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BOUNDED MIRRORING

Joint action and group membership in political theory and cognitive neuroscience

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Fighting against a "cognitive monster": group membership and cognitive processes

A crucial socio-political challenge for our age is how to redefine or extend group membership in such a way that it adequately responds to phenomena related to globalization like the prevalence of migration, the transformation of family and social networks, and changes in the position of the nation state. Two centuries ago Immanuel Kant assumed that international connectedness between humans would inevitably lead to the realization of world citizen rights (Kant 1968). Nonetheless, globalization does not just foster cosmopolitanism but simultaneously yields the development of new group boundaries (Castells 1997). Group membership is indeed a fundamental issue in political processes, for: "the primary good that we distribute to one another is membership in some human community" (Walzer 1983: 31) – it is within the political community that power is being shared and, if possible, held back from non-members. In sum, it is appropriate to consider group membership a fundamental ingredient of politics and political theory (Latham 1952). How group boundaries are drawn is then of only secondary importance.

Indeed, Schmitt famously declared that "[e]very religious, moral, economic, ethical, or other antithesis transforms into a political one if it is sufficiently strong to group human beings effectively according to friend and enemy" (Schmitt 1996: 37). Even though Schmitt's idea of politics as being constituted by such antithetical groupings is debatable, it is plausible to consider politics among other things as a way of handling intergroup differences. Obviously, some of the group-constituting factors are more easily discernable from one's appearance than others, like race, ethnicity, or gender. As a result, factors like skin color or sexual orientation sometimes carry much political weight even though individuals would rather confine these to their private lives and individual identity (Appiah 1992).

Given the potential tension between the political reality of particular group membership definitions and the – individual and political – struggles against those definitions and corresponding attitudes, citizenship and civic behavior becomes a complex issue. As Kymlicka points out, it implies for citizens an additional obligation to non-discrimination regarding those groups: "[t]his extension of non-discrimination from government to civil society is not just a shift in the scale of liberal norms, it also involves a radical extension in the obligations of liberal citizenship" (Kymlicka 2001: 298–99). Unfortunately, empirical research suggests that political intolerance towards other groups "may be the more natural and 'easy' position to hold" (Marcus et al. 1995: 224). Indeed, since development of a virtue of civility or decency regarding other groups is not easy, as it often runs against deeply engrained stereotypes and prejudices, political care for matters like education is justified. Separate schools, for example, may erode children's motivation to act as citizens, erode their capacity for it and finally diminish their opportunities to experience transcending their particular group membership and behave as decent citizens (Kymlicka & Norman 2000).

This chapter outlines a possible explanation for such consequences. That explanation will be found to be interdisciplinary in nature, combining insights from political theory and cognitive neuroscience. In doing so, it does not focus on collective action, even though that is a usual focus for political studies. For example, results pertaining to collective political action have demonstrated that the relation between attitudes and overt voting behavior or political participation is not as direct and strong as was hoped for. Several conditions, including the individual's experiences, self-interest, and relevant social norms, turned out to interfere in the link between his or her attitude and behavior (Marcus et al. 1995). Important as collective action is, this chapter is concerned with direct interaction between agents and the influence of group membership on such interaction – in particular joint action. Although politics does include many forms of action that require no such physical interaction, such physical interaction between individuals remains fundamental to politics – this is the reason why separate schooling may eventually undermine the citizenship of its isolated pupils (Kymlicka & Norman 2000).

This chapter will focus on joint action, defined as: "any form of social interaction whereby two or more individuals coordinate their actions in space and time to bring about a change in the environment" (Sebanz, Bekkering, & Knoblich 2006: 70). Cognitive neuroscientific evidence demonstrates that for such joint action to succeed, the agents have to integrate the actions and expected actions of the other person in their own action plans at several levels of specificity. Although neuroscientific research is necessarily limited to simple forms of action, this concurs with a philosophical analysis of joint action, which I will discuss below. Given this correspondence, the neuroscientific study of joint action may still deliver us insights into relevant properties of more comprehensive, political action.[1]

I will employ the example of joint action mentioned by Sebanz and colleagues of two persons carrying a table, requiring them to coordinate goals and means at several levels. Both persons can face the table and each other, partly imitating each other's behavior and partly complementing it, for instance by walking forwards and backwards respectively (Sebanz et al. 2006). Furthermore, the scenarios for joint action can become more complicated if the table has to be carried upstairs, with persons of different sizes, or without a previously agreed direction or goal for carrying the table. Joint actions with a clearer political resonance, like writing and carrying a banner, building dikes or operating a cannon are not dissimilar in their relying on individuals coordinating their actions in order to obtain a goal in their environment. What is not yet integrated in neuroscientific research of joint action is group membership, although political theory teaches it to be fundamental. Indeed, imperative for the success of any such joint action, is the prior recognition of others as potential members or candidates for such an action (Searle 1990). Drawing on neuroscientific evidence that sheds some light on the impact of group membership for activation of so-called mirror neuron systems (MNS), I will discuss how this political element can become integrated in the mechanism responsible for joint action. Importantly, for joint action to succeed we need to recognize and understand the other agent's movements and intentions, irrespective of his or her group membership. Nonetheless, group membership turns out to modulate these MNS activations. As a result, it is difficult to maintain that the MNS are merely grounding our "capacity to constitute an implicit and directly shared we-centric space," which is crucial for joint action (Gallese 2006: 21). Indeed, even though these MNS are being held by some authors to imply that: "the evolutionary process made us wired for empathy" (Iacoboni 2009: 666), other, recent neuroscientific evidence suggests that our wiring is much more complex than that and is vulnerable to political or ideological strife of a more recent date. Group membership appears to function as a filter, offering bounded entry into this "we-centric space" to out-group members and thus affecting our capabilities for social interaction from the very start.

As a result, we will find that there are several and different brain processes involved in joint action, which can respond differentially to a political issue like group membership. Since evocation of stereotypical prejudices and behaviors via perception of group membership is hard to control or avoid via rational choice, Bargh concluded that we possess deep down a "cognitive monster" (Bargh 1999). This raises the question: Why do we carry around such a cognitive monster at all? Would it not be more preferable if our brain performed only consistently, having all cognition and behavior coordinated and determined through political and similar decisions? If that were the case, political theory would need to have only superficial interest in cognitive neuroscience (from now on: neuroscience), since neuroscience would not bring insights to the table that were of much relevance to political theory. Conversely, if neuroscience would demonstrate that this monster is completely insensitive to political decision making, one could wonder what relevance would be left for political theory. A third response to this phenomenon of multiple (sub-)mechanisms in one brain will be defended below, supportingthe integration of insights from political theory and neuroscience. A response that echoes Aristotle's account of man, who famously claimed man to be: "by nature a political animal" (Aristotle 1984, *Pol.*: 1252a 3; cf. *Eth. Nic.*: 1097b 11).

