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3 Making Sense in Participation: An Enactive Approach to Social Cognition

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Abstract. Research on social cognition needs to overcome a disciplinary disintegration. On the one hand, in cognitive science and philosophy of mind – even in recent embodied approaches – the explanatory weight is still overly on individual capacities. In social science on the other hand, the investigation of the interaction process and interactional behaviour is not often brought to bear on individual aspects of social cognition. Not bringing these approaches together has unfairly limited the range of possible explanations of social understanding to the postulation of complicated internal mechanisms (contingency detection modules for instance). Starting from the question *What is a social interaction?* we propose a fresh look at the problem aimed at integrating individual cognition and the interaction process in order to arrive at more parsimonious explanations of social understanding. We show how an enactive framework can provide a way to do this, starting from the notions of *autonomy*, *sense-making* and *coordination*. We propose that not only each individual in a social encounter but also the interaction process itself has autonomy. Examples illustrate that these autonomies evolve throughout an encounter, and that collective as well as individual mechanisms are at play in all social interactions. We also introduce the notion of *participatory sense-making* in order to connect meaning-generation with coordination. This notion describes a spectrum of degrees of participation from the modulation of individual sense-making by coordination patterns, over orientation, to joint sense-making. Finally, we discuss implications for empirical research on social interaction, especially for studies of social contingency.

Contents

3.1 Introduction…… ... 34
3.2 Enaction…… ... 34
3.3 What is a social interaction?…… ... 36
3.4 Making sense in participation…… 40
3.5 Implications…… ... 43
3.6 Conclusion…… 45

3.7 References…… ... 45

3.1 Introduction

A strange situation dominates contemporary approaches to social cognition. Whilst anthropologists and other social scientists – traditionally the investigators of social interaction processes – are not often interested in relating their findings to questions about individual cognition, psychologists and cognitive scientists seem generally not aware of, or take for granted, the importance of the interaction process for social cognition, and focus instead on individual capacities. On one side, the focus has been too exclusively on the interaction process, whereas on the other, the individual has been over-exaggerated. This situation needs to be re-balanced.

Our understanding of social cognition is developing fast. Recently proposed embodied accounts of social cognition receive a lot of attention, and rightly so. They go beyond traditional cognitivist explanations and emphasise the role of the body in our understanding of another's intentions. However, a drawback of many of these approaches is that the emphasis is still too exclusively on the *individual* body. In the enthusiasm for embodiment in the social realm the fact is sometimes overlooked that social understanding is crucially an *interactional* process. To social scientists, this may seem a trivial insight, but in cognitive science the importance of the interaction process is only beginning to trickle through the still very individualist net (see also [1]). An account of social cognition that can recombine the individual and the interactional is timely.

Most approaches, even those that are embodied and 'interactive', subscribe to an individualistic view of social cognition. We call this the *Rear Window* view. As a result, the question 'What makes an interaction social?' falls into a blind spot for most of social cognition research today. In this chapter, we bring together ideas developed in our recent work in order to shed an enactive light on these questions [2, 3]. This contribution extends the enactive approach to show that it can provide a non-individualistic basis for social cognition. We develop a definition of social interaction and discuss implications for empirical studies.

3.2 Enaction

The concept of enaction today is applied with a variety of different meanings, which nevertheless often overlap. However, it is necessary to clarify as much as possible how this term is going to be used, particularly if we want to extend it into a novel area. Francisco Varela and colleagues [4-6] have provided the clearest articulation of enactive ideas. In their writings we find a view of cognition as an ongoing and situated activity shaped by life processes, self-organisation dynamics, and the experience of the animate body. In this perspective the properties of living and cognitive systems are part of a continuum. When referring to the enactive approach, we mean the perspective based on the mutually supporting concepts of *autonomy*, *sense-making*, *embodiment*, *emergence*, and *experience* [4, 5, 7, 8]. For our purposes here, we focus particularly on the first two: autonomy and sense-making.

