neural circuit for controlled processing, that is, a kind of processing which seems to be quite different from simple associative dynamics. One possibility is that controlled processes, rather than being localized in PFC, emerge from the interaction of this cortical area with many others, and especially with sensory and motor neuronal assemblies; this interaction would generate self-sustained long-distance loops which are believed to produce a global workspace accounting both for conscious integration of information and its maintenance in working memory until current goals have been accomplished (for this hypothesis, see Dehaene, Changeux, Naccache, Sackur, & Sergent, 2006).

4.2. Automatic Goal-Directed Processes: A Stream of Action

We have already considered some reasons to believe that action is not in general the result of controlled, top-down processes: actions can be driven by non-conscious goals, or even by habitual associations. In line with a proposal of Morsella, a way to frame these facts is in terms of a “stream of action . . . driven by a continuous series of activations stemming from various sources” (2009, p. 19). In other words, our perceptions would endlessly feed automatic processes impinging on motor representations, so that plans of action are activated automatically at each moment and then compete for behavioral expression (Morsella, 2009, p. 16). For sure, high-level behavioral representations could play a role in this process, by participating in the overall dynamics of activation which is spread throughout the cortex. However, it is not necessary that those representations are consciously entertained in order for actions to be prompted, although this might occasionally occur: for instance, when
we are explicitly required to execute a task, or when we make deliberate plans. But this is not the general case. Most of the times, perceptions “lead to actions automatically, and all that can be done in the process of selection is to inhibit the execution of undesired plans” (Morsella, 2009, p. 19). However, it should be emphasized that inhibition too might mostly occur as an automatic—rather than an active and controlled—process:

Any competitive system with a built-in winner-takes-all mechanism (which is common in contemporary network models) produces inhibition of non-selected alternatives, without any particular “active” inhibition system. From this perspective, it makes sense to assume that the inhibition process is an automatic consequence of the way the cognitive system is configured and prepared rather than an achievement of online executive processes. (Hommel & Elsner, 2009, p. 383)

Research on motor intentions in neurophysiology converges on this hypothesis of an automatic “stream of action,” insofar as it insists that conscious representations cannot be what prompts bodily movements in general. First of all, as Libet’s work has shown (e.g., Libet, 1992), “consciousness of the goal of an action is not immediate, it takes time to appear” (Jeannerod, 2006, p. 28). More precisely, Libet’s experiments seem to have shown that:

The first conscious awareness associated with the initiation of the movements...occurs well after the start of the neural activity that culminates in the movement....This clearly suggests that whatever events one might reasonably consider to be the neural initiators of these movements, those events occur pre-consciously. (Pockett, 2006, pp. 18–19)

Besides, “it is common experience that goal-directed movements executed under conscious control are usually slow and inaccurate, e.g., during the first attempts at learning a new skill” (Jeannerod, 2006, p. 28). Therefore, conscious control presumably cannot ensure the smooth functioning which is characteristic of most of our motor actions. As Jeannerod puts it, since consciousness is a slow process and in motor action there are temporal constraints which do not leave enough time for consciousness to appear, “it follows that a fast accurate movement can only be executed automatically” (2006, p. 29).

Due to these considerations, it has been proposed that consciousness is essentially a post hoc phenomenon:

Conscious free choice, like conscious will, is not a direct perception of a causal relation between a thought and an action.... The role of consciousness should rather be to ensure the continuity of subjective experience across actions which are—by necessity—executed automatically. Because it reads behavior rather than starting it, consciousness represents a back-ground mechanism for the cognitive rearrangement after the action is completed. (Jeannerod, 2006, p. 37)

More precisely, an efference copy of our intentional plans would be sent to the cerebellum and then compared with the actual sensory feedback. The result of this
comparison would be the source of our conscious information, and this mechanism would be the key to our sense of agency and the distinction between our own and others’ actions (Choudhury & Blakemore, 2006; Jeannerod, 2006; Pockett, 2006). However, we suspect that this conclusion is too extreme: although the evidence strongly suggests that consciousness cannot be what instigates action, which rather emerges from an automatic dynamics of activation and competition, consciousness could nonetheless play a wider role than simply enabling our sense of agency. We will come back to this in a moment.

4.3. Shifting of Conscious Attention

As we saw in section 2, the traditional assumption of a clear-cut distinction between controlled and automatic processes must probably be rejected. This is true, amongst other things, with regard to the idea that a given action can be described as either controlled or automatic but not both. On the contrary, there is nowadays growing acceptance that “conscious and nonconscious goal pursuit are two collaborative partners taking turns in working towards goal attainment” (Gollwitzer et al., 2009, pp. 620–621). A well-grounded hypothesis is that there is a dynamic interaction between automaticity and conscious control, such that “during goal pursuit individuals shift back and forth seamlessly between conscious and nonconscious processing” (Gollwitzer et al., 2009, p. 610). There is some neuroscientific evidence supporting this hypothesis: Dehaene and Naccache (2001) have reviewed functional magnetic resonance imaging research showing that “neural structures associated with conscious control engage and disengage from processing as they are (or are not) needed” (Gollwitzer et al., 2009, p. 610).