Nonetheless, Aristotle acknowledged the multiple factors that influence human action, for he emphasized that this human nature needs the constraints offered by politics to avoid development into a monster indeed: "For man, when perfected, is the best of animals, but, when separated from law and justice, he is the worst of all" (Aristotle 1984, *Pol.*: 1253a 31–33). According to this response, neuroscience can contribute to the investigation of man's nature, leaving ample room for the influence of political contents on neural processes. Scientific progress in the explanation of human action and cognition does therefore not contradict but rather confirms the: "indispensability of political theory" (MacIntyre 1983).

Causal pluralism and the integration of political theory and neuroscience

Action is a phenomenon that can be approached from many different scientific perspectives, offering different explanations of that phenomenon. Jointly carrying a table, for instance, requires agreement between agents about when to start walking, who walks in front and in what direction. Besides, other forms of agreement about more distal goals are implied when this table figures in a political rally, for example. As a result, the same phenomenon of two persons carrying a table may invite political scientists, social psychologists, cognitive scientists, and neuroscientists to offer explanations, each focusing at one or more components of the explanatory mechanism. This complexity of action implies therefore a causal pluralism, where each cause contributes to the production of the phenomenon. Similarly, each cause also yields specific constraints on the phenomenon (Craver 2007): physical limitations, psychological obstacles, and political strife can all interfere and thwart this joint action. For the realization of an extremely simple political action like carrying this table, a plurality of causes must perform in coordination in order to produce the action.

Given this complexity and the corresponding causal pluralism it is not surprising that social scientists have become increasingly interested in the cognitive processes underlying our behavioral and cognitive responses. The "cognitive turn" in the social sciences refers to an increasing interest in the properties of cognitive processes performed by subjects while engaging in activities (Fuller 1984). If the interest in the precise nature of these cognitive processes was limited due to a prevailing behaviorist or functional perspective, this has changed dramatically in recent years. As the development of the cognitive sciences since some 55 years (Miller 2003) and the subfield of cognitive neuroscience since some 30 years (Gazzaniga, Ivry, & Mangun 2002) was accompanied by an expanding toolbox of experimental and computational research instruments, insights from these fields found ever-greater appeal in the social and humanistic sciences. From their side, these "biologists of the mind" have come to claim that they can inform those "who wonder what life, mind, sex, love, thinking, feeling, moving, attending, remembering, communicating, and being are all about" (Gazzaniga et al. 2002: 1). Even more pertinent to social and humanistic sciences, cognitive neuroscientists claim that our "social codes" are largely dictated by our biology and not by our ideas (Iacoboni 2008) or that "there could be a universal set of biological responses to moral dilemmas, a sort of ethics, built into our brains" (Gazzaniga 2005: xix).

In light of the complexity of social interaction and the roles played by ethical, political, and social debates concerning group membership in reshaping our socio-political environment, these latter claims appear overstated and one-sided. In contrast, evidence strongly suggests the presence of a "reciprocal determinism" of socio-political factors and neural processes involving both top-down and bottom-up interactions (Cacioppo & Visser 2003). Moreover, the concepts or explanations that humans develop for self-reference have striking "looping effects" and as such influence subsequent cognitive and behavioral processes (Hacking 1995). For example, intercultural differences in the individual's independence from or interdependence on his or her group have been found to affect even an unconscious perceptual process, like focusing on single objects or their contexts, respectively (Nisbett & Miyamoto 2005). More relevant here is a looping effect when particular self-categorizations of subjects did influence their subsequent automatic intergroup or racial bias upon seeing strange faces (Van Bavel & Cunningham 2009). Given such interactions, political theory and neuroscience need to join forces to explain the different processes that are relevant in this domain, regarding the influence of culturally specific cognitive representations or categorizations that are used in these processes (Sperber 1996) and more generally regarding a "cognitive view of culture" (Shore 1996: 39), without each discipline having to surrender itself.

Recognizing such reciprocal determinism, I will discuss the role of development and learning for the brain. In that context I will shed light on the consequences of the fact that generally scientists refer to a mechanism with a complex and hierarchical structure in order to explain particular cognitive and behavioral responses. While emphasizing that this complex and hierarchical structure yields to such a mechanism benefits in terms of processing speed, stability, flexibility and cost-effectiveness, we have to acknowledge that at times it can be disadvantageous that the components or operations of such a mechanism have relative autonomy and independence. For at times, this structure hinders the simultaneous adjustment of all sub-mechanisms that constitute such a complex mechanism, as when a socio-political decision does not affect all relevant sub-mechanisms of the brain that are involved in joint action. Interdisciplinary integration of insights in the complex interaction of these components may allow us to improve that situation.

Hierarchical structure and its benefits for individual action coordination

When two persons are carrying a table up a stage for a political debate, they demonstrate a case of coordination of goals, means, and behaviors at several levels of specification – both together and individually. This will be discussed as the "cascade of intentions" below, distinguishing distal, proximal, and motor intentions (Pacherie 2008). For example, each individual will have a similar distal intention or long-term interest – perhaps even partisanship – in politics. Similarly, each will want to enable the political discussion and assume that the table suits that occasion. Together, they must then form a proximal intention to walk the table in a particular direction and to a specific location. Finally, they will automatically and tacitly align their motor intentions, relevant for walking speed, holding the table, and so on. Interestingly, there is also coordination at stake between these levels of intentions for each agent, both individually and together. Importantly, however, the coordination between levels – like between political goal and walking synchronization – is rather loose: the political goal does not determine how to walk with the table, nor does adjustment of walking speed enforce political revisions – not for the individual nor for the interacting agents.

Generally, in complex and dynamical systems, ranging from biological systems to large social organizations, processes are structured hierarchically. The general prevalence of hierarchical forms of organization does not preclude relative autonomy and independency of levels. On the contrary, control of the specifics of the here and now are relegated to a lower level, while the control of more general aims and goals are generally kept at higher levels. Important advantages of such a structure for those systems are their being more stable and faster in their response, less vulnerable to interruption, more flexible in responding to environmental changes, and more efficient in evolution, development, or learning (Simon 1969; Wimsatt 1986).

