# Self–other contingencies: Enacting social perception

Marek McGann · Hanne De Jaegher

**Abstract** Can we see the expressiveness of other people's gestures, hear the intentions in their voice, see the emotions in their posture? Traditional theories of social cognition still say we cannot because intentions and emotions for them are hidden away inside and we do not have direct access to them. Enactive theories still have no idea because they have so far mainly focused on perception of our physical world. We surmise, however, that the latter hold promise since, in trying to understand cognition, enactive theory focuses on the embodied engagements of a cognizer with his world. In this paper, we attempt an answer for the question *What is social perception in an enactive account?* In enaction, perception is conceived as a skill, crucially involving action (perception is action and action is perception), an ability to work successfully within the set of regularities, or contingencies that characterize a given domain. If this is the case, then social perception should be a social skill. Having thus transformed the question of what social perception is into that of what social skill is, we examine the concept of social contingencies and the manner in which social skills structure—both constrain and empower—social interaction. Some of the implications of our account for how social and physical perception differ, the role of embodiment in social interaction and the distinction between our approach and other social contingency theories are also addressed.

**Keywords** Autonomy · Cognition · Cultural psychology · Embodiment · Enaction · Intersubjectivity · Participatory sense-making · Perception · Social interaction · Self · Skill

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## Introduction

The well-known traditional approaches to social cognition, theory of mind and simulation theory, have been extensively criticized in the last few years. Criticisms of these mainstream approaches include that they are overly cognitivist and individualist (Hutto 2004), i.e., that there is a lack of attention to the embodiment of social agents (Gallagher 2001; Stawarska 2006), a neglect of the interaction process (Gallagher and Hutto 2008; De Jaegher and Di Paolo 2007, 2008; De Jaegher 2009), that they are based on a stage conception of development, which is more simplistic and less plausible than a process conception (Hendriks-Jansen 1997), and that the experience of engaging with others is ignored in them (Hobson 2002; Thompson 2001). Steps are being taken in alternative directions and the present paper situates itself within the realm of these contenders. Specifically, we take an *enactive* route to answering the question of the role and nature of perception in social understanding.

Why this approach? Enaction, as a general approach to cognition and as characterized by Varela, Thompson, and others, focuses particularly on a set of elements that we think are also pertinent to understanding *social* engagements (see also Thompson 2001). These elements are: autonomy, sense-making, emergence, embodiment, and experience (Di Paolo et al. 2009). In putting forward these five themes as the basic concepts for an account of cognition, this program sets itself apart from more loosely described "embodiment" theories. More so than the latter the enactive approach, while also taking embodiment as one of its basic axioms, pays particular attention to the interaction between the cognizer and her world. This is especially relevant to an investigation in the realm of the social, as we will see.[1]

Accounts of cognition that call themselves enactive do not necessarily share all of their assumptions. Differences based on respective basic premises can be delineated (Torrance 2005), in particular between the life–mind continuity brand of enaction (e.g., Varela et al. 1991; Thompson 2007) and the dynamic sensorimotor account of perceptual consciousness (O'Regan and Noë 2001; Noë 2004; Hurley and Noë 2003). The former is characterized by the five themes mentioned in the paragraph above. It aims to provide a story of what the mind is and holds that the biological organization and experience of the agent are central to his cognitive capacities. Another way to put this is that, for this school, "living is itself a cognitive process— a process whereby a living being creates and maintains its own domain of meaningfulness, in generating and maintaining its own self-identity as an embodied organism" (Torrance 2005, p. 359). The sensorimotor account, on the other hand, claims that perceptual consciousness consists in the exercise of knowledge of sensorimotor contingencies. That is, perception is a matter of exploring the environment in an active, engaged way, a process in which the embodiment of the cognizer and specifics of the environment play a crucial role. Perceiving, on this account, consists in exercising a set of sensorimotor skills. Another important difference between the two stories is that the latter is not concerned with developing

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[1] Even approaches that stress the interactive and embodied nature of social cognition (e.g., Gallagher 2004, 2008) are in need of further elaboration, specifically with regard to the precise role of interacting in intersubjectivity (De Jaegher 2009). The present paper is also in part motivated by these discussions.

an elaborated account of who the subject is, whereas for the former, answering this question is paramount for understanding cognition.

Despite their differences, these programs share important characteristics as well: first, in the way they attempt to understand cognition, they distance themselves from the classical cognitivist discourse for which cognition is the representation of the "outside world" and the internal manipulation of these representations and, second, they adhere to the idea that meaning is created in an "active," embodied–embedded engagement with the world in terms of value and meaning or *sense-making* in short. In the present paper, we aim to bring together aspects of both lines of thought in order to explicate what social perception is on an enactive view.

The paper has three main elements. Beginning with a brief overview of the principal elements of an enactive approach, we outline as simply as possible the major tenets of the perspective which will have an impact on how we consider social perception, social skills, and the self that deploys them. Following that basic outline, we examine the basic concepts of an enactivist account of the social—describing both the participatory, shared (rather than observatory and inferred) character of intersubjectivity, along with a detailed exploration of the idea of social perception and how it might relate to the idea of perception as mastery of contingencies. In the final section of the paper then, we examine some of the implications of this enactive account of social perception for our understanding of the self and embodiment and identify a key domain of research—cultural psychology—where much enactive thinking is already extant and which may provide a rich and fruitful source of understanding for enactive social interaction.

## Enactive perception

The enactive approach focuses on the interaction between an autonomous agent and its environment (Varela 1997; Di Paolo 2005; Thompson 2007). Cognition, perception, and action are three facets of the general process of sense-making, an agent adaptively coping with the challenges of embodied existence. In order to make clear the continuity of form between individual cognition and social perception, it will help to explicate some of the principles of the enactive approach and to outline the way in which the basic concepts of autonomy, identity, and embodiment give us an account of perspective and meaning making—how they give us an enactive account of perception and action.