In particular, a traditional hypothesis which still enjoys widespread acceptance is that “we become aware of our goals consciously when we experience failure in our goal striving” (Gollwitzer et al., 2009, p. 611; for evidence on this point, see also Bongers & Dijksterhuis, 2009). Jeannerod (2006, p. 30) has himself acknowledged that awareness of a discordance between an action and its sensory consequences is expected to emerge whenever the magnitude of the discordance exceeds a certain amount. But this sort of evidence strongly suggests that consciousness is more than just a post hoc mechanism “for the cognitive rearrangement after the action is completed,” as claimed by Jeannerod (2006, p. 37) in the above quote. On the contrary, conscious control appears to be occasionally required in the course of action when smooth automatic processing fails: in this case, it is rational for a cognitive system to exchange smoothness and speed for deliberate control.

Moreover, although conscious instigation of action is not the general case, we should refrain from concluding that it never occurs. Sometimes we make conscious plans of action, or we are explicitly required to accomplish a task, and so on. Importantly, in such and other cases, consciousness could also have a key role in top-down maintenance of goals and top-down inhibition: the execution of long-term
plans cannot be accounted for solely in terms of automatic spreading of activation. As Pezzulo and Castelfranchi have observed, long-term intentions require extra mechanisms to support self-regulation over long periods of time; these are the hallmark of executive functions, such as the ability to ‘shield’ these intentions from distracting opportunities, and dedicated memory mechanisms. The passage from proximal to distal action is therefore a major evolutionary step, requiring a sophisticated form of control. (2009, p. 564)

Also, attempts at learning a new skill, as Jeannerod himself observes, require controlled processing: not only do we behave in accordance with old habits, we also form new habits or modify old ones. Another interesting case is when conscious plans of action lead us to the creation of what has been called an “implementation intention” (Gollwitzer, 1999) or a “prepared reflex” (Hommel, 2000): in this case, we consciously create an association between a behavioral response and a situation in which to initiate that response, thus facilitating action initiation in the appropriate circumstances.

These considerations together strongly suggest that conscious goal representations are not merely post hoc constructs: they may instead have a key role in the initiation and maintenance of action, and in the effortful execution of new and difficult tasks. The fact that conscious goal representations are not necessarily required in order to instigate action does not mean that they cannot occur at some point in processing, be it the beginning or not. Automatic and controlled processes do presumably cooperate in the course of action processing. Specifically, there are reasons to think that goal-directed representations are automatically activated for the most part, but conscious control may occasionally play a role in this activation; what’s more, in the course of automatic processing consciousness may shift, and focus on this or that component of the process when needed.

Goals at different levels of abstraction are presumably amongst the candidates for being consciously attended, although consciousness might not be focused only on goals: as we saw above, goal-directed representations include the representation of contexts and behavioral means as well. As a matter of fact, we are constantly engaged in conscious monitoring of the environment and our own behavior, even when we automatically respond to perceptual inputs: in Saptute and Lieberman’s words, for the most part of our lives “we live in a supraliminal world” (2006, p. 91). For instance, in dialogue we normally attend in some measure to our interlocutor’s utterances, to the context, and also to our own responses. Monitoring the different components of automatically-driven actions, and not planning action, could be the primary function of consciousness. Although goals may be consciously attended, too, and genuine planning abilities may occasionally occur, in most cases conscious control seems instead involved in maintaining automatically activated courses of action or, on the contrary, inhibiting them when they happen to be in conflict with preferred goals. In this sense, again, intentionality is not concentrated in one single moment of action processing: consciousness, monitoring, and control are spread across the overall course of action. The notion of a single determinate intention instigating action is probably a myth.
5. Conclusions

As should be clear, the perspective defended here is quite different from Levelt’s view that communicative intentions drive controlled processes leading to speech. In our proposal, intentionality is not concentrated in one single point (and one single content) at the instigation of action; instead, it is dynamically distributed across the whole complex of goal-directed representations involved in action. More specifically, any action has a plurality of goals, and both behaviors and goal representations may be activated by bottom-up, automatic processes. As far as language is concerned, not only are utterances normally embedded in dialogue, as noticed by Garrod and Pickering, they are also embedded in an overall stream of non-linguistic actions and social practices. As a consequence, a variety of linguistic and non-linguistic stimuli may trigger chains of cerebral activation which automatically prompt actual pieces of behavior.

At the same time, our perspective clearly differs from the view according to which actions are in most cases non-intentional—and specifically, nonconsciously goal-directed. It is a crucial feature of human actions that they are rarely if ever completely unconscious. In particular, the stream of linguistic and non-linguistic actions in which any speech act is embedded is itself consciously attended most of the time, so that, at the moment when the agent is about to speak, she/he is normally aware of participating in one social practice or another. But consciousness is too slow for it to ensure fast and efficient action initiation: most of the time conscious control comes later, in the course of processing, as a mechanism for goal maintenance and shielding, for reorganization of habits, or for the management of unexpected difficulties. In fact, consciousness flows across the represented stream of action, focusing on this or that component when necessary.

