The orientation preference of face identity recognition, why so horizontal ?

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Résumé

The recognition of individual identity despite variations in face appearance is a core and challenging function of the human visual system. Past evidence shows that humans are particularly sensitive to horizontal cues when identifying faces. It is generally assumed that face identification is horizontally-tuned because most of the energy (i.e., contrast) in the face image is contained in this orientation range, due to the horizontal structure of the main features and their configuration (e.g., eyes, brows, mouth). Here I present three studies aimed at further characterizing the orientation tuning of face identification.
The preliminary results of one study testing the identification of orientation-filtered faces presented with a tilt of 0∘(upright), 45∘ and 90∘indicates that horizontal tuning is face- and not observer-centred.
A second study aimed at characterizing the nature of the information contained in the horizontal range of the face stimulus. Past research has proposed the existence of two main sources of face-identity information: feature configuration and surface properties, the access to which is disrupted by inversion and contrast negation, respectively. Participants performed an identity recognition task using orientation-filtered (from 0∘ to 150∘ in steps of 30∘) pictures of familiar male actors presented upright, inverted, or negated. We modelled the inversion and negation effects across orientation using a Bayesian Gaussian mixed model. The inversion and negation effects both peaked in the horizontal range and showed strikingly similar orientation tuning profiles. This confirms that the horizontal tuning of face identification is due to this range facilitating the access to configuration; our findings further suggest that it is also the main carrier of the surface cues.
In a third study, we show that the rich configuration and surface identity cues conveyed by the horizontal range are also the most stable across viewpoints, which optimally supports viewpoint-tolerant identity recognition.
Altogether, these results indicate that the horizontal content of the face stimulus provides a privileged access to the configural and surface cues and optimally drive view-tolerant identity recognition.

Mots-Clés: Face Identification, orientation selectivity, horizontal tuning, inversion, negation

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