Autonomy and naturalistic value

It all begins in autonomy. Recently, Thompson and Stapleton have examined the basis of enactive thinking in the concept of autonomy. Attempting to capture the principles of autonomy worked out by Varela (1979, 1997), they claim that an autonomous system has the following three key characteristics: The constituent processes of the system must:

(1)  recursively depend on each other for their generation and realization as a network,
(2)  constitute the system as a unity in whatever domain they exist, and

(3)   determine the domain of possible interactions with the environment (Thompson and Stapleton 2009, p. 24).

Autonomous systems are not organized or maintained by processes outside of the system, they are not tended by either a maker or a set of support services. In identifying the set of causes that produces any of the component processes of the system, you will always make reference to some other component process of the system.

Autonomy, vitally, does not mean that the system is causally closed (Varela 1979). Quite the reverse. Your body, for example, is an autonomous system, and it only manages to maintain itself by drawing in many things from outside of it (water, air, nutrients, and energy) and churning them up to continually produce itself. Autonomous systems are always running to stand still, as it were. But those elements brought into the system are drawn in by the processes of the system itself and their impact on the system is determined by the operation of those processes. Though the system is open to the world (and embedded in it), it governs its own behavior. It is the organization of the system itself that structures and constrains the manner in which interaction with the world occurs—which substances can be drawn into the processes of the system itself, how different perturbations affect its activity, and so forth. Its state at any given time is determined by the system's own activity rather than being set by the world around it in the way a computer is programmed or controlled by key presses. An autonomous system is, then, always in the process of producing itself and will continually digest the various materials required for that in its environment.

The enactive approach sees in autonomous organization the foundation for naturally occurring values (Thompson and Stapleton 2009; Di Paolo 2005; Weber and Varela 2002). Any autonomous system will require certain criteria to be continually met if it is to continue existing. If the organization of processes is disrupted or the necessary raw materials are unavailable, then the autonomous system ceases to be. At first glance, it looks like an autonomous system values its own conditions of continuity in about the same way that a falling rock values gravity, but there are a few key facts that must be borne in mind when describing autonomy as the naturalistic basis for value.

Firstly, the system produces the need in the very same processes as it produces itself. The details of a system's organization and component materials (what we will discuss in a moment as the system's *embodiment*) simultaneously determine the identity of the system and the conditions that it must maintain to continually produce itself. The conditions of continuity (or viability) are determined by the organization, not by the recognition of them by some outside observer nor by attribution.

Secondly, the system's organization is not a brief occurrence fortuitously and evanescently produced by the chaotic roiling of a dynamic world, like a face in the clouds. Once formed, it holds itself together not because of chance but because keeping its organization is precisely what the organization of the network does.

Embodiment, adaptivity, and life on the edge

Now, autonomy is important, but it does not yet get us all that we want. We might have a basis for an intrinsic value to a given system, but with that alone there are

only two ways in which the system in question can appreciate the state of its values—by continuing to exist or by disintegrating. Such a limited set of possibilities does not do justice to the complexity of meaning and experience that we consider a typical cognitive agent to enjoy. To address this issue, we can examine in a little more detail a further key ingredient to an enactive account of mind.

Di Paolo (2005) examines the considerations arising from the fact that "bare" autonomy does not give us much to work with in terms of value. Specifically, Di Paolo argues that, if a system is to be considered genuinely capable of appreciating the state of its values, then it must have some adaptive capacity. Adaptivity is defined in this context as a system's capacity to distinguish between activities that will drive it toward or away from disintegration and to favor the latter. The specific forms of adaptivity evidenced by the system will depend on its physical instantiation—its embodiment—as will the particular range of sensitivities and possible actions.

With the recognition of adaptivity as essential for the system's appreciation of its current state, we have all of the components for an enactive description of agency, meaning, and mind. Rather than just maintaining itself or disintegrating, we have the resources to describe ill-health and well-being, the dynamic trajectory of a system whose state is improving or disimproving, stressed or comfortable.

The autonomy of the system creates its values just as it creates the system itself continuously. Any such entity whose behavior is plastic in a manner that allows it to better maintain itself over time is not just a dynamic system but an agent—a system with intrinsic values whose behaviors are governed by those values rather than being dictated by the environment.

Within an enactive framework cognition—rather than being something that you carry with you in your skull and feed with information—is the entire ongoing relationship between an agent and its environment in which its values are adaptively maintained. Enactivists call this process "sense-making" (see Di Paolo et al. 2009; also Thompson and Stapleton 2009; De Jaegher and Di Paolo 2007). Sense-making is the autonomous organism's interaction with the world in terms of meaning and value. Because the organism is its own identity-generator (see below), its interactions with the environment have a direction: that of its continued existence, the maintenance of its identity. The organism regulates its couplings with the world on the basis of this, and thus, some aspects of that world have meaning and value for it and others do not.

The point being made in using the term sense-making rather than a more neutral phrase such as "adaptive behavior" is to make clear that the process is not a neutral or abstract one. The activities of the agent are arranged the way they are because the agent's values (grounded in its identity formation and maintenance) give meaning to events, to actions, to outcomes. What is a tangle of physical and chemical dynamics becomes a tangle of valued implications for the agent's identity.