According to enaction, living organisms are the paradigmatic cases of cognisers. Their organizational properties are the departure point of the approach. One such crucial property is the constitutive and interactive *autonomy* that living systems

enjoy by virtue of their self-generated identity as distinct entities in constant material flux. An *autonomous system* is defined as a system composed of several processes that actively generate and sustain an identity under precarious circumstances. In this context, to generate an identity is to possess the property of *operational closure*. This is the property that among the enabling conditions for any constituent process in the system there will always be one or more other processes in the system (i.e., there are no processes that are not conditioned by other processes in the network – which does not mean, of course, that conditions external to the system cannot be necessary as well for such processes to exist). *Precarious* conditions are those where isolated component processes would tend to run down or extinguish in the absence of the organization of the system as a network of processes, under otherwise equal physical circumstances. Similar constitutive and interactive properties have been proposed to emerge at different levels of identity-generation, including sensorimotor and neuro-dynamical forms of autonomy [4, 7, 9-11].

In such a view, a cogniser is not seen as responding to environmental stimuli or satisfying internal demands, which are part of the traditional dichotomy between internal and external determinants of behaviour. The enactive approach gives the autonomous agent its proper ontological status as an emergent biological self instead of subordinating it to a passive role of obedience. The organism is an embodied and experiencing centre of activity in the world.

The notion of interactive autonomy implies that organisms cast a web of significance on their world [4, 12, 13]. An organism regulates its coupling with the environment because it aims at the continuity of the self-generated identity or identities that initiate this regulation. This regulative process provides the organism with a *perspective* on the world, which is inseparable from the agent being a centre of *activity* in the world [4, 7, 10, 12, 13]. Being a cognitive system means that exchanges with the world are inherently significant for the cogniser who engages in the creation and appreciation of meaning or *sense-making* in short. Like few ideas in the past, this naturalised dimension of significance strikes at the heart of what is to be cognitive.

Sense-making implies an inherently active engagement; it is an activity. This is in contrast to the view that organisms receive information from their environment in a more or less passive manner and then process it into internal representations, which are invested with significant value only after further processing. Natural cognitive systems do not build 'pictures' of their world (accurate or not). They engage in the generation of meaning in what matters to them and *enact* a world. The notion of sense-making grounds a relational and affect-laden process of regulated exchanges between an organism and its environment in biological organization. Binding affect and cognition together at the origins of mental activity, metabolism creates a perspective of *value* on the world. This idea has been defended by Hans Jonas [14] and elaborated scientifically in terms of the theory of autopoiesis [4, 10, 12, 13, 15].

Sense-making describes a more general aspect of the relation of the cogniser with its world than those more specific engagements often described as action or perception, which are in fact later specializations of the activity of sense-making. Both action and perception are forms of sense-making. Examples illustrating this point have been discussed in the enaction literature. The clearest illustration is given by perceiving the softness of a sponge [16]. This quality is not 'in the

sponge' but in its specific response to particular probings and squeezings by appropriate bodily movements. A particular encounter between an embodied 'questioning' and 'probing' agent and a 'reacting' and 'responding' segment of the world results in the perception of softness. Lawful co-variations in this dialogue between agent and world stabilise sense-making into the perception of an *object* (often not detached from its use). Movements are consequently at the centre of mental activity: a sense-making agent's movements – which may include utterances – are tools for her cognizing.

Based on these core ideas, what should be the central concerns of an enactive theory of social cognition? Previous approaches, including many embodied ones, have tended to shoehorn the whole realm of our social capacities into the problem of figuring out someone else's intentions out of our uninvolved individual observations of them – a *Rear Window* approach to the social. This removed cognitive problem is indeed an aspect of social cognition. However, it has unduly dominated the field at the expense of downplaying more engaged forms of interaction. This chapter aims to move away from a view that centres almost exclusively on individual cognitive mechanisms. In its place, it sketches the outlines of an approach that defines the social in terms of the embodiment of interaction, shifting and emerging levels of autonomous identity, and joint sense-making and its experience.