Notes

[1] One of the anonymous referees has invited us to be as clear as possible with the complex terminology in this field. Let us then make some terminological clarifications. We use ‘intentions’ for conscious representations of purposes, ‘goals’ for representations of purposes that are not necessarily conscious, and ‘purposes’ in a generic sense. A conscious goal, then, is by definition an intention. An “intentional behavior” is (as a first approximation: our aim is precisely to put into question this definition) a behavior driven by an intention, that is, consciously directed towards a goal; a behavior can be instead “goal-directed” when the represented goal it is directed to may not be conscious. Goal-directed representations are representations sustaining goal-directed behaviors, and including representations of goals. Finally, ‘intentionality’ is not used here in its traditional philosophical sense; as it is common in the psychological literature on the matter, it is just the result of the nominalization of the adjective ‘intentional’: a behavior exhibits intentionality insofar as it is intentional.

[2] The notion of distributed intentionality is not new. It can be especially found in the literature concerning interaction between agents, where the focus is on the fact that intentions are better conceived of as residing in social routines than in individual minds (Duranti, 1993, 2007; Garrod & Pickering, 2007, p. 10). However, it can be argued that the spreading of intentions across social practices is somehow rooted in their spreading across
individual representations (see below, note 11). In the present paper we are exclusively concerned with distributed intentionality in this latter, individual sense.

[3] See for instance Levelt (1989, p. 114): “the speaker’s utterance invites the addressee to infer the communicative intention, i.e., to construct a representation of the information to be conveyed.”

[4] The notion of “illocutionary act has” been put forth by Austin (1962), and it refers to the kinds of behavioral moves we can make with a certain propositional content: we can claim it, hypothesize it, doubt it, wonder if that is the case, and so on.

[5] Of course, since the output of the Conceptualizer is a preverbal message, here the term ‘proposition’ must be intended as referring to the conceptual content—however it is conceived—that only at a later stage becomes the content of a verbal message.

[6] In Bargh’s (1994) own terms, the four parameters are awareness, intentionality, efficiency, and controllability. However, Garrod and Pickering suggest that “non-interruptibility” is a more proper label for what Bargh calls “controllability.” Similarly, we observe that by the term ‘intentionality’ Bargh properly means that a process is not mandatory: the notion at issue is not the full notion of intentionality we are interested in.

[7] See also Gollwitzer, Parks-Stamm, and Oettingen, where they suggest that goals may behave in accordance with simple associative (Hebbian) principles: “under the assumption that goals, too, are represented mentally and become automatically activated by the same [Hebbian] principles, goal representations should also be capable of automatic activation through contact with features of the contexts in which those goals have been pursued often and consistently in the past” (2009, p. 605).

[8] An anonymous referee asked whether an achievement goal could not be better described as a sort of motivation rather than a goal proper. We agree that this is a possibility (this is acknowledged by Dijksterhuis et al., 2007, p. 99), although the boundary between motivations and goals is hardly rigid: in line of principle, a motivation can be explicitly represented and pursued so as to give birth to metacognitive goals; we will come back to this below. However, our argument does not depend on this. We just want to show that an achievement goal is probably not the goal of the action; this is a fortiori true if an achievement goal is not a goal at all.

[9] The distinction can be found in Jacob and Jeannerod (2005), and it is based on Searle’s (1983) distinction between intentions-in-action and prior intentions. Other distinctions and terminologies can be found in Bratman (1987: future-directed and present-directed intentions), and Mele (1992: distal and proximal intentions). Pacherie (2008) has put forth a more complex, three-tiered model where distal or prospective, proximal or immediate, and motor intentions are distinguished.

[10] For a discussion of hierarchical arrangement of goals at different levels of abstraction in psychological explanations, see for example Carver and Scheier (2009, p. 301).

[11] Recall Garrod and Pickering’s suggestion that message planning is distributed between interlocutors. On the one hand, this is intended to mean that an agent might not consciously represent the goals of her/his own action, insofar as she/he is simply following a routine in which those goals are embedded. On the other hand, an agent who participates in a social practice normally has a representation—although not necessarily a conscious one—of how goals are distributed across the participants in that practice. In a sense, goals can be distributed across the participants in a practice just as they can be distributed between different components of an agent’s action when a superordinate goal is arranged in a certain number of subgoals. This consideration has led us to transfer the notion of distributed intentionality from the social domain (Duranti, 1993, 2007) to the mind of the individual agent (see also Mazzone, 2010; Mazzone & Campisi, 2010).

[12] The role of consciousness in action execution is discussed at greater length in Mazzone and Campisi (2010).
References