Because of its adaptivity and its autonomy, the agent makes meaning in its interactions with its environment. As mentioned above, this is not attributed meaning, not a characteristic of our observations of the agent, but it is meaning for the agent itself, intrinsic to it and independent of us. The mind is not, in this view, something compartmentalized from or above the ongoing processes of living. There is a genuine continuity between life and mind (Jonas 1966; Thompson 2007). The biological autonomy and needs of a living embodied agent are precisely what

provide the ground for the creation of mind and meaning in the agent's interactions. The meanings are for the agent, experienced by the agent, precisely because the value of those experiences is their value for the agent.

The fact that the system is open to the world both in terms of digesting the energy and materials used in its continued self-maintenance and also in terms of being (obviously) subject to impacts and perturbations from outside of itself means that it is sensitive to its environment. But the particular aspects of its environment to which it is sensitive depend on the nature of the system itself. Many (if not most) events in its environment will have no real bearing on what the system does. The kinds of events and perturbations that have any significance for the system are determined by the structure and operation of the system itself—only those events that have some bearing on its values can become entangled with the system's own activities. The world with which the system interacts is, therefore, partly determined by the system itself. This is the concept of "reciprocal determinism" or "reciprocal causation" often referred to in the enactive literature, the basis of what Varela et al. (1991) call the "fundamental circularity." It is drawn from the work of Merleau-Ponty (1962, p. 430): "The world is inseparable from the subject, but from a subject which is nothing but a project of the world, and the subject is inseparable from the world, but from a world which the subject itself projects."

The system reacts to (and thereby imbues with meaning) those events in its environment to which it is sensitive by virtue of the fact that those events affect its values, its activities. Meaning arises in a relationship of implicature, ramification, and consequence for the values of an autonomous system (McGann 2007).

When all needs are met and values unthreatened, the world is simple and safe. When we are driven to the very edge of death or disintegration, the world is rich and dangerous. Most experiences are a ranging trajectory between these two extremes though we might spend a little more time in the rich and dangerous end of things—an autonomous system has to run to stand still after all, and the world cannot be relied upon to maintain it. An agent, therefore, is never unconcerned, never neutrally involved with its environment. The relationship is always loaded or skewed, perspectival rather than objective or abstract. The enactive approach must provide a clear account of perspective if we are to provide a general account of perception, social or otherwise.

Enactive points of view

Of most of what is going on around an agent at any given time, the agent is unaware. Think of the myriad flows and eddies in the air caused by your movements, your breathing. Think of the electromagnetic waves in which you are marinading day and night—television and radio signals that saturate the volume of space around you. Think of the slow oxidation of metals and the eons-long slide of tectonic plates, the rising and falling of the air pressure. All of these things are outside of your awareness because the kinds of things that you can be aware of have depended on the evolutionary history of things that affect the perennial values of an organism with a similar organization to yours. Among the various things of which it is possible for you to be aware, feel the clothes on your skin, examine the details of the texture on a nearby wall, the sounds that murmur in the background, what you become conscious of depends on your concerns, your interests, your intentions at any given time.

In short, your relationship with the world is always skewed to fit your values as an autonomous agent, maintaining yourself in the face of continuous perturbation by your environment. It is a key tenet of the enactive approach that if we are to describe your cognition—your sense-making—we must give an account not just of what is going on around you (the information available in your environment), but of your perspective, values, adaptivity, and embodiment that enable, drive, and constrain your interactions with the world.

To sum up this way of thinking, we need to define the final concepts which will play a significant role not just in this general enactive model of perception, but also in the account of social perception that we will go on to develop in this paper.

The first is identity, in the enactive approach taken to be that which is maintained by an autonomous system. Though the material substrate of an autonomous system may be in constant flux like the water in a waterfall, the organization is continuous. What is more, the system, because of its self-producing character, implicitly and intrinsically distinguishes between itself and its environment, thus producing and maintaining an identity. This is what the enactive literature refers to as producing and defining an identity as a unity within the domain in which it exists.

Identity is this defining and self-distinguishing aspect of an autonomous system and is thus the basis for the values of that system.

The related and in many ways complementary concept of perspective is the relationship that holds between an identity and its environment. That perspective is relational is vital to understanding the concept. Though it is "owned" by the agent whose values drive it, it can only be fully described or explained when both the agent and its environment and their interaction are included in the discussion.

Perspectives are given their character by the values and the embodiment of the agent (its adaptive capacities and various sensitivities) and create meaning by imbuing raw, embodied sensitivity with implication for those values.

Ultimately, then, for the enactive approach, the mind is a process of sense-making by an identity in perspectival interaction with its environment.

Enactive perception and skilled activity

The enactive approach to understanding the mind means that cognition is never conceived of as a series of progressive steps beginning when the sensory surfaces are stimulated and culminating in the triggering of peripheral muscle movements. Perception is a facet of sense-making rather than a distinct "input" phase. It must be understood within the context of valued, skilful activity. Perception is not structured by the character of bodily sensitivities alone (the light-sensitive retina, the pressure-sensitive skin) but also by the skills that the agent is enacting, deploying at a given time. It is in the conception of perception that the dynamic sensorimotor approach of O'Regan and Noë (2001; and also Noë 2004) and the enactive approach most closely align. O'Regan and Noë (2001) argue that vision is the deployment of certain sensorimotor skills, the conduct of action coordinated by a person's knowledge of the relevant contingencies of the situation.

Enactive theorists typically endorse much of this embodied, skill-based account (see, for example, Thompson 2007, pp. 254–256), but it is important to add that an enactive approach highlights the fact that the agent's values and autonomy are

structuring behavior at all times. The skills in question are not, and never should be, considered abstractly. They develop in the service of the embodied agent enacting its values, maintaining itself.

The concept of skill, despite its vital importance and load-bearing position within the enactive conceptual framework, has largely gone unanalyzed within the literature.[2] A full development of the idea is beyond the scope of the present paper. However, some preliminary comments are in order.