3.3 What is a social interaction?

The individualistic perspective that prevails in social cognition research has already been challenged in other areas of cognitive science, such as in active perception work in AI and robotics [17-19]. The main lesson to be drawn from such work is that there is no empirical foundation to the view that a cognitive system bears the weight of its cognitive performance on its own in an environment that is only contextual (and often abstract). On the contrary, engagement with environmental dynamical processes is more often than not the central part of the cognitive mechanisms that render performance possible. In other words, most of everyday cognition happens thanks to processes involving the dynamics of the agent/environment coupling. In social cognition research this situation should be most obvious. However we find that, paradoxically, empirical and theoretical investigations are still informed largely by a view that places the key to appropriate performance exclusively within the agent's individual cognitive mechanisms. Social interactions are often seen as abstract, disembodied, and non-dynamic (e.g., in snapshot views in which time-oblivious discrete actions are followed by discrete responses). Accordingly, social interaction is the contextual problem-space where a socially-capable individual solves the problems of social performance. The interaction process is hardly ever seen as part of the *mechanisms* that allow embodied social skills to unfold. Even work involving rich interaction dynamics (such as studies of social contingency or collaborative work [20]) is often interpreted in terms of the individual mechanisms that would be sufficient to give rise to the observed results. The conjecture is very rarely made that the observed phenomena may be generated by a combination of individual mechanisms – which may in themselves be insufficient – and the right interaction dynamics. We argue that the introduction of the interactive dimension will, rather

than complicate the picture, in many cases simplify the explanation of social cognition.

In order to progress beyond what we see as a limit on the development of a social cognition research that is properly social, concepts must be introduced that will allow us to uncover the complex structure of the social interaction process. Interactions are processes extended in time with a rich structure that is only apparent at the relational level of collective dynamics. This organization may be grasped using the notion of *coordination*. Once we understand how coordination arises, is sustained, changes and breaks down during social encounters, we will be in a position to make a connection between the temporal aspects of interaction and their consequences for joint and individual sense-making.

Several physical and biological systems exhibit coordination behaviour, even when their coupling (the amount of influence that a system's variables have on another's parameters) is weak. There are many paradigmatic cases of coordination in biology. For example, individual flashing behaviour in a species of firefly in Southeast Asia is synchronised at the group level through the visual influence of the collective flashing pattern on the individuals [21]. Countless systems coordinate when coupled collectively and the phenomenon has been heavily studied in physics, mathematical biology and dynamical approaches to cognition [22-25]. In social science, coordination between interactors has been extensively researched [26-29]. However, here we will not review this literature, but present a general and systemic analysis of the concept of coordination in order to understand how it impacts on social cognition.

An important and widespread feature of coordination (understood as the non-accidental correlation between two systems beyond what is expected of them) is its typical reliance on rather simple mechanisms of coupling. Coordination does not generally require any sophisticated skill even when cognitive systems are involved. It is, on the contrary, often difficult to avoid. This is shown in a study by Schmidt and O'Brien [30] who asked pairs of subjects to avoid synchronous oscillations while swinging a pendulum with their arms. They found that oscillations were uncoordinated if the subjects were not looking at each other, but presented a strong tendency to synchronize otherwise. We may conclude from such studies that there is no general need to postulate dedicated individual mechanisms to sustain coordination; it is rather a phenomenon that is likely to appear under a range of conditions if the coupled systems possess broadly similar properties. Coordination is also found to occur at multiple timescales [24] and adopt several forms, i.e., not just synchronisation but in general many cases of appropriately patterned behaviour, such as mirroring, anticipation, imitation, etc.

