Social Inferences from Faces: Ambient Images generate a three-dimensional model

* Three experiments are presented that investigate the two-dimensional valence/trustworthiness by dominance model of social inferences from faces (Oosterhof & Todorov, 2008). Experiment 1 used image averaging and morphing techniques to demonstrate that consistent facial cues subserve a range of social inferences, even in a highly variable sample of 1000 ambient images (images that are intended to be representative of those encountered in everyday life, see Jenkins, White, Van Montfort & Burton, 2011). Experiment 2 then tested Oosterhof and Todorov’s two-dimensional model on this extensive sample of face images. The original two dimensions were replicated and a novel ‘youthful-attractiveness’ factor also emerged. Experiment 3 successfully cross-validated the three-dimensional model using face averages directly constructed from factor scores. These findings highlight the utility of the original trustworthiness and dominance dimensions, but also underscore the need to utilise varied face stimuli: with a more realistically diverse set of face images, social inferences from faces show a more elaborate underlying structure than hitherto suggested.
* 75% people in one poll believed that you can gain some information about a person’s character from their face (Hassin & Trope, 2000)
* Oosterhof & Todorov (2008) asked participants to infer traits from faces, then applied principal component analysis (PCA), which reduced the trait judgements made into two underlying dimensions: trustworthiness/valence and dominance. The authors argues that these dimensions are fundamental in first impressions because they relate to the appraisal of threat
* The trustworthiness/valence dimension concerns perceived intention to help or harm, and is based on an emotion generalisation; so that faces which appear angry are perceived as untrustworthy and therefore to be avoided, while faces which appear happy are viewed as trustworthy and approachable (Todorov, 2008; Zebrowitz, Kikuchi & Fellous, 2010)
* The dominance dimension, on the other hand, is based in perceived ability to carry out any harmful of helpful intentions. Underlying this inference are judgements of physical capability, maturity and masculinity (Fink, Neave & Seydel, 2007’ Oosterhof & Todorov, 2008)
* Here, our goal is to further examine first impressions of faces and, specifically, to test Oosterhof & Todorov’s social evaluation model with ambient images of different identities. Our ambient images are photographs of 1000 different faces collected from the internet, which have been deliberately chosen to display wide-ranging ages, expressions, poses, and levels of health, and include facial hair and paraphernalia such as piercings or glasses (Santos & Young, 2005, 2008, 2011). This range allows a strong test of the utility of valence/trustworthiness and dominance dimensions; as well as allowing other potentially important dimensions to emerge
* At present, the models largely only consider physical cues; yet, social or cultural stereptypes should also affect trait judgements (eg the wearing of glasses as indicating intelligence: Leder et al, 2011). Amore naturalistic sample should preserve more of this information, allowing us to determine if the dimensions can account for these stereotypes as well as physical features.
* Experiment 1 investigated how consistent the facial cues underlying trait inferences are, given a starting sample of ambient face images. To investigate this, averaging and morphing techniques were employed. Previous studies of this type mostly used images whose properties were tightly constrained.
* In summary, Experiment 1 sought to extend previous work by estimating how consistent are the cues that underlie social inferences of intelligence, trustworthiness, dominance and confidence; given a highly variable, ambient image sample. In addition to averaging images to reveal underlying traits, we sought to provide converging evidence for face-trait cues by using a morphing procedure to show that each trait could be varied across a continuum.
* Discussion 1. There were high correlations between the manipulated attributes and the participants’ ratings. Therefore, it seems that there are features in faces that do reliably cue social inferences. This consistency was not only true at the face level, but also held for the majority of individual raters.
* While the attributes were manipulated separately, there seemed to be similarities between the trait impressions, eg the trustworthiness and dominance continua appear also to change in sex.
* Experiment 2 aimed to test the Oosterhof & Todorov (2008) model using our large database of ambient images. As well as testing the two-dimensional model, our approach allows noel dimensions to emerge, and based on the various previous points regarding the importance of attractiveness in first impressions, this was an obvious candidate factor.
* The first factor appears to replicate the valence/trustworthiness factor (Oosterhof & Todorov, 2008) with high loadings of approachability, trustworthiness and degree of smiling. There is also high negative loading from aggressiveness. An appropriate factor name might thus be ‘approachability’. The third factor also appears to replicate the previous dominance factor (Oosterhof & Todorov, 2008), with dominance, sexual dimorphism (increasing masculinity) and age contributing as expected. Confidence and intelligence also load highly on this factor.. However, the second factor in novel: it has a high positive loading from age, and high negative loadings from attractiveness, health, and babyfacedness. Consequently, it appears to be a negative ‘age’ factor, with increasing age perhaps corresponding with decreasing sexual fitness. For ease of interpretation, this factor is henceforth described in inverse form, as ‘youthful-attractiveness’
* Discussion 2. The approachability and dominance factors found through our analyses replicate the valence/trustworthiness and dominance dimensions from previous work (Todorov, 2008). However, a novel dimension also emerged, best described as ‘youthful-attractiveness’. Moreover, this three-dimensionsal model clearly showed a better fit than the original two-dimensional model. The finding of an additional attractiveness factor is not entirely surprising, as previous studies did not utilise such varied stimuli: without this variance, this factor was perhaps not free to emerge.
* It is interesting that while in previous studies, attractiveness mainly contributed to the approachability dimension (following Oosterhof & Todorov, 2011; Walker & Vetter, 2009), here, it was powerful enough to emerge as a dimension on its own right. . Seemingly, when less constrained, the visual cues that make a face appear young and beautiful are substantially different from those that make it approachable or trustworthy (or indeed, dominant).
* In the Experiment 3, face averages were generated to cross-validate the model in a new sample. As described previously, the averaging technique (Tiddeman et al, 2001) allows one to visualise only the properties common to the majority of faces, in this case, those lying high or low on a factor
* The face averages can be seen to differ on the cues which correspond to the dimension of interest, thereby acting as a qualitative cross-validation of the current three-dimensional model.
* General discussion.