I INTENTIONALITY

Bretono’s Thesis
Intentionality is directedness towards an object. All and only mental phenomena are intentional. It is a feature of mental states, which are irreducible to physical states (Bretono 1874).

The structure of intentionality: Subjects are related to contents via intentional modes
Subject – intentional mode – content

Two Traditions
Many (analytic) philosophers treat intentionality primarily as a feature of linguistic expressions and ascriptions of propositional attitudes contents (Chisholm, Quine, Churchland, Dennett...). Intentional contexts meet criteria for intentionality:
(a) failure of existential generalization and (b) failure of substitution of co-refering terms salva veritate

Philosophers from the phenomenological tradition emphasize the essential role of an agent’s body and sensorimotor capacities for cognitive development and the way in which these constrain and prescribe an agent’s intentional relations (Husserl, Heidegger, Merleau-Ponty...).

Proposed Theoretical Framework
Intentionality is treated primarily as a feature of goal-directed behaviour, perception and action being the “biologically primary” forms (Searle, 1983), allowing embodied agents to engage in intentional relations, or “comportments” (Heidegger) to some object or goal through their sensorimotor, affective, and cognitive activities. Thus the intentionality of propositional attitudes is ontogenetically and systematically preceded by more basic varieties. The structure of intentionality: embodied agent – intentional activity - object

Aim & Methodology
Differentiation and description of varieties of intentionality with increasing complexity in a hierarchy of levels, taking empirical data from developmental psychology and the cognitive neurosciences into account – without a reductionist impetus. The framework proceeds from the beginning onward, rather than from the bottom up or the top down” (Gallagher 2005): The varieties are characterized according to significant cognitive abilities manifested by human characters (Gallagher 2005): The varieties are characterized by the development and partial use of the imagination during the 24 months of age children show new intentional behavior and understanding like gazing following, social referencing, directing the attention of others and imitative learning. This requires that the child (a) understand other’s behaviour as intentional and their perception as attentional, and (b) to make some sort of self-other-equivalence and understand that there are alternative perspectives towards an object (Tomasello 1999).

Neurobiological Evidence
Functional bifurcation between two pathways in the primate visual system (Milner & Goodale 1995, Jacob & Jeannerod 2003):
(a) Visual perception: Semantic processing of visual information in the ventral pathway (V1→IT) underlying non-conceptual perceptual representations (“non-epistemic vs. epistemic seeing”, Dretske 1969). Brain lesion results in “visual form agnosia”, leaving visuomotor capacities intact.
(b) Visual Guidance of Action: Pragmatic processing of visual information in the dorsal pathway (V1→PPC) underlying non-conceptual visuomotor representations. Motor intentional activities like grasping depend on sensorimotor capacities and “constitute essentially bodily understanding of objects” (Kelly 2002). Brain lesion results in “optic ataxia”, leaving visual perception intact.

Sensorimotor “mirror neurons” respond both when a monkey performs a particular intentional action and when it observes another individual performing a similar action. Thus, such neurons seem to represent the planning and execution of an intentional action irrespective of the subject executing it (Rizzolatti et al 1996).

2 JOINT ATTENTION

The second level is characterized by triadic relations, e.g. involving the child, adult, and object to which they share attention. At 9–12 months of age children share intentional behavior with their parent (Brenna, 1995). At 12 months the child can now “hold in mind” representations of non-object entities such as other persons (Fredrickson, 1998). At 18 months the child can now represent relations among persons, relations among objects (e.g. a 3–4 months old infant being intentionally directed towards a toy, by visually perceiving or grasping and manipulating it, without understanding the relation in terms of perspective-taking or possession of mental states.

• Strong dependence on actual stimuli in current contexts of perception and action.

• Overt and covert structure is determined by the coordinated course of one containing a banana and as one in which the child (a) understands other’s behaviour as intentional and their perception as attentional, and (b) to make some sort of self-other-equivalence and understand that there are alternative perspectives towards an object (Tomasello, 1999).

Neurobiological evidence
Activation in dorsal medial prefrontal cortex (MPFC) is closely associated with the understanding of triadic social relations between two minds and an object (Saade 2006, Frith & Frith 2003).

3 IMAGINATION AND PRETEND PLAY

The third level is characterized by the development and partial use of the imagination during the 2nd year of life. Since children can now “hold in mind” representations of non-object entities and events, which can also guide their actions, their understanding of intentionality is partly independent from current experience. A two year old may perhaps pretend to see a particular event instead of the actual event (Baren-Cohen 1996).

4 THEORY OF MIND

At the age of four children show an explicit understanding of others as agents with intentional states and hold beliefs about another’s beliefs: they mentally represent other people’s mental representations and understand that their behavior is directed by what they believe to be the case rather than what really is the case (Freke, 1997). This condition of autism is often interpreted as a deficit with respect to this capacity (Baron-Cohen 1995).

III CONCLUSION

Intentionality is not restricted to propositional attitudes (and ascriptions of them). Rather, it can be shown that this ability develops gradually during infancy being preceded by more fundamental varieties of directedness towards objects. The most basic cognitive abilities are essentially embodied and tied to current experience, while higher varieties are characterized by an increasing use of the imagination as the power to represent non-occurrence objects – culminating in the power to represent the representations of others.