In discussing the (rather elusive) distinction between intellectual and performative skills, psychologists Rosenbaum et al. (2001, p.454) define skill as "an ability that allows a goal to be achieved within some domain with increasing likelihood as a result of practice." That skills arise through a process of adaptively engaging with the world (through practice) is perfectly consonant with the concept of cognition as an adaptive process of making sense of the world, but it is the highlighting of the goal-driven character of skills that is of interest to us here. It is an appreciation of this point that distinguishes the dynamic sensorimotor view from the enactive. Skills arise and are deployed in the service of the agent's goals, their values. For the enactivists, these are not goals somehow represented by the system, but rather instantiated in the very organization of the system—an adaptive organization that will grow more complex over time. The result is that every action and perception is infused with values of the agent to its very core; meaning is not added to abstract information or neutral sensation at some stage in an assembly line of progressive processing. What the world implies for the acting agent is not inferred through some process of logic applied to passively received signals from the environment. Meaning emerges from the agent's sense-making, a product of autonomy, adaptivity, and perspective.

The autonomy and adaptively developed skills of the agent are thus basic to the enactive analysis of cognition. Sensations and sensorimotor contingencies offer us little by themselves (something noted by O'Regan and Noë 2001 who require a mastery of sensorimotor contingencies), but with the regularity and structure they give, when contextualized within the complementary structure of the agent's valued actions, we get perception, cognition, and action. We are never simply "observers," never letting the visual world wash over us, but in the case of vision, for example, we are visually guided walkers, chess players, or art critics. The skills structuring the actions of the agent play equal part in their perceptions with the sensory aspects.

For O'Regan and Noë, vision involves a "mastery of the laws of sensorimotor contingency," while for Noë (2004), a mastery of the knowledge of sensorimotor regularities. The definition of skill by Rosenbaum et al. (2001) reminds us that skills are domain-specific, practiced, and goal-directed. What characterizes the domain of a skill is precisely the laws of contingency that apply within it—the collection of consequences that await given actions which can, given experience and adaptivity, be incorporated into the agent's processes of self-maintenance. In short, skills are

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[2] The principal analysis of the concept of skill in the literature is a debate over the use of the distinction between "knowing that" and "knowing how" used by O'Regan and Noë (2001). This distinction appears to have produced more heat than light on the matter, however, and its use has been questioned by several authors (e.g., Hutto 2005; Rowlands 2007). The particular form of the distinction has also been a source of confusion and criticism for Noë's (2004) dynamic sensorimotor account.

characterized by the specific contingencies that are involved in the interaction between an agent and its environment.

The perspective of the agent is formed at any time in part by the skills that adaptive agent has developed over its existence, skills which structure the very activity of perception (enaction) itself, not something that enriches otherwise passive reception of sensory information. There is no such thing as neutral or objective perception, only valued and perspectival interaction, structured by the goals of the agent and the contingencies contextualized within those valued actions.

It is our contention in this paper that social interaction, and sociality generally, while being unique as a domain of activity due to the presence of other dynamic and adaptive agents, follows precisely this value-laden contingency-structured form. The present paper is an explication of that idea and its consequences for understanding enactive agents and the nature of social cognition. Let us now turn to the social and examine how this value-imbued, embodied–embedded perception works in this domain.

## Social perception: participating in intersubjective contingencies

People can interindividually coordinate. Coordination is "the non-accidental correlation between the behaviours of two or more systems that are in sustained coupling, or have been coupled in the past, or have been coupled to another, third, system" (De Jaegher and Di Paolo 2007, p. 490). People can coordinate movements (Schmidt and O'Brien 1997), including utterances and eye contact (Bavelas et al. 2002), and even heart rate (Neugebauer and Aldridge 1998). Such coordinations have been described in connection with, for instance, affect regulation in infancy (e.g., Stern 1985/1998) or the constitution and use of interaction space (Scheflen and Ashcraft 1976; Kendon 1990). These findings about coordination have the potential to stretch psychology's generally individualist and cognitivist imaginations of social cognition.

De Jaegher and Di Paolo have proposed an account of intersubjectivity based on the idea of sense-making, the phenomenon of coordination, and a definition of social interaction. They suggest that the following two elements make up a social interaction: (1) the autonomy of the participants and (2) the autonomy of the interaction process. According to their definition, "social interaction is the regulated coupling between at least two autonomous agents, where the regulation [concerns] aspects of the coupling itself [and] constitutes an emergent autonomous organization in the domain of relational dynamics, without destroying in the process the autonomy of the agents involved (though the latter's scope can be augmented or reduced)" (De Jaegher and Di Paolo 2007, p. 493).

In order to see how this definition of social interaction expands into an account of how people can make-sense together and of each other, we need to further examine the concepts of autonomy and sense-making. We have described autonomy above as the organization that characterizes a self-producing system. A social interaction can also self-organize during parts its unfolding and thus constitute a—temporary—self-producing system. This may happen because a set of subprocesses self-organizes and thus maintains an overall self-organization. Such subprocesses can include

coordinations between movements and utterances of the participants (e.g., in eye contact, gesture mirroring, or intonation entrainment). Thus, interactors may coordinate at the level of their gazes, gestures, prosody, and so on. The kind of coordination that is most interesting in this regard is *interactional coordination*. (Another kind is external coordination, which is brought about by each system being coupled to the same third system.) Such interactionally generated coordination or coregulated coordination can happen at several levels, ranging from the entrainment of aspects of participants' movements to the coordination of intentions.[3] If such coordinations self-organize, we can say that, during the period in which this is the case, the interaction is autonomous.

