Morphological Resonance, Eye Contact and Inter-Facial Relations

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Our current research aims to address a niche emerging from studies of interpersonal co-ordination and synchrony in ecological psychology [1], minimalist studies of technologically mediated social interaction [2]. With regard to the former, there is a need for focused study of what mediates the couplings between individuals alluded to by behavioural co-ordination. With respect to the latter, the nature of the technological mediation minimizing the interaction provides a highly restricted interactive context which is unrelated to human embodiment. We are interested in the role of shared facial morphology in mediating a communication channel between individuals based on spatial resonance between similarly distributed sensor-receiver arrays (i.e. eyes).

A simple outline of this notion is introduced in [3]. Inter-facial morphological resonance offers a new framework for rapid, efficient face detection in the real world (it doesn't work well for photographs), a communication channel between interactors and a general contribution to the perception of "like me" relations in terms of world and body based "morphological computation". The basic notion is that the distribution of our two eyes can be used to low-pass filter the real world lightscape with a cut-off around inter-pupillary distance (IPD), simply by linear pixelwise combination of the stereo pair. In essence, the distribution/spatial frequency of the sensors offers an implicit sensitivity to similarly distributed texture in the world.

This direct "world processing" (as opposed to "image processing"), in combination with monocular high pass filtering, enables a band-pass filter whose bandwidth/response peak is centred on IPD and applies to *actual physical size* of stimuli, rather than the size of their retinal projection. Although we are currently focusing on the potential role of this mechanism in visual-facial cognition, the tuning to a particular physical size regardless of depth also offers a new and efficient approach to binocular depth perception without disparity calculation, which will be briefly touched upon. The physiology of lateral geniculate nucleus is particularly well suited to the necessary calculations, suggesting a possible role for the exquisitely ordered structure of this organ; integrating the stereo signals in a manner analogous to the integration of signals from sensor arrays .

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