Face Perception: How many Dimensions are there?

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Introduction

Face perception research has traditionally used the bi-dimensional Stereotype Content Model (Fiske, Cuddy & Glick, 2007) to assess people's emotional and behavioral responses to others. These two dimensions, namely warmth (W) and competence (C), were soon joined by a third one that emerged from research in cognitive psychology: dominance (D) (Sutherland, Oldmeadow & Young, 2016). Other dimensions have received so far few if any consideration but appeared important in other areas of social judgment: trustworthiness, morality, openness, and neuroticism. But are these the only dimensions that rule face perception?

Hypothesis

There are more than the 3 traditional dimensions used in cognitive psychology to face judgement. At least a fourth one ought to be included: trustworthiness.

Methods

Participants and Recruitment

323 participants (50.8% male) from 18 to 80 years old were recruited for the study and 80 faces were used. Data acquisition was carried out mainly online. Paper format was also seldomly used to ensure that all subjects could participate to the study.

Procedure and Materials

Participants were each shown 10 faces at random, mainly from the 10k US Adult Faces Database (Bainbridge, Isola & Olivia, 2013) and were asked to rate them on 21 items (3 per dimension) on a 7-point Likert (Figure 1). The dimensions are: warmth, competence, dominance, trustworthiness, morality, openness and neuroticism (WCDTMON).

Factor Loadings

| | Factor | | | | | | | |
	1	2	3	4	5	6	7	Uniqueness
Control	0.92770							0.19329
Power	0.75823							0.37998
Impose	0.66501							0.41980
Competent		0.92323						0.21027
Talented		0.71822						0.37599
Intelligent		0.67185						0.42755
Friendly			0.88895					0.20463
Warm			0.83911					0.27034
Cooperative			0.47467					0.42691
Trustworthy				0.94093				0.14643
Reliable				0.71409				0.29098
Honest				0.41708	0.37327			0.43224
Humble					0.74993			0.37229
Patient					0.71318			0.45283
Fair					0.54769			0.44451
Original						0.83006		0.35145
Creative						0.76527		0.36837
Curious						0.47020		0.64595
Anxious							0.83003	0.30056
Hot Tempered							0.34339	0.70839
Emotional							0.34176	0.69088

Note. 'Maximum likelihood' extraction method was used in combination with a 'oblimin' rotation

Figure 2 : Exploratory Factor Analysis of the 7 initial dimensions

Pas 1 du tout d'accord	2	3	4	5	6	d'ac
Ce visage est souriant	○	○	○	○	○	○
Cette personne est talentueuse et efficace	○	○	○	○	○	○
Cette personne est compétente	○	○	○	○	○	○
Cette personne est chaleureuse	○	○	○	○	○	○
Cette personne est fiable	○	○	○	○	○	○
Cette personne est coopérative	○	○	○	○	○	○
Cette personne possède du pouvoir	○	○	○	○	○	○
Cette personne exerce un contrôle sur les autres	○	○	○	○	○	○
Cette personne est capable d'imposer ses vues	○	○	○	○	○	○
Cette personne est douée et intelligente	○	○	○	○	○	○
Cette personne est amicale	○	○	○	○	○	○
Cette personne est digne de confiance	○	○	○	○	○	○
Cette personne est honnête	○	○	○	○	○	○

Figure 1 : Sample of the items used to measure face dimensions

Results

Participants were recruited via social network to participate in a study on face impression (N participants = 323, M_{age} = 28.17, SD = 14.24; 49.2% female participants) and evaluated each 10 faces, for a total of 80 faces, which resulted in 3230 * 7 dimensions * 3 items = 68880 ratings of trait impressions.

The results of an EFA based on parallel selection suggested a 7 factors structure explaining 61.36% of the variance. Bartlett's Test of Sphericity gave a p-value < 0.001. The normed χ^2 of this model was 4.83. An EFA enforcing a 7-factor structure (minimum residual extraction and promax rotation) revealed that all items loaded on their expected dimension (Figure 2). Only the traditional 3 dimensions and trustworthiness had a sum-of-square loadings > 2, altogether explaining 40% of the variance.