Like in the definition of autonomy given above, an interaction often maintains this organization in the face of perturbations. In the social domain, this happens for instance when the interaction overrides individual participants' intentions. This is illustrated by situations in which you end up interacting even if none of you was planning to or you are unable to stop interacting even if everyone would like to. When participants are not interested in interaction and would rather carry on with other business or they would like to end an interaction and actively attempt to bring this about, this constitutes a precarious situation for the interaction. When they are nevertheless not able to avoid or end the interaction, the interaction as a process exhibits resilience in the face of these perturbations. Of course, it is generally possible for either of the interactors to undertake something that will break the autonomous coordination. For instance, in the case where two people meet on a narrow road and end up in front of each other, mirroring each other's steps for a while, when what they each initially intended to do was to just walk past each other, one of them can say "after you." This breaks the unintended coordination and each can return on their individual path.

An interaction process does not have to be continually autonomous. It can take on a "life of its own" at some point during its course, but does not have to remain so all the time. Social interactions fluctuate between highly organized (low-dimensional) and less organized (high-dimensional) states, being sometimes autonomous, sometimes determined by the participants. These fluctuations are bound to happen in a process that emerges between already autonomous systems. It is precisely this complex interplay between the different autonomies—those of the individuals and that of the interaction process—that is central to the different manifestations of intersubjectivity (understanding each other, negotiation, fighting, love, group dynamics, trust, *amae*, aggression, responsibility, making and transforming meaning together, tact, language, perspective-taking, misunderstandings, and so on).

De Jaegher and Di Paolo's argument about how interpersonal understanding works is straightforward. They propose that, if people can coordinate with each other through and in movement, and their animate movement forms an essential ingredient of sense-making (cf. Sheets-Johnstone 1999), then people can participate in each

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[3] This theoretical proposal about coordination in social interaction needs empirical corroboration. Certain is that dynamical systems analysis will be part of the toolkit and that we need to find a way to delineate the relevant "units" to be correlated. The dynamics of coordination in the interagent domain are already being studied, for instance, by Di Paolo (2000), Vallacher et al. (2005), and Auvray et al. (2009). Although discussion of such work would take this paper beyond its scope, we emphatically agree with our reviewer who suggested that more work is needed in this direction.

other's sense-making. This happens when coordination structures in the interaction affect individual sense-making and coregulations of intentions, areas of concern, affect, and so on occur. De Jaegher and Di Paolo (2007) propose that participatory sense-making opens up potential new ranges of sense-making for each individual and can allow each to do things they could not do outside of this particular interaction. The fact that the interaction process can take on a certain autonomy implies that responsibility for what happens may not always be easily attributable to either one of the interactors.

Social perception and social skill

Something still lacking in the participatory sense-making story is an account of social skill. We believe that this issue is closely related to the question of what social perception is—our main concern in this paper. Why? According to the sensorimotor approach to perceptual consciousness, perception is action and action is perception. This extends to social perception, which can be equally conceived as action in the interpersonal domain. If perception is the skilful engagement with the physical world, social perception is the skilful handling of social situations. In this paper, we propose that social perception is the capacity to participate in social or self–other contingencies.

In order to characterize our understanding of self–other contingencies, we first turn to research on social interaction in infancy, what is referred to in the literature as "primary intersubjectivity," and which Gallagher (2001) has argued forms the basis for social interaction throughout life. Reddy et al. (1997) describe primary intersubjectivity as the mutual regulation of affect and attention. Children, on this view, are not idle recipients of parental activity but are themselves engaged in that activity. Bateson (1979) describes children as collaborating in patterns of "proto-conversation," exchanges of motion and vocalization that serve the mutual regulation. To this end, the subtle timings of the interaction are noted and important for both the infant and the adult. Murray and Trevarthen (1985) showed that no matter how positive and expressive the mother's behavior to her infant child, if that behavior is not modulated to account for the child's own activity (as, for instance, if it is recorded and shown to the child on video), the child shows signs of agitation and distress (such signs are not shown even if the mother is interacting through a video-link, so long as actual timings of responses and eye contact are not distorted). Murray and Trevarthen (1986) showed that the mother is equally sensitive to such distortions of the communication channel. This removes support for the idea that truly mutual interaction between infant and adult is an illusion arising out of the adult's attributions of communicative intent to the child. Trevarthen (1998, p. 34) concludes that "…normal, happy, protoconversational games need immediate sympathetic contact".

Infant intersubjectivity is essentially a primary empathy, an emotional foundation to communication and personal interaction. Emotions are not just about state-regulation or self-regulation (Trevarthen 1998). Infants do not just emote when hungry, tired, or in pain. Their emotions also regulate their interactions with others, interactions that are not just responses to but intentional engagements with another agent. The contingencies of social interaction are thus largely emotional or affective

in nature. Action and perception in the social domain are a matter of coordinating the behaviors, emotions, and intentions of the agents involved, in and through the coordination of movement (including utterances). Social skill then is the mastery of these social contingencies. Being able to structure our actions based on how our own and others' emotions change and affect them, and the complementary knowledge of emotional dynamics in other people, is a very significant part of social skills and the social domain of activity.

This emphasis on the emotional character of social action highlights that social perception is different from ordinary physical perception in three important ways. Firstly, in the social domain, you are not perceiving a "what" but a "who"—a subject, not an object. Secondly, this "who" is herself a perceiver and, moreover, a perceiver of you. She participates in the very same interaction in which you perceive her. Thirdly, the contingencies of social interaction seem to be less closely tied to the fine details of embodiment than is the case in physical perception. Social contingencies are plastic and this makes them amenable to negotiation between participants in the interaction itself. Let us take each of these differences in turn.