Not surprisingly, processes involved in action are usually also hierarchically structured. A hierarchical organization of control allows better performance of complex actions than sequential or chaotic orderings do, as evident even in simple grooming behavior of flies (Dawkins & Dawkins 1976). The complexity of action in humans and primates is due to their exhibiting many more levels of superordinate and subordinate action goals and having longer duration. Analyses of great apes' plant-eating behavior has led to the distinction between a vocabulary of basic actions and the complex action programs appropriate for each plant for which these actions are flexibly assembled. The hierarchical structure allows these animals to interrupt, repeat, correct, or adapt a sub-routine without affecting the overall action (Byrne & Russon 1998) – adding to the previously mentioned benefits of hierarchical structure. Additionally, it enhances the understanding and imitation of another individual's action (Lestou, Pollick, & Kourtzi 2008), important for joint action.

Hierarchical structure also facilitates tool use and action planning in animals, especially observable in humans (Clayton, Bussey, & Dickinson 2003; Emery & Clayton 2009). When language emerged, with its hierarchical structure and its recursivity,[2] humans became even more apt at reflecting on and coordinating their actions and action plans – not just individually, but also intersubjectively (Deacon 1997). Such reflection and the coordination of actions and action plans, adds in particular coherence and consistence between actions to the other benefits like enhanced speed, stability, flexibility, consistency, and cost-effectiveness of action. Indeed, while animals appear generally to be driven from moment to moment by their proximal or immediate intentions, philosophical analysis underlines that it is: "particularly characteristic of humans, however, that they are able to form … 'second-order desires' or 'desires of the second order'" (Frankfurt 1988: 12). Reflecting on and evaluating their desires or intentions, humans are better capable of organizing and coordinating their complex actions. Such coordination requires the development of stable preferences for second-order desires like the desire to devote more time and resources to one's political activities and to reject a dislike for political rallies. Without such constraints, an agent will easily succumb to counter-productive and inconsistent actions: "Suppose that someone has no ideals at all. In that case, nothing is unthinkable for him, there are no limits to what he might be willing to do. He can make whatever decisions he likes and shapes his will just as he pleases" (Frankfurt 1999: 114). Below, we will discuss whether a political ideal can serve to constrain an agent's action space at several levels of specificity.

Similar to Frankfurt's emphasis on second-order goals and ideals, Bratman assumes a "methodological priority of future-directed intention" because such distal intentions support the coherence and consistency of our actions by coordinating these actions over time (Bratman 1984: 379). Choosing a political career, for example, coordinates more actions over time than choosing where to put a table here and now. Importantly, Bratman emphasizes that it is undesirable for an agent to continuously reconsider and reorganize his action plans. Instead, a planning agent has to make some "basic commitments" which are helpful in organizing his life, which have survived recurrent considerations and of which it is reasonable for him to be conservative about (M. E. Bratman 2006b). This conservatism may be adequate in the case of rational action planning, leaving open the possibility of instantaneous adjustment of our distal intentions. An important question is, however, whether such a modification will then transpire to all lower levels of specification of the action hierarchy and adequately affect the cognitive and neural processes that are involved in our action performances. Before taking up that question, we will expand the present reflection on hierarchical action plans in order to consider joint action.

Joint action and the incomplete yet sufficient merger of action plans

Action planning delivers two further advantages. First, thanks to his constrained space of actions, an agent must not continuously reconsider his actions, thus accepting “that there are significant limits on the time and attention we have available for reasoning” (Bratman 1999: 59). Second, action plans are beneficial for ourself and for joint action because: “our pursuit of organization and coordination depends on the predictability to us of our actions” (Bratman 1999: 59). Extending this analysis of individual action to joint action is warranted, since “there are clear analogues, in the shared case of the coordinating, structuring, and guiding roles of intention in the individual case” (Bratman 2009: 154). This, however, raises an important question: Is it necessary for joint action to succeed that both agents’ intention hierarchies or action plans become completely identical?

The answer is no, thanks again to the complexity of the hierarchical and dynamical structure of action. Two agents can carry a table without agreeing politically and, conversely, they can join the same party but still disagree on how to carry that table. They need to be able to, implicitly or explicitly, identify at what specific level within their hierarchies a particular action is placed and to evaluate its potential role in their own comprehensive action plans. The partial merger of their action plans may imply that they share particular subordinate goals, while still diverging regarding other aspects of their action plans. However, in order to successfully act together, they must allow such divergent aspects of the other agent’s plans also a role in their own action planning, aiming for a fair trade-off in their negotiations about the details of their joint actions (Bratman 2006a). If one agent prefers walking in front, it is sensible for the other to give way if that ensures the two agents reaching their goal.

Interesting both to political theory and to the neuroscience of joint action, such cooperation therefore cannot succeed without the two agents taking into account each other’s intentions, priorities, goals, and the like. Without such mutual recognition, they both risk that the other agent opts out of the cooperation, doubting whether his goals are supported sufficiently. Because of this, a spillover effect of joint action obtains in the form of a tendency towards shared deliberation and even shared governance as conditions for successful joint or social action (Bratman 2006a). If one needs the other to help carry a table, one is advised to let political differences rest, for example a partial merger of action plans is necessary, but political ideals must not be shared in this case. Joint deliberation should allow the cooperators to identify converging and diverging aspects of their action plans and to integrate these plans at several levels, as far as necessary.

Clearly, such deliberation does not usually touch upon the motor behavior necessary for carrying the table. Indeed, joint action relies on an automatic inclusion of the other agent’s motor intentions and capabilities in one’s (implicit) action plans, as was observable in an experiment where agents of different heights appeared to smoothly handle wooden planks of different lengths alone or together without deliberation (Richardson, Marsh, & Baron 2007). The cognitive processes that allow this form of joint action are of a different nature than those reflected upon in this and the previous sections. Nonetheless, they can interact with each other. Obviously, not only are action plans specifiable at various levels, they are also carried out by mechanisms that can be analyzed and explained at several levels. This is responsible for a causal pluralism that can bring along its own coordination problems. Processes that take place at specific levels of a mechanism are characterized by their own properties and constraints. It may be that in a situation where political constraints demand the immediate adjustment of our definition of group membership, the inclusion of a former out-group member in our automatized and implicit action plans will still be constrained by a "cognitive monster." If we want our political decisions to be aligned with those neural activations that constitute our cognition and behavior, we may need neuroscience to inform us about constraints of the neural processes involved. In addressing some of these constraints below, I will again refer to the benefits that a hierarchical structure of complex and dynamical systems yields, even if at times it appears disadvantageous.