In order to test this 7-factor structure, we performed a CFA. The normed χ^2 was 16.90. Parsimony of the model was reasonable (RMSEA = .07 with 90%CI [.068:.072]), reasonably different from a null model (CFI = .92), and the overall difference between the observed and predicted correlations was also satisfactory (SRMR = .07).
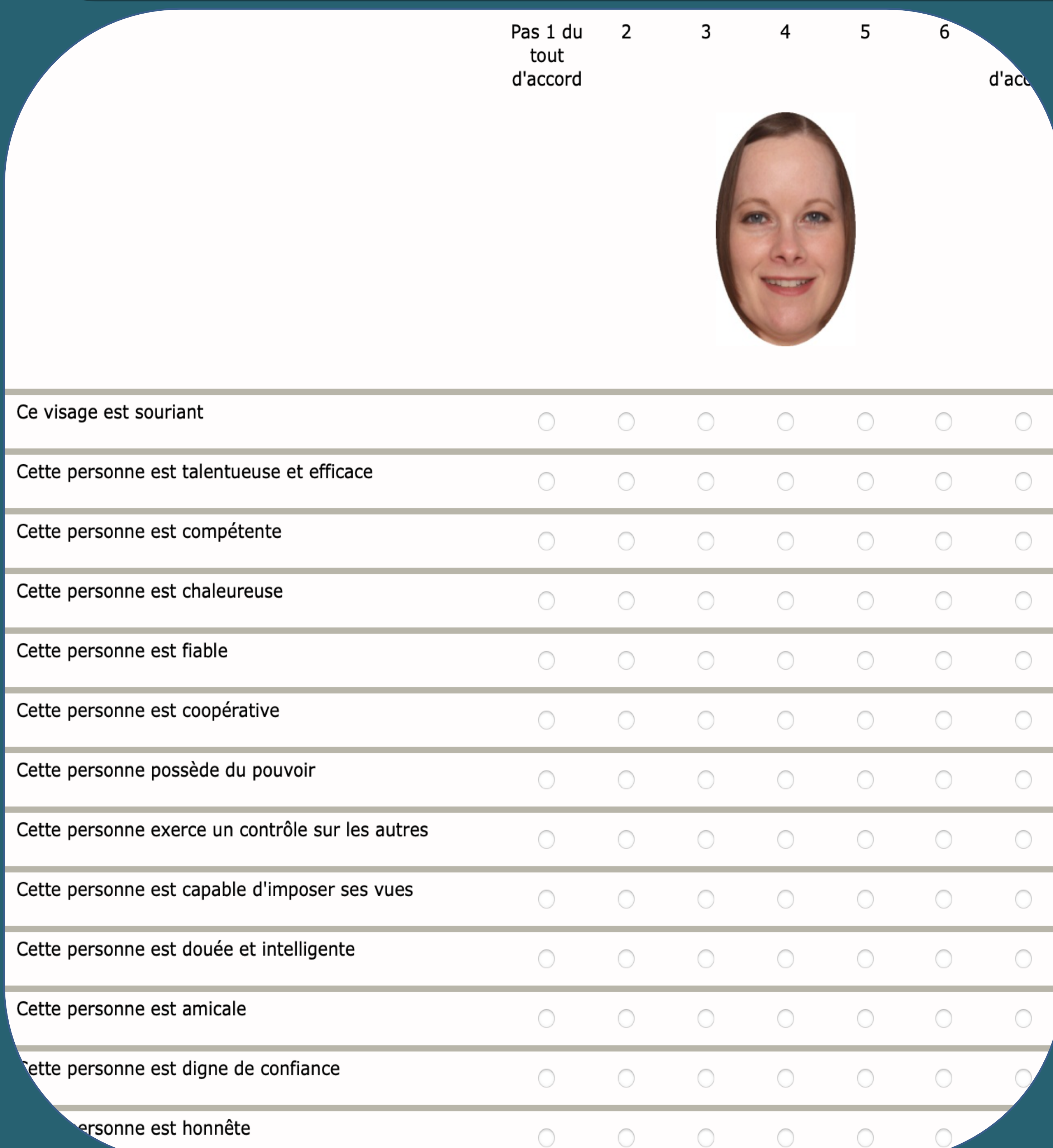
Discussion and Conclusion

There are indeed four main dimensions to face perception as far as we know: warmth, competence, dominance and trustworthiness.

- The other three variables did not appear in many different papers and were an attempt to explain the remaining 60% of the variance left.
- Morality, trustworthiness and warmth correlate so well with one another (0.66<r<0.7) that we could think that they are all unique parts of the same broader dimension. But they all relate to specific features of human personality and do not cover the exact same notions.
- We need more studies concerning the number of face perception dimension and their relation to each other.

Bainbridge et al., (2013). The intrinsic memorability of face images. *Journal of Experimental Psychology: General. Journal of Experimental Psychology: General, 142*(4), 1323-1334.
Fiske et al., (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences, 11*(2), 77-83.
Sutherland et al., (2016). Integrating social and facial models of person perception: Converging and diverging dimensions. *Cognition, 157*, 257-267.

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