In a social interaction, you are interacting with another subject. (At least, this is the case as long as the interaction satisfies the first criterion of De Jaegher and Di Paolo's definition, namely, that each interactor maintains his autonomy. As soon as one of them loses it, the interaction stops being a social one and you might as well be interacting with an object or tool.) Moreover—and this is the second difference—a person can, by his actions, change you too. Of course, this happens with objects as well. If a beam falls on your head, you will not be the same afterwards. But the beam does not intend to change or influence you, whereas a person often does. In interacting with persons, we are interacting in the first place with their intentions, not just with their physical properties. In fact, social interactions are hardly ever merely physical (actually, this is also the case in "physical" perception, as perception is always value-laden, but our perception–actions with objects are laden with mostly different kinds of values). The traditional account surmises that it is our "cold" perception of the human figure's physical features that, when put through the right finely tuned mechanism, leads us to understanding the thoughts, feelings, desires, and beliefs hidden inside them. On the basis of the perceived drops of water on a friend's cheeks, the downcurled corners of his mouth, and the dullness in his eyes, we deduce that he is crying. But on the approach we are investigating here, we immediately engage with a person's emotions and intentions and through this engagement understand, perceive, and influence them. Contingencies of action are not simply sensorimotor, but social and personal. We refer to them as self–other contingencies.

Finally, the presence of two intentional subjects in social interaction gives the entire situation an even more dynamic character than coupling with the physical world. Certainly, sensorimotor contingencies are at play in interactions between people. After all, you interact with them through your sensorimotor apparatus. Indeed, people interpersonally coordinate their movements, utterances, and so on, and this is a sensorimotor interaction. But whereas our interactions with objects rest on fixed regularities, interactions with other agents can be far less predictable. When you move your eyes around an object in a certain way, you may be able to tell whether it is a bar or a cube. When you move your eyes around a person, you may

be able to tell whether they are a man or a woman, but you may also dramatically change your social relationship with that person. And the way they move their eyes around you will equally transform the relationship. These transformations are dynamic and negotiable. For instance, the very same eye movements over the very same body, done when the two first meet, might destroy their relationship before it begins. But done later on in an interaction, it might add fuel to an already lighting fire.

Asking someone their name in a bar, for example, is not a mere request for information but a social action which begins a subtle dance coordinating not the bodily movements or available information, but the relationship between the people involved—their identities, their selves. Transforming that relationship is done in a participative, shared process structured by the people's values, their own perspective on the situation. Our perceptions of other people, apart from being imbued with our values, are structured by the activities in which we might both participate—flirting, bargaining, commanding, theory building, hanging out—and may change over the course of the ongoing unfolding of these activities.

It is important to also stress that, even though interactions with others can be flexible, they can also be rigid. Inflexibility may manifest for instance in relationships between people, i.e., when there is a history of interacting with each other. For example, Granic has investigated how the relationship between parents and their teenage children can be stuck in a pattern of hostile interactions, even if all parties want to put a stop to this trend. She suggests that interactions and their development (and the development of the participants) are interdependent and that real-time interactions between people can form a system that is not reducible to its constituent parts (Granic 2000).

Enacting social skills

So what is a social skill on this account? Social skill is not a purely individual feature. At an individual level, social skill can be described as the plasticity to deal with the regularities (and also the irregularities and surprises) of the social domain provided by the actions of others, who may each be very different from one another. This plasticity, though in part individually determined, is also determined by the process of interaction.

In order to illustrate this, let us take a look at the well-known literature in developmental psychology on the *detection of social contingencies* (Gergely and Watson 1996; Nadel et al. 1999). Gergely and Watson hypothesize that "human infants are sensitive to the existence of contingencies between their behavior and environmental events" (Gergely and Watson 1999, p. 101). This is why they developed the idea of a module that can detect such contingencies. The assumption is that contingencies are features of certain stimuli, and therefore, out there to be detected and perceived. Objects in the infant's world either react to his motions with a high contingency (moving immediately after a movement of the infant, for instance, an object that is kicked by the infant) or with a lower contingency (moving at a slight delay, as does another person).

We want to make clear in what way our approach differs from this. If the contingencies in Watson and Gergely's view, as features of certain stimuli, are out there, the question to be asked is: Where do they come from? On the enactive,

interactive account of perception, it is more accurate to say that contingencies are not features of an object, but characterize an individual's *interaction* with a certain aspect of his world. As such, social contingencies are in the first place processes that individuals themselves participate in and construct. Social contingencies are features of social interactions, not of objects perceived from a distance to then be categorized, e.g., as living, social, static, or otherwise. This idea is also illustrated in Murray and Trevarthen's research, already mentioned above, which extended the still face experiment and, in our view, shows that, as soon as interactors cannot participate anymore, but are faced with for instance a recording of their partner's previous behavior, it is not possible to mutually engage anymore. Infants can indeed distinguish between contingent and noncontingent stimuli but they do this through participation rather than through the use of a dedicated cognitive module.

Intersubjective contingencies

De Jaegher and Di Paolo's (2007) enactive account of sociality removes a double screen of inferences from between the agents in a social encounter. Agents do not interact by proxy—transmitting information out into the world through facial expressions, vocal utterances, and bodily movement in the hope that the others will be able to put the pieces together and understand them, while struggling with the same jigsaw from them. Values and actions become coordinated, or fail to, in a direct manner, as agents participate in the cooperative (or competitive) production of meaning. Note that this also entails a different assumption about intentions from the traditional view. On our account, intentions are not hidden away and static, needing to be carried from head to head. Instead, we conceive of intentions as accessible and susceptible to change through embodied interaction.