The flexible and open structure of responsible mechanisms

In explaining political decision making or carrying a table, the brain plays a central and crucial role.[3] Research of cognitive and neural processes usually presumes the recognition of different levels of analysis and explanation. Different levels of analysis are employed when researchers distinguish between, for example, neuro-physiological, anatomical, psychological, and computational perspectives on one and the same phenomenon (Churchland & Sejnowski 1988). For the integration of the results that interdisciplinary investigation of such a complex process at various levels yields, neuroscientists usually aim to present a mechanistic explanation of that phenomenon. Such a mechanistic explanation of carrying a table or a specific case of political cognition or behavior offers the analysis and description of its responsible "mechanism" by referring to "a particular set of parts that carry out specific operations, organized so as to produce a given phenomenon" (Bechtel 2007: 4). Developing a mechanistic explanation of complex phenomena, researchers generally use two different yet related research strategies that help them develop an explanatory mechanism: the heuristics of decomposition and localization. This implies that the phenomenon or process under study is decomposed in sub-components and operations, which are subsequently localized somewhere in the system or organism that produces it. Each sub-component may be explained by a separate explanatory (sub-)mechanism. Studying these sub-components and operations requires a variety of research methods and explanatory theories (Bechtel 1993).

Similar to the ever more refined explanatory mechanism for visual information processing (Bechtel 2001) and for (the various forms of) memory (Craver 2002), the performance of an action can be decomposed into components and operations that are somehow realized by an agent.[4] For instance, the explanatory mechanism for (proximal) intentional action consists of "what," "when," and "whether" components, relying on hierarchically organized neural networks (Brass & Haggard 2008). Explaining joint action requires additional components and operations that enable agents to recognize and integrate each other's movements and goals into their own action plans (Sebanz et al. 2006). Integration of all relevant insights into an explanatory mechanism, its operations and components, and the relevant environmental conditions is very complex and leads at most to a "mosaic unity" (Craver 2007).[5]

This complexity is even enhanced by the prolonged development and far-reaching learning processes pertaining to biological organisms. First, learning and exercise usually leads to adjustments of the hierarchically structured mechanisms. As a result, an automatized skill like walking can receive relative autonomy and be then performed alongside an additional task like talking (Poldrack et al. 2005). Importantly, once a skill such as walking or talking is automatized, its responsible mechanism no longer includes continuous conscious, top-down control as it is required for novices (Karmiloff-Smith 1992).[6] Second, and especially relevant to our discussion of political theory and joint action, during this process of learning and automatization, an integration of environmental information in the mechanism often occurs, constraining the automatized function. For example, even the simple imprinting mechanism in goose chicks is relatively open for such integration of environmental information. Because of that, chicks will potentially follow for the rest of their lives not a mother goose but a dog, an ethologist, or another object that fits the only loose constraints of the rather autonomous imprinting mechanism. Being much more complex, the mechanisms producing human cognition and behavior are even better capable of integrating environmental information (Wimsatt 1986).[7]

Learning therefore implies that information from an agent's socio-political environment becomes integrated in the mechanism underlying socio-political cognition and behavior. Under circumstances, this may even increase the benefits in terms of speed, stability, flexibility, adaptivity, and corrigibility that we ascribed to hierarchically structured, complex, and dynamic systems. Given the autonomy and independence that component mechanisms and operations can have, however, this can also lead to undesirable forms of inconsistency or incoherence. The coordination between levels that was earlier defended may face its limitations. To understand this, we will next discuss the presence of a shift of control in the so-called "cascade of intentions" (Pacherie 2008) that underlies motor behavior.

The cascade of intentions and a shift of action control

Elaborating on the previously discussed, philosophical distinction between distal (or future-directed) and proximal (or present-directed) intentions and integrating it with cognitive neuroscientific and computational insights, Pacherie has developed a hierarchical model of action control supplementing these with a third type of intentions: motor intentions (Pacherie 2008).[8] Applying our example once again, motor intentions are involved in specifying our motor movements when carrying a table, while proximal intentions are concerned with the affordances of the situation in which we are carrying it. The distal intentions are relatively abstract and wait for appropriate situations to be further specified. Consideration of this model of multilevel control can inform us why and how it is that an embraced political ideal or even a proximal intention to cooperate with an out-group member may still not be sufficient to determine the performance of appropriate behavior.

As shown in Figure 10.1, although the arrows at the right refer to existing bottom-up and feedback processes, the important direction of control is downwards. Emphasizing the interaction between the three types of intentions, yet also their relative independence, Pacherie notes that the "what" or the goal of an action "can be specified at the three levels of M-intentions, P-intentions, and D-intentions" (Pacherie 2008: 196). Distal intentions are the result of deliberation and planning in the sense of Bratman. They need subsequent anchoring in a particular situation, as proximal intentions, for their realization. To this end, the conceptual terms of the distal intention are being combined with the perception and recognition of the options for action here and now, while memorized information is employed as well. As a result, the proximal intention delivers not an abstract but instead an "indexical representation of the action to be performed" (Pacherie 2008: 184). Given this indexical representation of a situation and relevant objects and agents, motor intentions need subsequently to be specified. This second step is responsible for a "parameter specification" in the form of motor intentions – or motor schemas or representations, as they are called in the