When it appears in coupled systems, coordination does not have to be absolute or permanent. This is significant when we consider fluid social interactions. Coordination may come in degrees. Kelso contrasts the ideas of absolute and relative coordination to illustrate this point [22]. When a child and an adult are walking together their natural tendency to walk at a different speed is somehow overcome and they often remain together overall. This can only happen if one or the other adjusts either the frequency of their step or the length of their stride without necessarily walking in synchrony. Such coordination is "far more variable, plastic and fluid … than pure phase locking" ([22], p. 98). In perfect synchrony (pure phase-locking) coordination is absolute (e.g. pairs of duetting tropical birds singing in antiphonal synchrony [31]). Transitions happen from one perfectly

coordinated state to another, or to non-coordination. By contrast, relative coordination presents a broader range of options as it is not defined by strictly coherent states but global trends (such as walking together).

The concept of coordination will help define what a social interaction is. We may think that two cognitive systems engaged in a coupling are already interacting socially. However, not all couplings between agents meet our intuitions of being social. For instance, heat transfer between two people in a crowd does not seem to exemplify the idea of a social encounter. Is bumping into someone on a busy road a social event? The structures of coordination that may arise during couplings enable a refinement of these intuitions.

We propose that a distinct feature of social interaction is its (temporary) tendency to sustain an encounter through patterns of coordination. A social interaction has self-maintaining tendencies. In contrast to other forms of coupling, coordination patterns can affect the individuals involved so that they would tend to sustain the social encounter. Several 'events' that arise during an interaction (for instance, phrases, movements, postures and gestures aimed at establishing or repairing turns in a conversation) have the effect of facilitating its continuation. And, crucially, these sustained dynamics in turn constrain the range of possible coordination patterns that are likely to happen due to the fact that interactors are susceptible to change plastically as a consequence of the interaction history. If an encounter installs this reciprocal directed link (from coordination onto the unfolding of the encounter and from the dynamics of the encounter onto the likelihood to coordinate) the encounter becomes a social interaction, forming an emerging level that is sustained and identifiable as long as the processes involved (or some external factor) do not terminate it.

This organization corresponds to the *autonomy* of the interaction. When there are coordination structures that help sustain the social encounter, and the encounter itself promotes coordination, this double link between encounter and coordination makes the collective pattern into an autonomous system according to our definition. This permits the identification of a specific interaction on the basis of the organization of its collective dynamics.

The autonomy of social interaction is typically a fleeting one. It is a property to be found even when social encounters last just a few minutes. During that period an encounter may exhibit the organization just described in terms of the reciprocal influence between coordination and global self-maintenance. Coordinated patterns between the agents sustain the interaction and the interaction in turn affects the individual behaviour of the agents and invests them with the role of interactors. An autonomous entity, the interaction process, emerges as social encounters acquire this operationally closed organization. For certain currents in social science this is not new; as Erving Goffman says, "a conversation has a life of its own and makes demands on its own behalf. It is a little social system with its own boundary-maintaining tendency" ([32], p. 113). An interaction constitutes a level of analysis not reducible, in general, to individual behaviours. Individuals co-emerge *as interactors* contemporaneously with the interaction. Considering how individuals are affected by the encounter leads to an additional requirement for defining the interaction as social: individuals as interactors must not lose their own autonomy in the process (even though the encounter may enlarge or diminish the scope of individual autonomy). This is a constitutive constraint necessary for defining the social. In its absence, if the autonomy of an 'interactor' were destroyed, the whole

process would reduce to the cognitive engagement of the other agent with his world. The 'other' would become a tool, an object, or a problem for his individual cognition, making the engagement indistinct from non-social ones. We can now see that, e.g., the event of bumping into someone on a busy road is by itself not yet a social interaction, because it does not necessarily establish a co-regulated coupling. It may of course initiate a subsequent interaction.

We propose the following definition of social interaction:

Social interaction is the regulated coupling between at least two autonomous agents, where the regulation is aimed at aspects of the coupling itself so that it 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).