Participative sense-making in essence creates a new domain of interaction between an agent and their environment, a social domain whose landscape is negotiated, continually evolving at a rate dramatically higher than the "merely" physical environment. Nevertheless, physical and social perceptions remain very similar in form. Value-driven agents are perspectively engaged and perception, action, and cognition are structured by the affect-laden self–other contingencies present in (in fact, created in) the interaction.

A subject is not fully constituted outside of the interaction, independently of it. A subject, instead, is partly constituted in and through the interaction. A subject in interaction, a participant, also does not fully constitute the interaction. The other has to cooperate, and so, in a sense, does the interaction process. Social skills involve in part acting through socially constructed norms and practices. In deploying such skills, we effectively produce contingencies between ourselves and others and explore the social landscape through a mastery of them. Particular interactions will be a product of the perspectives of both interacting agents and their values and the particulars of the social practices through which they are engaging with each other. The commitment of both (or more) parties to those social practices provides a certain stability to the interaction, but also ensures that our autonomy is transformed, structured, or limited.

Social skill itself is not only a mastery of the contingencies extant in social norms and practices, therefore, but also a mastery of negotiation. Such existing practices are

coordinated in interaction with other agents rather than simply acted out without sensitivity to the actions of the other. Social skills involve a mastery of mutual coordination, not just a mastery of social sensorimotor contingencies. The contingencies in any given interaction will not just be a set of "standard" sensorimotor ones governed by social norms, but contingencies which arise and transform dynamically due to the values and skills of the other person with whom we are interacting. We do not simply perceive and act on, but *socially interact with* other people.

The social, therefore, has much to tell us about the nature of the individual, and the enactive approach, which makes much of the continuities of mind (from life to cognition, from self to other), has another continuity to offer—from individual to society.

## Social contingencies, cultural psychology, and the self as perspective

An agent's perspective is given structure by the skills it deploys. Skills are the means by which the agent achieves its goals in a given situation, by meshing its own behavior with the set of contingencies in that situation. The contingencies of social interaction are partially negotiated in each interaction because they depend on the interacting agents' own behavior, their emotional responses, their intentions and goals on that specific occasion. The social domain is, therefore, challenging in a way that physical activities are not. These negotiations, however, are never begun from scratch. Some contingencies in social interactions are standardized, settled during a long process of enculturation. The culture we inhabit provides social practices, rituals, grammars, narrative tropes, and social mores into which a person is inducted in the course of their development.

An enactive approach to social interaction will need to acknowledge and analyze the various social means by which people negotiate and participate within shared meanings. Thankfully, though, this enterprise has already been ongoing in cultural psychology (see Bruner 1990; Benson 2001). Bruner (1990) describes cultural psychology as a project to understand how human beings make meaning (he contrasts it with computationalism, an attempt to understand information processing). In this, the approach shares much with the enactive perspective and with social enaction in particular.

Cultural psychology has extensive studies of the ways in which societies and communities develop and sustain narrative practices, standard genres, and stories which help structure social interaction and the management of our places in various cultural or societal networks [for example, see Harré's (1997) examination of personhood; Nelson's (1996) studies of language and narrative skills in development; Bruner's (1990) discussion of the way in which narrative is used by a family group to negotiate shared meaning and, in particular, emotional responses]. It incorporates social constructionist and developmental approaches to psychology and provides us with studies on the potency of narrative, grammar, and collective practices in joining with and participating in shared meanings. Acknowledging this work means that a social enactive approach is not developing into a void. Rather, social enaction provides an overarching framework that makes clear not only how cultural psychology might relate to biology and autonomous systems, but how the two are

continuous with one another. Culture is not stapled onto autonomy and agency, but is intrinsic to their development and operation. The approach gives to the mind sciences a coherence that is both scientifically and humanistically satisfying. The relationship between the various facets of subjects as biological entities, meaningful cognizers, socially engaged, and culturally embedded agents can be acknowledged and accounted for without being crassly reduced, eliminated, or ignored.

Work within the domain of cultural psychology, then, can aid us in explicating the form and function of social contingencies and the dynamics of social interaction. For the enactive approach, mastery of these social contingencies involves developing and deploying skills that help achieve, maintain, and transform the identity of an agent in social contexts.

In the enactive literature, an autonomous system is often described as instantiating a "minimal self." The fact that this self exists is what grants the interactions between the system and the world meaning. The self is the principle of coherence of the cognitive process. As noted in the discussion of autonomy and adaptivity above, however, identity alone is the basis for intrinsic value, but is not sufficient for the kind of rich forms of meaningfulness that we might understand as cognition. Di Paolo's (2005) arguments suggest that identity is necessary but not sufficient for cognition. We wish to draw a distinction, based on Di Paolo's logic, between identity on one hand and self on the other. While identity is the basis for value and meaning, the self is the coherence of values and skills of an adaptive organism that constitutes its perspective, the meaningful relationship between the organism and the world.

While identity provides the foundation for intrinsic value for the fundamental basis of a self, it is in the richness of the skilled, adaptive self that we encounter agency and cognition. In the case of physical perception, such as navigating the physical world, we are physical selves, embodied, dynamic, fleshy, and hungry. In the case of social interaction where we recognize and coordinate with other cognitive agents, we are social selves, personal selves—that is, we are people. The enactive approach shares with cultural psychology a fluid, dynamic conception of selfhood that depends on goals, intentions, and other people. The self that we discuss in more generic contexts—the idea of "who we are"—is precisely that set of skills that enables us to engage with, negotiate with, and interact with other people. In Western culture, those engagements have been standardized around the idea of a unitary and consistent center (sometimes explicitly labeled a "true self"). What matters, though, is that the idea is consistent enough to enable perception, cognition, and action within a given interaction. The personal self, in such a view, is an affective, lived, bodily set of skills we deploy to successfully participate in shared meaning in our culture.