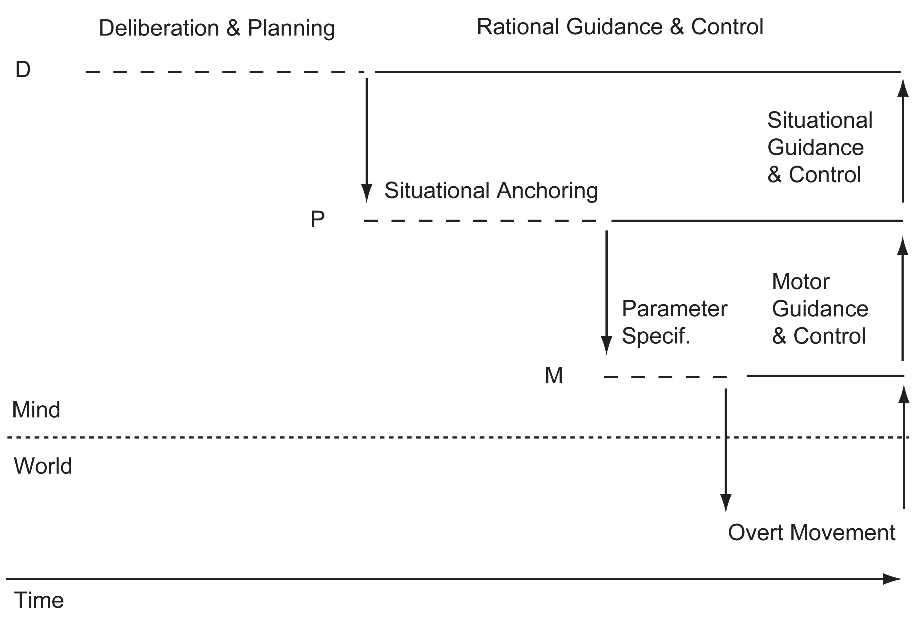

FIGURE 10.1 The intentional cascade of D-intentions, P-intentions, and M-intentions. Source: Pacherie (2008: 189).

literature (Pacherie 2008: 189).[9] For this, the agent partly relies on those motor schemas that are stored in his or her memory, depending on previous experience and practice. Such specification of our motor intentions occurs usually without involvement of higher levels of control, saving the agent a lot of cognitive resources and time. Even more so, the relative autonomy and independence of this lower level of action control is such that: "the affordances of an object or situation are automatically detected even in the absence of any intention to act" (Pacherie 2008: 186). In a pathological form this can lead to utilization behavior, when patients are incapable of inhibiting an action upon perceiving particular objects – putting on several pairs of glasses on top of each other (Sumner & Husain 2008).

Affordances of a person or an *agent* are similarly detected automatically, potentially influencing joint action, as we will see below. It turns out that features of group membership can be perceived automatically and modulate the affordance detection, even though group membership is mostly irrelevant for motor actions. Nonetheless, since affordance detection results in a "prepotentiation" of corresponding motor intentions, when an agent is not recognized as such, this will influence subsequent behavior (Grezes & Decety 2002). Indeed, because of this upstream direction of control, a prepotentiated motor intention can at times induce the development of a corresponding higher-level intention – for instance when we feel like throwing a ball upon seeing it.

Such a change in control occurs once a task is automatized or habituated after many repetitions. The relative autonomous evocation of motor intentions by affordances is produced by "neural systems underlying the *shift from deliberative behavior controls to the nearly automatic, scarcely conscious control* that we associate with acting through habit" (Graybiel 2008: 378, emphasis added). Such automatized or habituated action is often triggered by specific environmental stimuli (Hommel 2006), which have become integrated in the hierarchical structure underlying action, as was the case in imprinted chick behavior (Wimsatt 1986). Not just motor responses, but also emotional and affective processes associated with particular objects or agents, that do play a role in political cognition and behavior, can be evoked thus (Marcus & MacKuen 2001). Again, this shift of control to the lower levels of the hierarchy yields benefits in terms of saving cognitive resources and time, and increasing response speed and flexibility. Unsurprisingly, such adjustment is not only available for simple cognitive and behavioral responses, but equally for political behavior (Lieberman, Schreiber, & Ochsner 2003), and for habitual virtuous behavior (Pollard 2003; Snow 2006). However, if group membership does not remain in the lofty realms of deliberative and rational processes but also – and relatively independent of those processes – affects lower levels of the mechanism underlying joint action, this can lead to inconsistent and incoherent behavior. In the next section I will discuss neuroscientific research that concerns group membership as it is processed by particular components of the mechanisms that explain joint action.

Mirror neuron systems modulated by assumptions of group membership

Evidence suggests that the evolution of the human brain has occurred in support of the "Machiavellian intelligence" required for the maintenance of social groups and pair bonds (Dunbar & Shultz 2007), and group membership as a lasting factor in human affairs may indeed signal its role in evolutionary selection processes (Brewer 1999). Indeed, group membership is handled as a primary good in human interaction (Walzer 1983). Still, notwithstanding the relevance of group membership in human evolution and history, it does not generally figure in the explanation of joint action. For instance, surveying cognitive neuroscientific and other research on social interaction and joint action, Knoblich and Sebanz sketch four different scenarios of increasingly complex forms of interaction without group membership being part of any scenario (Knoblich & Sebanz 2008). These range from a scenario that includes "socially blind" individuals who respond simultaneously but independently to an environmental affordance, to a scenario where two agents intentionally engage in joint action. In that case they need to merge their action plans similar to our description above: "two actors need to share an intention, but they also need to plan their respective parts in order to achieve the intended outcome" (Knoblich & Sebanz 2008: 2025).

Mirror neurons and mirror neuron systems are involved in explanations of the necessary capabilities of recognizing, understanding, and responding to actions of another agent, in terms of action goals, intentions, means, and the like – without any role for group membership in the scenarios. As mirror neurons fire not just during a motor performance or only to the observation of such a performance, but in both conditions, this overlap in activations rendered them right upon discovery a crucial role in explanations of understanding action (Pellegrino, Fadiga, Fogassi, Gallese, & Rizzolatti 1992), grasping its meaning, predicting its consequences, and enabling the observer to respond appropriately (Gallese, Fadiga, Fogassi, & Rizzolatti 1996).

Meanwhile, and after scores of research results, MNS in humans[10] are supposed to underlie the extensive human capacities for understanding, imitating, communicating, and empathizing with each other (cf. Iacoboni 2009; Rizzolatti & Craighero 2004). As Rizzolatti, being a pioneer in MN research, writes about their relation to action understanding: "the *direct nature* of this understanding gives rise to a *potentially shared space for action*, which underlies progressively more elaborate forms of interaction (imitation, intentional communication, etc.) that in turn rest on increasingly articulated and complex mirror neuron systems" (Rizzolatti & Sinigaglia 2008: 192, italics added).[11] His colleagues concur with the hypothesis that the MNS indeed ground our most important social interactions, assuming that "human beings are primarily wired to identify with each other" (Gallese 2009: 24), or that "the evolutionary process made us wired for empathy" (Iacoboni 2009: 666). Apart from the fact that neurons or neural activations are in these quotes described in terms of psychological domains or functions[12] – which is mostly unwarranted given the extensive and distributed networks involved in such functions (Anderson 2010) – one wonders if these MNS are unbounded in their responses. Is this "shared space for action" opened up in every instance of motor action, or are there limitations on this sharing – perhaps grounded in other relevant properties? Even more relevant for the present context: Does a crucial socio-political factor like group membership also constrain that shared action space? Contradicting the suggestions quoted above, several factors are in fact binding mirror neuron activations.