To illustrate this, it is best to think of a situation where the individual interactors are attempting to *stop* interacting but where the interaction self-sustains in spite of this. Such a situation sometimes occurs when two people walk along a narrow corridor in opposite directions. In order to get past each other, they must adopt complementary positions by shifting to the left or to the right. Sometimes the individuals happen to move into mirroring positions at the same time creating a symmetrical coordinated relation. Due to the spatial constraints of the situation, such symmetry favours an ensuing shift into another mirroring position (there are simply not so many more moves available). In this way, coordinated shifts in position sustain a property of the relational dynamics (that of symmetry) that all but compels the interactors to keep facing one another, thus remaining in interaction (despite, or rather thanks to, their efforts to escape from the situation). In addition, the interaction promotes individual actions that tend to maintain the symmetrical relation. Coordinated sideways movements conserve symmetry and symmetry promotes coordinated sideways movements. While it lasts, the interaction shows the organization described above in terms of the mutual influence between the individual actions and the relational dynamics. It becomes clear that interaction is not reducible to individual actions or intentions but installs a relational domain with its own properties that constrains and modulates individual behaviour.

Our definition avoids the error of considering only the social aspects of the interaction and ignoring the individual elements in it. This is expressed in the condition that the autonomy of the interactors must be conserved throughout the encounter so that it may be considered a social interaction. As a consequence, the enactive perspective makes explicit the ongoing tensions between individual and social processes. This is in stark contrast to the methodological individualism prevalent in today's cognitive science [1].

Conceiving the social as a properly autonomous domain offers an important implication for fashionable theories of social cognition. Recent embodied proposals have made heavy use of neurological mechanisms, such as mirror neurons, for explaining social understanding. These explanations are agnostic about the role of the interaction as a structured and structuring process. They tend, in contrast, to concentrate on atomic correlations, for instance, the fact that a subject's mirror neurons fire both on performing a goal-directed action and while perceiving someone else doing it [33]. This style of explanation (which may have

its own problems; see [34, 35]) remains entrenched in the mindset of an individual attempting to figure out another. The question of how such a figuring out participates in and is itself shaped by coordination dynamics, in other words, the question of what is properly social about the whole situation, remains untouched. To transfer a correlation in social activity (by which an encounter manifests the presence of mutual understanding) into a neural correlation does little but re-describe the problem. A theory based on mirror-neurons could provide a snapshot of the mechanisms involved in the recognition of intentional actions. Whether such a recognition happens to be part of a coordinated or un-coordinated period in the unfolding of an interaction is not a question that can be addressed in these terms. It is by definition a relational question that only makes sense at the level of the collective dynamics, and it is at this level that social understanding is for the most part manifested.

An advantage of balancing the autonomies of the interaction and the interactors is that it allows us to understand how coordination at different levels shapes the interaction throughout its history. We can expect interactions that have been sustained for some time to have gone through repeated loss and recovery of coordination. Because of the durability of such interactions, interactors must have found themselves affected by such events in ways that allowed them to remain in interaction and occasionally finding better ways to sustain the process. There is an experiential counterpart to this: we perceive some interactions as getting easier and more fluid over time, with an increased feeling of connectedness. Recovering from a breakdown in coordination takes the role of a learning event whereby new contextual significance is acquired. There is an analogy here with the growth of an adaptive system, and this analogy provides a context for the question we now turn to: the transformation of sense-making in social interactions.

3.4 Making sense in participation

At the level of human communication, Merleau-Ponty [36] proposes a view that encapsulates what we propose for the more general case of sense-making in interaction. Arguing against a perspective on language as the sharing of representations, he emphasises the sense-making activity that underlies speech production. Speech, he says, is not set in motion by an explicit thought, but by a "sense-giving intention" which is a "certain lack asking to be made good" (p. 213). Speech, in other words, is not alien to the general logic of sense-making. Likewise, as an interlocutor, "my taking up of this intention is not a process of thinking on my part, but a synchronizing change of my own existence" (ibid). That is, I partake of the sense-making of the other as it becomes, at least partially and through a change in myself, my own sense-making activity. But how is this possible? In this section, we focus on this question by examining what the picture of the social interaction process presented thus far implies for sense-making.