From this point of view, the mutual regulation of affect in primary intersubjectivity is similar to an apprenticeship through which a child learns the structure of normal social interaction in their community. Through forming, learning to maintain and to act within social interactions with others, the infant develops the kinds of skills that they will need to participate fully, to make meaning as a member of their cultural or social group. Among other things, this means that the child develops a personal self.

The contrasts between the enactive approach to social contingencies and that of Gergely and Watson (1999) have already been noted. The emphasis on the dynamic and continually negotiated character of social contingencies in the present paper

would appear at odds with the kind of standard or stable forms of contingency that are formed in a child's infantile apprenticeship of social interaction. This conflict is only apparent, however. While standard modes of action and forms of activity are certainly extant within a culture, they are never simply acted out, rigidly adhered to within a given social interaction, but modulated and customized, as it were, to fit the details of the current interaction. The child never experiences a fixed set of social contingencies, but is rather inducted into the ranks of skilled, fluid interactors.

Bodies in social interaction

Not even this initial apprenticeship is entered into ab initio by the child, however. It is a fundamental tenet of the enactive approach that all cognition is embodied, and that while bodies may constrain behavior to some extent, they also structure activity and afford certain actions—and interactions. Primary intersubjectivity is embodied at its core, a delicate and intricate dance of lived bodily, facial, and eye movements coordinating the actions of infant and adult.

We are physically present in the domain of interaction. Our lived bodies, in gross form and fine detail, are fundamental to the interaction—am I a man or a woman, adult or child? Where are my eyes looking? What are my hands and arms doing? How is my body oriented? These details, basic and subtle, express my lived-bodiness and pervade my social interactions.

My embodiment is an important part of my social self, but the physical aspects of the social domain are not all there is to it. The domain we explore as social beings is principally affective in character. The skills we deploy in these interactions are secondarily sensorimotor, contextualized as they are in social and cultural practices. Culture transforms our body from a physical mode of cognition, action, and perception to a social one where action can be shared, values coordinated. It is a dramatic alchemy that occurs through participatory sense-making and the acknowledgement of the agency of another. The implications of this fact for the enactive approach cannot be overstressed.

The enactive approach was inaugurated in the appreciation of the embodied mind (Varela et al. 1991). It is closely associated with an appreciation for the biological basis of meaning and value (see the significant literature on autopoiesis, taking perhaps Maturana and Varela 1987; Weber and Varela 2002; Di Paolo 2005 as points of departure). Its greatest impact on the mainstream of cognitive science has been through its influence on and support of research on the sensorimotor basis of perception [e.g., O'Regan and Noë's (2001) examination of vision, drawn upon by Thompson (2007) in his enactive account of perception, and Noë's (2004) slightly amended approach, which he terms "enactive," but which we have referred to here as dynamic sensorimotor]. Despite this deep commitment to the essential inclusion of bodily facts in our understanding of meaning and experience, the approach's deepest loyalties are to meaning and experience themselves. It is not the simple fact of its physicality and the constraints it imposes on cognitive activity that makes the body important, but that it instantiates and adaptively maintains the values of the organism. The body provides a basis for the agent's perspective, but that perspective cannot be reduced to biology (Di Paolo 2009, see also Thompson and Stapleton 2009). The agent's motivated, lived, skilful actions are our focus, constituting his

perspective. Though behavior can always be given a biological description, the actions of the agent occur in the domain in which the agent is skillfully engaged. In the case of social interaction, that is the social domain—related to but ultimately quite distinguishable from the physical.

## Conclusion

The account of the social advanced in this paper highlights some aspects of enactivism that have recently come under scrutiny, in particular the relationship between embodiment and cognition, and contextualizes those considerations within the social domain. Furthermore, new avenues of research have been opened through the development of the concept of social or self–other contingencies and the consonance of this enactive conception with the approach to understanding meaning making already extant in the cultural psychology literature.

Social enaction offers the enactive approach a clearer view of the self as the principle of coherence of skilled activity by the agent. This view holds the self as central to cognition, while allowing us to appreciate the manner in which it is partially constituted in and through interaction. There will undoubtedly be a range of implications for our understanding of transformations or pathologies of self that have had to remain beyond the scope of the present paper. Our account, for instance, makes the idea that autism is a kind of "mind blindness" ever more literal, given the manner in which social understanding is meaning-imbued perception (rather than inference to sociality based on perception). There may also be interesting implications for phenomena such as Capgras syndrome, a disorder in which a person holds a delusional belief that a friend, spouse, or other close family member has been replaced by an identical-looking impostor. Ratcliffe (2008) has recently described this disorder as a transformation of the relationship between a person and their loved ones, being simultaneously social, affective, and perceptual in character. This kind of approach to the syndrome would fit well with the way we have characterized social perception as social skill here.

Important challenges also arise for enactive theorists and researchers. The concept of skill is fundamental to the enactive theory and plays a foundational role in the description of the social advanced in this paper. It is still a poorly explicated concept within the enactive literature generally, however, and much work is yet to be done in teasing out the various aspects of embodiment, adaptivity, goal-directedness, and coordination of behaviors that will be needed before we have a description of skill with which we can feel satisfied. Further elaboration of this notion must take into account the role of sociality and be amenable to testing in empirical investigations.

Ultimately, an enactive understanding of sociality allows us to grasp both what social interaction shares with physical interaction and what makes the social unique. The enactive approach makes clear how the special character of social interaction arises from the same principles that structure our understanding of physical perception from an enactive point of view—autonomy, value, adaptivity, and perspective. The approach provides the concepts and framework to support an understanding of the social as genuinely social, rather than individual cognition where the content of thought happens to include other people.

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