First, MNS activations respond to actions with a limited time span and cannot grasp actions with distal or future-directed intentions (Jacob & Jeannerod 2005). Similarly, MNS fall short when these distal intentions are of a rather abstract nature or when a particular action might fulfill multiple intentions (Van Overwalle & Baetens 2009). Understanding such distal intentions and coordinating and organizing these between two agents must therefore rely on systems other than MNS, processing other types of information.[13] If grasping distal intentions is not required for carrying a table, MNS do at times even fail to grasp the proximal and motor intentions of other agents as well, due to specific and at times undesirable influences.

We would not expect otherwise, given our earlier observation that development and learning usually affect the hierarchically structured, complex mechanisms that produce phenomena like cognition and behavior and confirmed by our discussion of a potential shift of control of a habituated action to a lower level. In addition, we will find that environmental information indeed is integrated in the mechanism responsible for joint action. Moreover, this information integration is not always functional, just like the imprinting in goose chicks of a dog instead of a mother goose is dysfunctional. In the context of joint action, we would call dysfunctional a situation where irrelevant information has become integrated in the responsible mechanism or when habituation has constrained the "shared space of action" such that out-group members are not included in that space of action. Would MNS be exempt from such dysfunctional cases?

As a second point, learning and habituation does indeed modulate MNS activations, responding more to familiar than unfamiliar actions. This goes so far that significant correlations were found between MNS activation patterns and the motor familiarity of observers with very specific types of dance – either classical dance or capoeira (Calvo-Merino, Glaser, Grezes, Passingham, & Haggard 2005), or with degrees in basketball expertise (Aglioti, Cesari, Romani, & Urgesi 2008). Action familiarity was even found to modulate MNS activations in the case of observation of actions by different species: the motor unfamiliarity of humans with barking correlated with decreasing MNS activations during the observation of biting and communicative actions in humans, monkeys, and dogs (Buccino et al. 2004). But not just this familiarity in terms of motor intentions modulates MNS activations.

Environmental information is indeed also relevant for situational anchoring when "the affordances of an object or situation are automatically detected even in the absence of any intention to act" (Pacherie 2008: 186). MNS activations, third, depend on the agent's familiarity with situational affordances. Activations were different, for example, during the observation of a table ready for lunch or one to be cleaned up – situations that indeed invite different action responses (Iacoboni, Molnar-Szakacs, Gallese, Buccino, & Mazziotta 2005). Similarly, MNS activations were diminished during the observation of relatively familiar actions because of the implausibility or unfamiliarity of a specific situation (Brass, Schmitt, Spengler, & Gergely 2007; Liepelt, Von Cramon, & Brass 2008). Next and directly related to the subject of this chapter, we are interested in another situational feature that was found relevant for joint action: the other agent and more in particular the socio-political property of his or her group membership.

Intersubjective interaction does rely on more sub-mechanisms than MNS alone. For example, it has been acknowledged that humans use gaze recognition to discover another person's mental state of attention (Baron-Cohen 1995): is that person looking at a particular object, at me, or being distracted? Direct eye contact, moreover, enhances unconscious mimicry between agents (Wang, Newport, & Hamilton 2011). Remarkably, MNS appear to be also affected by such a component of social interaction. MNS activation was found to differentially respond to observable actions, depending upon the agent's facing away or facing towards the observer. The authors conclude: "The results of the current study lead us to suggest that signals about the actions of other people are *filtered*, by modulating visuospatial attention, *prior* to the information entering the 'mirror system' *allowing only the actions of the most socially relevant person to pass*" (Kilner, Marchant, & Frith 2006: 147, italics added). Recent evidence confirms such "favouritism," as an action performed by an interaction partner evokes larger MNS activation than when a third person performs it (Kourtis, Sebanz, & Knoblich 2010). Such filtering is not just a matter of attention, as it is the observer's assumptions concerning the identity of the other agent that modulate MNS activations.

Even though mirror neurons are held to represent motor actions in an "agent-neutral" way (Pacherie & Dokic 2006), we do by now expect group membership to be integrated in the explanatory mechanisms involved in action. As the integration of socio-political constraints can in many cases be functional, we should not be surprised to discover such constraints on the "shared space for action" and on our capabilities for intersubjective identification and empathy.

A fifth constraint on MNS activations indeed appears to be the – assumed – familiarity with an observed agent. As MNS activations prepotentiate motor responses, diminished responsiveness or response speed upon the perception of a robot hand in contrast to a human hand was taken to be a sign of a familiarity bias (Press, Gillmeister, & Heyes 2007). Such an unfamiliar – wooden – hand was also found to interfere less with an observer's performance of a computer (Simon) task, than when observers saw a human hand. This suggests that the observer's assumption to interact with a human or a non-human did matter (Tsai & Brass 2007). This could still be a matter of implicitly perceived social relevance;

manipulating the observer's belief was also effective. Keeping the on-screen virtual hand constant, researchers found that if observers were explicitly reminded to be looking at a hand drawn by a computer, their automatic imitation responses were reduced (Longo & Bertenthal 2009). Following up on this, it is argued that this difference is not due to the direction of attention as it turns out that it is the observers' belief regarding the interacting hand that filters or gates the information: "when they believe the movement stems from a nonintentional agent the movement does not gain privileged access to the mirror system" (Liepelt & Brass 2010: 226). Given this limited and conditional access to MNS of perceived interacting hands, it will come as no surprise that the responsible filter or gate is also sensitive to group membership. The more so, as the "cognitive monster" of stereotypes concerning group membership is prevalent in human social cognition and associated not just with perceptible traits but also with stereotypical behaviors (Bargh 1999). In that case, group membership properties must have shifted down in the hierarchy of action control, being integrated in the mechanisms responsible for motor and proximal intentions and not left to deliberative and rational decisions alone.