People have looked at the connection between coordination and meaning, trying to map affect onto degrees of coordination [26]. Such a mapping may work in certain cases, but will not capture all the complexities of social cognition. Instead, there is a spectrum of relation between coordination in interaction and individual sense-making.

An individual cogniser is engaged in ongoing sense-making. This is an intentional activity that can become expressive in social situations through embodied action. Moreover, individual sense-making activities can be directly shaped by interactive coordination. In fact, they may themselves acquire a coherence through interaction. The proposal is the following: if the regulation that sustains a social interaction happens through coordination patterns and if those patterns affect the movements – including utterances – that are the tools of individual sense-making, then *social agents can coordinate their sense-making during interaction*. We call this process *participatory sense-making*: the interactive coordination of intentional activity affecting individual sense-making, whereby new domains of sense-making may appear that were unavailable to each solitary individual.

A spectrum of participation may be used to describe the different manifestations of the coherence that sense-making activities may acquire through coordination. At one extreme, sense-making remains largely an individual activity that is at most modulated by the interaction. Participation is minimal in these cases. At the other end, defined by the highest levels of participation, we find the process of joint sense-making, where intentional engagements become fully shared.

To illustrate how patterns of coordination and breakdown can enter into the shared meaning of an interaction, we may look at situations where the normal flow of an interaction is interrupted. Imagine the following dialogue taking place over a video conferencing line with an inherent delay (the implications of these kinds of glitches in communication technology have been studied by e.g. [37], from where we have adapted this example).

A: That was a pretty good presentation.
(Pause)
A: If you're into that kind of work.
B: Well, I suppose someone has to do it.

The pause, indicating to A a lack of a response from B when A was expecting it, prompted A to alter her initial praise (by justifying it in anticipation of a disagreement). B responds to this situation by expressing a similarly moderate view, even if at the start he may well have shared A's initial enthusiasm. This example illustrates that individual sense-making can become aligned in a direction not initially intended by the interactors and that this shift in meaning can be introduced by the properties of the interaction dynamics. It also shows that temporal coordination plays a crucial role in producing this adjustment of individual sense-making. Generally, sense-making in interaction fluctuates with changes in interactional coordination patterns over time.

Next on the scale of participation we have *orientation*: coordination of sense-making orients one of the interactors towards a domain of significance that was already part of the other's sense-making. For example, an interactor (A) calls the attention of an other (B) to what he cannot yet perceive. Say B is scanning the room to find something. The embodied expressiveness of this activity affects A's sense-making and she can now purposefully modulate B's sense-making by grabbing his attention and pointing to the lost object. Orientation can also be achieved through an extended temporal regulation of coordination. Stern describes a relevant example of how affect is regulated between mother and infant. An infant

may be aroused by his mother repeating a phrase such as 'I'm gonna getcha' while extending the intervals between repetitions ([38], p. 114). According to Stern, this "increases the discrepancy from the expected" for the infant and he becomes more and more excited (ibid.). The change of affective state is a case of orientation according to our view, which happens through the infant's coordinated engagement with the mother's tempo. This orientation happens thanks to the mother's attunement to the infant's responses as well as the infant's active role in sustaining the interaction dynamics. The mechanisms involved need not be more complex than the cases of relative coordination described earlier. As in the case of the adult and child walking together, mother and infant seem to undergo a process of phase attraction in their temporal behaviours and expectations. Such a hypothesis (which would need empirical verification) does not require the postulation of specialized individual mechanisms. The relational dynamics of the interaction, in this view, would in themselves be sufficient. Mother and infant would not need more than a capacity to enter into a temporal interaction with an external event or object. The mother intends to regulate the infant's sense-making (affect) and this makes it a case of orientation.

