Innate Neonatal Face Preference - An Embodied Phenomenon?

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Abstract

Faces appear to attract the attention of humans in an extra-ordinary way from birth [1] and throughout the rest of life. The currently dominant view in developmental psychology is that infants have some form of innate internal representation which preferentially matches face like stimuli. The debate surrounding this issue has become a canonical stage for issues such as the nature of innateness and the development of specialisation in the brain. This poster/presentation will introduce initial results from modelling studies of innate face preference conducted on the iCub humanoid robot.

The hypothesis under investigation is that an innate internal representation is unnecessary, and possibly insufficient for basic face preference in real world conditions. Instead we exploit the fact that the visual system is mounted on a face to make faces "special" to the robot. This fact enables the emergence of a visual "affordance", or sensorimotor invariance in the relationship between the viewer and the world, which we recently described in [2]. On this view, the reason why pairs of eyes pop out in visual scenes is that we see things with a pair of eyes. Other facial texture can also play a role. Eyebrows are known to be very important in visual-facial perception. We are testing this hypothesis in both real interactions with humans and with stimuli used to study human neonates. Performance is compared to a model based on the CONSPEC hypothesis of an innate face template [3].

A well defined theoretical framework has allowed us to make predictions regarding neonate face preference which we hope will motivate studies on neonates [4]. In addition to offering a way out of a somewhat unproductive 20 year debate in the literature on newborn face preference as to the form of this representation, this theoretical framework and the results it generates will bear on issues of innateness and the nature of cognitive and behavioural inheritance.

This study also exemplifies wider debates in cognitive science. Does cognition occur primarily in internal models of self and world which are somehow matched to the sensorimotor flux and used to control that flux from outside it? Or is cognition largely embedded in the embodiment of the agent and the form of the sensorimotor flux itself? Can the causative structure of behavioural and cognitive events and processes be functionally localised in space, such within a brain region? Or is a systems approach required to understand what may be fundamentally distributed networks of causality without a central controller? What is the appropriate way to use abstraction and concreteness in cognitive modelling? We will present our results in the light of their relevance for these broader discussions within the field, in the hope of showing how bridges between developmental psychology and developmental robotics may be built, a process crucial to the ongoing success of developmental cognitive science as an inter-disciplinary project.

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2. References

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