Indeed, when Nicaraguan and American citizens performed cultural gestures from both cultures, understanding of familiar gestures could be "overruled" if subjects observed an incongruency regarding culture in the agent–gesture combination, diminishing MNS activations compared to congruent combinations (Molnar-Szakacs, Wu, Robles, & Iacoboni 2007). Just like group membership should here in fact be irrelevant for understanding the specific gesture, one would hope it to be irrelevant for the invocation of empathy. However, observing painfully hurt hands of members of another race did decrease MNS activations. Strikingly, an unnatural violet painted hand did still increase MNS activations in observers, putting out-group hands at a larger distance than these unnatural hands (Avenanti, Sirigu, & Aglioti 2010). Instead of concluding that "the evolutionary process made us wired for empathy" (Iacoboni 2009: 666), it seems that evolution enabled us to apply socio-political filters or gates such that our empathizing wirings are seriously constrained in their scope.[14] Recent experiments with South Asians, Blacks, and East Asians confirm that "a spontaneous and implicit simulation of others' action states may be limited to close others and, *without active effort*, may not be available for outgroups" (Gutsell & Inzlicht 2010: 1; italics added).

Meanwhile, readers may not be surprised about these findings of differential responses for in-group and out-group members, nor should they be, as we can witness such biases at work much too often. However, that neural activations associated with motor behavior are modulated by such a bias shows how a socio-political distinction can become integrated in a level of action control that is itself hard to control (which is not new, either). It explains why the deliberative and rational formation of a distal intention to revise group membership may still not adequately facilitate social interaction like carrying a table, for which we need to integrate another agent's intentions in our action plan. A rational decision cannot immediately open the filter or gate that bounds MNS activations. The benefits of speed, stability, and cost-effective processing delivered by the neural processes associated with MNS come at some cost as it is relatively hard to align them with the coordination that stems from a rational decision.[15] Conversely, and I do not have the space to discuss this here, we may even expect an influence going upstream. Failing MNS activations may hinder joint action and subsequently confirm the agent's explicit prejudice against the out-group, not being aware of his or her own, bounded, mirroring. In the next and final section I will discuss what this teaches us about the relation between political theory and neuroscience. The least I hope to have shown is that there is indeed a "reciprocal determinism" between neural activations and socio-political factors (Cacioppo & Visser 2003), enabling the integration of group membership somewhere in mechanisms that underlie joint action. In the final section I will spell out some consequences of this "reciprocal determinism" for the relation between political theory and neuroscience, the subject of this volume.

Integrating political theory and neuroscience: a partial and dynamic merger

Acknowledging the causal pluralism responsible for action, Aristotle lists seven causes: "chance, nature, compulsion, habit, reasoning, anger, or appetite" (Aristotle 1984, *Rhet.*: 1369a 5–6) and then continues to mention situational influences on these. Given such reciprocal influences between contexts and causes and the central role for psychological functions, one can only confirm his advice that the: "student of politics, then, must study the soul" (Aristotle 1984, *Eth. Nic.*: 1102a 22–23). Obviously, the converse is true as well, given these interactions between individual mechanisms and social mechanisms (Hedström & Ylikoski 2010). Indeed, given the flexibility and openness of the mechanisms responsible for action, variability of these mechanisms is to be expected: an individual variability including shifts in action control due to individual development and learning, and a social variability, due to the influences of situational information on those mechanisms.

Regarding the latter, a recent review defends the hypothesis that: "decades of exposure to cultural values or practices could shape or mold neural structures" (Park & Huang 2010: 396). Exposure consequently may lead not just to functional differences but to truly constitutional brain differences between cultures with respect to task-related neural activations (Han & Northoff 2008). That differences due to such group membership have not emerged earlier in neuroscience is probably due to the fact that psychological and cognitive neuroscientific research rests largely upon an unrepresentative sample of only 5 percent of the global population (Arnett 2008), drawn mainly from "Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies" (Henrich, Heine, & Norenzayan 2010).

A further expansion of the causal pluralism is to be expected, as the genetic contribution to interaction of the brain and environment is also found to be important. For example, political liberalism or conservatism is correlated with a genetic disposition for novelty seeking. However, that correlation only obtains for subjects with a large group of friends, provoking liberalism (Settle, Dawes, Christakis, & Fowler 2010). These insights regarding causal pluralism and variability dissuade simple conclusions concerning the relation between neuroscience and political theory. Indeed, given the fact that such conclusions are likely to have "looping effects" (Hacking 1995) themselves and feed back on the self-concept of us who are interested in these scientific insights, some caution is in order.[16]

Because of this pluralism and variability, I do not believe that such scientific insights should make a large "difference for the proper design of political institutions" (Simon 1985: 303): such design will likely not be robust enough to accommodate socio-political volatilities. On the other hand, I would also not subscribe to the "neuropolitical" plea for an unconditional embrace of socio-political plurality and variability while rejecting the universal scope of Kantian morals (Connolly 2002). Instead, Kant's political idea of world citizenship (Kant 1968) seems to me a valuable proposal supporting a just coordination of the variability between humans. What then is the value of integrating neuroscience with political theory that can be drawn from this chapter? The value apart from expansion of our insight in the interactions that explain human cognition and behavior, as the variable interactions between socio-political factors and neural activations? Or the value apart from neuroscience's and political science's fostering each other's research agendas and methodologies (McDermott 2009)?

Notwithstanding causal pluralism and variability, it is the agents' awareness of the potential interactions between neural constraints and political factors that can in principle contribute to the necessary coordination between intentions and actions. Insights in these interactions – however variable – may add to the human capability of meta-cognition, enabling humans to reinterpret their own representations of reality (cf. Penn, Holyoak, & Povinelli, 2008 and commentaries) – for example the variable representation of group membership. This meta-cognitive capability of making explicit and reinterpreting one's representations yields not only the ability of reflection, but also of instantaneous learning, de-bugging, and knowledge transfer in humans (Clark & Karmiloff-Smith 1993) and arguably the human forms of consciousness (Cleeremans, Timmermans, & Pasquali 2007). Further study of the neural mechanisms behind such meta-cognitive capabilities may even support their further development (Fleming et al. 2010). However, when we aim to "de-bug" cognitive and neural processes and restore the required coordination for our socio-political cognition and behavior, a next step is necessary. Perhaps, the integration of disciplines may be helpful here, too.

Given that after some time group membership can shift to components of the mechanism involved in joint action that escape direct rational and conscious control, one may think there is nothing to do. Similarly, Bargh originally concluded concerning the "cognitive monster" that the "only way to kill them [stereotypes] is to prevent them from becoming activated or rather from coming into existence" (Bargh 1999: 378). The latter does not seem to be an option, as I argue that environmental information will become integrated in the automatized cognitive and neural processes – that yield many benefits – as they develop in complex and dynamic systems. However, automatisms do not only respond to environmental information but are also influenced by the agent's internal, mental information state. This allows some room for self-regulation, potentially affecting the intentional cascade all the way down. Indeed, even Bargh came to recognize that agents are able to avoid automatisms and flexibly adapt their actions if they are adequately primed for the goal (Hassin, Bargh, & Zimerman 2009).