Another example of mother-infant interaction can illustrate *joint sense-making* (approaching the far other end of the scale of participation). Fogel describes a filmed session between a one-year-old and his mother ([39], p. 20-21). He studied this pair at weekly intervals since the baby's first month of age. Infants generally take objects from their caregiver earlier than they give things themselves, and here Fogel describes the first recorded event of giving by the infant, conveying how it is a jointly constructed event (what he calls a "co-regulated activity", p. 21). He describes it as follows:

"Andrew's action has two separate motor components. First, his arm extends (frames 1-6) and then he releases the object (frames 7-10). . . . Once Andrew's arm is extended his hand remains relatively stationary and gradually opens as mother's hand moves underneath his hand. The fork gently leaves Andrew's hand as it is pulled only by the slightest contact with the mother's moving palm (ibid.)."

In contrast to the infant simply dropping the fork in the mother's open hand, or the mother taking it from him, the giving is not an individual act. It needs the taking in order to be completed. Before reaching Fogel's own interpretation, if we assume for a moment that the infant is the initiator of the act, we realise that he must create an opening by his action that may only be completed by the action of the mother. The giving involves more than orientation of the mother's sense-making; it involves a request for her not only to orient towards the new situation, but also to create a sense-making activity that will bring the act to completion. In other words: to take up the invitation for an intention to be shared. This invitation may go unperceived and the act frustrated. But this is not the same as the situation in which the invitation is perceived and declined. The two situations are different from the perspective of the mother and this difference confirms that an invitation to participate is experienced as a request to create an appropriate closure of a sense-making activity that was not originally hers. To accept this request is to bring the 'other half of the act' into a successful joint activity.

When we remove the simplifying assumption that the infant intentionally originated the act, we open up the possibility for even richer degrees of

participation. The act may then indeed result from a "co-regulation" that emanates from previous aspects of the interaction, as Fogel proposes. A certain movement extending the fork in the direction of the mother, without yet intending to *give* it, may now be opportunistically invested with a novel meaning through joint sense-making. Latent intentions become crystallised through the joint activity so that not only the completion of the act is achieved together, but also its initiation.

Clearly, more sophisticated examples of joint sense-making than this act of giving can be found, especially as we move into the realm of linguistic interactions. It is possible to think of examples such as the creation of private nuances in meaning between intimate friends, the elaboration of joint plans, teaching, making music together, to name a few. Different cases may afford more complex forms of participation, but in all of them the meaning of an act will require the coordinated participation of the interactors to be realised. Moreover, it is likely that making sense in participation may at any point involve situations across the whole spectrum of participation sketched in this section.

3.5 Implications

The shift in emphasis towards the interaction process that we are proposing in this chapter will require more elaboration. However, it is possible to derive interesting implications from this perspective already, for instance for the development of social capabilities, including its impairments [40]. It also contributes to enriching the dialogue between science and phenomenology by providing theoretical insights that could ground, for example, the experience of alterity of an other. Some of these implications are discussed in [2]. In this chapter, we would like to focus briefly on some implications for the empirical study of social interaction, in particular mother-infant interaction.

Let us take as an example the question of how infants are affected by the contingency of interaction. Empirical evidence, such as Murray and Trevarthen's double TV monitor experiments and its successors [41-43], indicates that individuals rely on their partners to behave responsively in order to sustain their involvement in an interaction. For instance, two-month-old infants are able to sustain a fluid dyadic interaction with their mothers via a live double video link. However, when at some point they are shown recordings of their mothers that were generated previously in the interaction, they do not coordinate with the unresponsive recording (which maintains intact the mother's expressive movements). Instead, the infants become distressed and removed. This indicates that the infant's recognition of the ongoingness and contingency of the interaction plays a fundamental role in its unfolding. Early involvement in socially contingent interactions and its implied connectedness play a fundamental role in the infant's affective and experiential development [44]. An individual sensitivity to social contingency in two-month-olds is inferred from these results [43], suggesting that such a 'recognition' is necessarily performed by the individual – again a *Rear Window* move. Candidate explanations for such a skill would require the postulation of, for instance, an innate contingency detection module [45]. Based on the view presented here, however, we may question this implication for the general case. Conceivably, the coordination structures that sustain the interaction could themselves be part of the mechanisms that affect the infant negatively when

contingency is removed. Then the postulation of contingency detection mechanisms becomes optional. The infant's history of participatory sense-making is directly altered in the passage from the contingent to the non-contingent situation.

