

## **An enactive approach to the recognition of others and imitation of facial expression. The collective dynamics of perceptual crossing.**

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How in everyday life or through technical devices (such as Internet), can we have the impression of the presence of another subject, and under which conditions can we differentiate another person from an object or a program? Dominant approaches in the philosophy of mind consider that this is the problem of the adoption of an intentional stance: identifying the behavioural criteria which trigger the representation of the perceived object by an internal system of naive psychology (Premack, 1990; Cisbra et al., 1999; Meltzoff & Decety, 2004). This psychology poses many problems, in particular, how to account for the mutual recognition without falling into the aporias of the inclusion of representations: I have to have the representation of his representation of my representation of... his perception. Furthermore, in this approach, the recognition of another subject is only hypothetical, resulting from an inference based on well-defined perceptions.

However, in our everyday experience as well as in many phenomenological descriptions (e.g., Merleau-Ponty, 1945; Sartre, 1943) the lived experience of the presence of others seems certain and directly perceptive.

Within the alternate framework of ecological or enactive theories of perception (Gibson, 1966; Varela, 1979; O'Regan & Noë, 2001) the question is not much more advanced since the recognition of the presence of an intentional subject remains a decision which occurs after the perception of determined form and movements (Gibson & Pick, 1963). But how to give an account of a direct perception of the presence of others? How to account for the enaction of the presence of an intentional subject? Our hypothesis is that it is only possible in a situation of mutual recognition, a situation in which two subjects perceive themselves mutually.

For example, when we catch someone else's eye, it seems that we do not only perceive particular movements; rather, we see directly that an intentional presence is looking at us. In order to give an empirical content to this intuition, we conducted an experiment in the framework of enactive interfaces. In order to do that, we built a technical mediation allowing to control strictly the perceptive actions and the sensory input received by each subject. Sensory stimulation was reduced to the bare minimum (one bit of information at each moment) and the perceptive actions were reduced to the right-left movements in an unidimensional space. This minimalist experimental paradigm not only facilitates the identification of sufficient conditions for perception; above all, by reducing the sensory input to just one bit of information at any given moment, it forces the subjects to externalize their perceptive activity in the form of a trajectory that can easily be recorded, thus providing good data for analysis.

Pairs of blindfolded participants, placed in separate rooms, interacted through a network of two minimalist devices. Each participant moved a receptor field along a line via the displacement of a computer mouse. Two additional objects were introduced in this one-dimensional space: a fixed object and a mobile object with movements strictly similar to the partner's receptor field. Each time one of the subjects encountered an object or the partner's receptor field, he received an all-or-none tactile stimulation on his free hand. The task was to

click when they judged that the tactile sensations were due to having met the receptor field of the other participant. Results shows that, despite the absence of any difference in the sensory stimulation in itself, participants were able to recognize when the succession of all-or-none tactile stimuli they experienced was due to the active exploration of another participant rather

	Receptor field		Mobile object		Fixed object	
Percentage of clicks	65.9 %	± 3.9	23.0 %	± 10.4	11.0 %	± 8.9
Percentage of stimulation	52.2 %	± 15.2	15.2 %	± 6.2	32.7 %	± 11.8
Ratio clicks / stimulations	1.26		1.51		0.33	

than the fixed and mobile object.

**Table I :** Mean percentage (and standard deviation) of clicks, stimulation, and ratio between clicks and stimulation obtained for the receptor field, mobile object, and fixed object.

Within the alternate framework of enactive theories of perception our experimental study makes it possible to understand the recognition of another intentional subject as a characteristic pattern in the sensorimotor dynamics of the perception. These dynamics are essentially conjoint, the situation of mutual perception forming an attractor which has no spatial stability.

However, this solution is primarily collective, and seems to be beyond the grasp of each of the individual subjects. At the level of the discrimination of sensory input, the individual subjects fail to discriminate the stimuli which are due to an encounter with their partner from those which are due to an encounter with the mobile lure. We therefore have to ask how it comes about that each subject is in a position, by his individual access to this collective dynamics, to find the elements necessary to constitute his lived experience of the presence of the other. We will present the results of a new experiment showing that the subjects correctly associate the presence of their partner with the dynamics of perceptual crossing: the other appears in the guise of an object which is present but which nevertheless resists precise spatial determination. While maintaining their presence, the others' glance resists spatial localization. I perceive another intentional subject, not through the movements of an object, but rather directly as a perceptive activity; as an intentionality that has the power to affect my own perceptual intentionality.

We are now seeking to explore the content of this perceptual experience of perceptual crossing which has such particular properties. In particular, we propose the hypothesis that it is in this reciprocal dynamics that the fascinating phenomena of mimesis in emotional expression can occur. How is it possible to imitate the face of someone else that we see, with our own face that we do *not* see?! We will present another new experiment which provides the basis for a possible answer. We will only note that, in the enactive approach adopted here, internal structures such as "mirror neurones" have no explanatory value. It is the formation of such internal structures that is *to be explained*, and not the other way round.

I will conclude by remarking that we find here, on the scientific level, some explanatory schemas very close to what was discovered at the level of phenomenological descriptions.

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