Associated with improving the general public's meta-cognition, therefore, the integrated insights of neuroscience and political theory could contribute to further exploration of forms of self-regulation of cognition and behavior as well. This can add to available psychological insights in self-regulation as a consequence of an agent's mental "reconfiguration" of his or her action plan or of his or her relation to out-group members.[17] Such self-regulation before or during a joint action like carrying a table or during political interactions can support the avoidance of undesirable interference by group membership features. For example, priming with disliked in-group members and admired out-group members helps to fight biased responses (Dasgupta & Greenwald 2001). Subtler even, preliminary self-categorization does affect the stereotypes that individuals maintain when they subsequently evaluate others in a mixed group (Van Bavel and Cunningham 2009). Another relatively effective way of action reconfiguration is by thinking about an alternative or counterfactual action situation or outcome as it mitigates the application of biases and enhances the consideration of future alternatives (Galinsky & Moskowitz 2000). Or agents can, preliminary to their action, engage in implementation intention formation, supporting the automatic achievement of the predetermined goal without being distracted by undesirable aspects (Gollwitzer & Sheeran 2006). MNS activations are found to be also modulated by preliminary verbal task commands – observation versus imitation, for example (Vogt et al. 2007) – or by the sort of information concerning agency discussed in the previous section.

The interdisciplinary investigation of such self-regulatory strategies will naturally also reveal their limitations, for instance by pointing out the cognitive efforts required for controlling racial attitudes (Richeson, Trawalter, & Shelton 2005). However, variability will in this case, too, result from the flexibility and openness of responsible mechanisms. Looping effects can therefore obtain between, for example, neuro-imaging studies of race and individual responses to race (Eberhardt 2005), which may consequently modulate the interactions between members from different groups. Given these variable constraints on cognitive and neural processes, we should keep on exploring different political concepts of group membership or action configurations in empirical and theoretical studies. For it is from such concepts that we must ultimately derive the global coordination and organization of action plans of individuals, groups, and societies.

Notes

1 Putnam, in his influential book *Bowling Alone*, notes that it is especially the cooperative form of political participation requiring coordination that is in stark decline (characterizable in terms of "serve," "work," "attend"), more than political participation in terms of "self-expression" (characterizable as "write") (Putnam 2000: 44–45).

2 Recursivity as a core feature of human communication has been suggested to be a characteristic of other human capabilities in social networking, navigation, and arithmetic as well (Hauser, Chomsky, & Fitch 2002).

3 Obviously, I do not mean to deny the importance of the brain's embodied nature (cf. Clark 2008). However, for the present context I do not need to focus on that aspect.

4 I have explored such an approach to action understanding in Keestra (2011).

5 The complexity of explanatory mechanisms in the life sciences is also the reason why there is a causal and theoretical pluralism involved. With each of these causes researchers can only partly explain the properties of a particular phenomenon, rendering each associated theory only limited significance. There are many theories regarding gene regulation, for instance, each explaining only a part of the properties or constraints of the phenomenon (Beatty 1997).

6 This result of learning holds even for simple skills like perception. The fact that this automaticity and relative independency is a result of development and learning and not a precursor to it, is the reason why such processes are called the result of modularization instead of being innately modular (Karmiloff-Smith 1992).

7 This fact can partly explain the socio-cultural variability among humans even in seemingly inflexible and innately determined cognitive functions like perception and attention (Ketay, Aron, & Hedden 2009).

8 Bratman's analyses of joint action, too, are being integrated in neuroscientific accounts (see Dominguez Duque, Lewis, Turner, & Egan 2009; Newman-Norlund, Noordzij, Meulenbroek, & Bekkering 2007).

9 In accordance with mechanistic explanation, motor intentions can be again decomposed for instance in arm transport and grip in the case of grasping movements (Cavina-Pratesi et al. 2010).

10 Only very recently have single-cell recordings in epileptic patients confirmed the presence of neurons with mirroring properties in human frontal lobe and medial temporal cortex (Mukamel, Ekstrom, Kaplan, Iacoboni, & Fried 2010). However, the widespread prevalence of such neurons in unexpected cortical regions raises the question if we can still define a common yet specific function for mirror neurons (Welberg 2010)

11 Indeed, mirror neurons were even being predicted to: "do for psychology what DNA did for biology," that is to unify research and explanations of psychological functions that were largely distinct, like the performance, the understanding, and the imitation of action, bridging the gap between oneself and another agent (Ramachandran 2000).

12 An extensive critique of the use of psychological terms in describing the function of neural areas is given in Bennett and Hacker (2003). In turn, we have argued that this critique overlooks limitations for the role of concepts in neuroscience (Keestra & Cowley 2009), which often play a role as heuristics for the development of mechanistic explanations and not just as yardsticks for adjudging empirical evidence (Keestra & Cowley 2011).

13 There is a growing consensus that for action understanding and social cognition, MNS are indeed complemented by a mentalizing, theorizing, or inferential system (see e.g. Brass, Schmitt, Spengler, & Gergely 2007; de Lange, Spronk, Willems, Toni, & Bekkering 2008; Goldman 2006; Van Overwalle & Baetens 2009; Zaki, Hennigan, Weber, & Ochsner 2010).

14 Likely to be important as a filter is the Superior Temporal Sulcus, activated by the perception of biological motion associated with intentionality (Frith & Frith 2010) and

described in another review as a "preprocessing station that then sends information to parietal and frontal cortex mirror areas," being also involved in mentalizing about other people's intentions (Newman-Norlund et al. 2007: 58).

15 This touches upon the subject whether mirror neuron properties are the result of Hebbian learning processes and not innate (argued among others by Del Giudice, Manera, & Keysers 2009; Heyes, Bird, Johnson, & Haggard 2005; Keysers & Perrett 2004).

16 The "looping effect" may also result in society's taking for granted the use of neuroscience in lie-detection (Wolpe, Foster, & Langleben 2005) or for cognitive enhancement (Schermer, Bolt, de Jongh, & Olivier 2009), which should raise serious ethical and political questions.

17 I discuss parallels between the hermeneutic emphasis on the indeterminacy of action (re-) configuration and cognitive neuroscientific research concerning imitation in my Keestra (2008).

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