Recent empirical findings and minimal social interaction models have demonstrated how the collective interaction dynamics can explain differences in individual action in cases with or without contingency. Experiments in minimalistic perceptual crossing have been carried out using a one-dimensional virtual space where two participants can encounter each other and other objects through the use of mouse movements and a tactile feedback device [46]. Their task is to locate each other in the presence of distracting objects that replicate their exact shapes and movements. The experiments demonstrate that they are successful at this task. However, the results indicate that this is not achieved through an individual appreciation of contingent interaction (in fact, individuals are unable to distinguish the movement of another subject from the non-contingent object that imitates those movements). Rather, participants find each other thanks to the fact that the interaction dynamics make them avoid the situations where confusion could arise. Models of this experiment confirm this interpretation and extend it to other tasks (analogous to the double TV-monitor experiments) [3]. In these extended models, the discrimination between contingent and non-contingent conditions is achieved through the inherent higher stability of the double feedback between interactors in the contingent condition. This double feedback is enough to keep the interactors engaged even in the presence of noise or disruptions. However, in the non-contingent condition (where the other end of the interaction is a recording), this feedback becomes one-sided and external perturbations are now sufficient to throw the engagement out of joint and make the agent fully disengaged. Response to contingency depends on the live interaction, which needs both agents to regulate its stable continuation [3].

In these experiments and models, discrimination between contingent and non-contingent situations is achieved through the social process in the ongoingness of the interaction. *The dynamics of interaction are not simply the data that an individual must evaluate; they are an integral part of the evaluation process itself.* In general, there is no a priori reason to assume that explanatory possibilities for mother-infant interaction situations have to be either purely individual or strictly social. Presumably, appropriate explanations for socially interactive processes incorporate both elements and, thereby, lie somewhere along a spectrum defined by strictly individual evaluation of interactive information at one end and purely social modulation of individual dynamics on the other. What is called for is a methodology that will permit to map this spectrum by (1) determining the dynamical properties of coordination present in a given social interaction and (2) generating hypotheses regarding their contribution to the observed social behaviour. Such tools would also allow the exploration of the mutual shaping (as well as the tension) between individual and social dynamics (corresponding to the two autonomies we propose to be present in social interaction) as an intrinsic source of (de-)stabilisation of coordination. Interactive factors affecting coordination may be uncovered by their signature response to controlled perturbation methods.

The successful unpacking of the contribution of the social and individual dynamics may be more easily achieved in situations when they are in conflict. The

narrow corridor situation may serve as a model for a range of social interactions where the individual intention to steer the interaction in a certain direction actually prevents the realisation of this aim because of the emerging coordination patterns at the social level. This motif may prove useful for exploring the relation between the two autonomous domains.

These implications for empirical research not only test the validity of the enactive ideas we propose, but are themselves instrumental in the program of improving this account and framing not just new explanations but also new questions in the field of interaction studies.

3.6 Conclusion

We have described some implications of enactive ideas for social cognition. These ideas allow us to define the social domain in a way that is novel and, more importantly, operational. This is done in terms of the embodiment of interaction using the concept of coordination, in terms of the shifting and emerging levels of autonomous identity and in terms of joint sense-making and its experience.

The framework presented in this chapter establishes what it means to take the role of the interaction process seriously in a way that remains close to the experience of interacting. By elaborating on the embodiment of the interaction and its autonomy as a process, we confirm that the interaction process really is a proper subject of study. Moreover, the framework balances the autonomies of interactors and of the social process, and allows further developments regarding their interplay. In this way, it contributes to crossing the gaps between social science and cognitive science by bringing dynamical and embodied approaches into dialogue with experience and interactional behaviour.

3.7 References

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