Facial Identification in Observers with Colour-Grapheme Synaesthesia

Sørensen, Thomas Alrik

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Facial Identification in Observers with Colour-Grapheme Synaesthesia

Thomas Alrik Sørensen[1,2]

[1] Centre for Cognitive Neuroscience, Aalborg University
[2] Cognitive Neuroscience Research Unit, Aarhus University

Self-report Questionnaire

The three-part questionnaire was originally developed by Jon Brock (Macquarie University). 8 observers with colour-grapheme synaesthesia and 106 students from Aalborg University completed the questionnaire. The questionnaire describes a number of situations where participants responds to what degree specific statement fits themselves on a four point scale. The first part of the questionnaire addresses identification from facial information (29 items), the second part on reading emotions from facial expressions (15 items), and the third and final part describes emotional evaluations based on non-facial information (10 items).

Results

Answers in the questionnaire where quantified based individual respondent ratings (1 to 4) for each item. An analysis of variance demonstrated no main effect of conditions ($F(1.746) = 1.031$, $p = 0.35$), however, there is an interaction between the two groups and condition; $F(1.746) = 7.088$, $p = 0.002$.

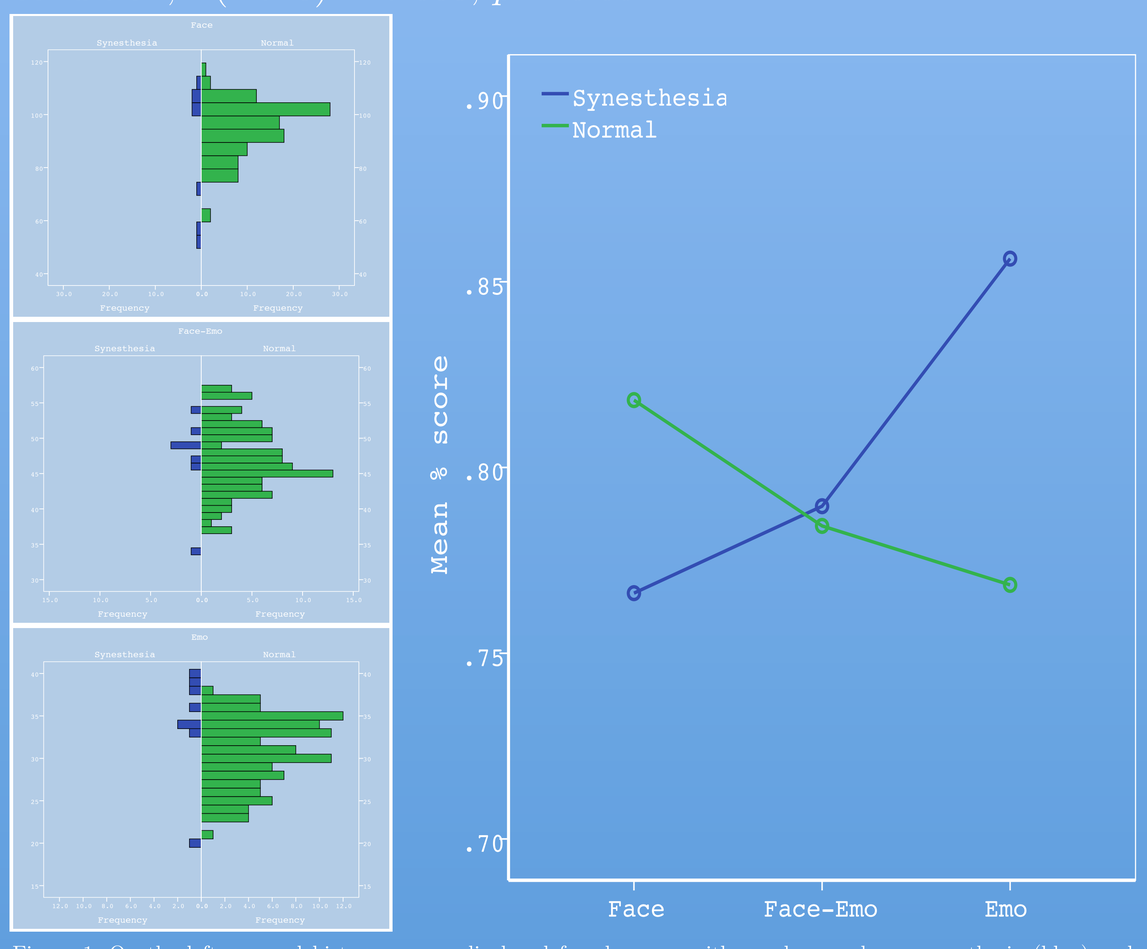

Figure 1: On the left grouped histograms are displayed for observers with grapheme-colour synaesthesia (blue) and normal observers (green), over the three subsections of the questionnaire; facial identification (top), extracting emotional information from faces (middle), and reading emotional information via other cues than faces (bottom). On the right the mean performance in the three subsections is displayed as a percentage of the maximum possible score.

	Face		Emo-Face		Emo	
Synaesthesia	88.9	25.09	47.4	5.93	34.3	6.30
Non-synaesthesia	94.9	10.26	47.1	4.88	30.7	4.08

Table 1: Average scores and SD for each of the three sub-questionnaires across the two groups.

Cambridge Face Perception Test

Duchaine, Germine & Nakayama [2007, Cognitive Neuropsychology, 24(4), 419-430] developed a brief test where observers are shown a target face (upright or inverted) and six faces that are morphed in different degrees. The task is to sort the six randomly presented faces in descending order from most like the target (left) to the least likely (right). Observers train the procedure on two training trials, followed by the task (eight upright trials and eight inverted trials).

Results

Position deviations were summed in each of the two conditions (upright and inverted faces) and to gain a measure for the upright face advantage a ratio between the two conditions (upright score / inverted score) was calculated for each observer with synaesthesia (N = 3) and each of the observers without synaesthesia (N = 5).

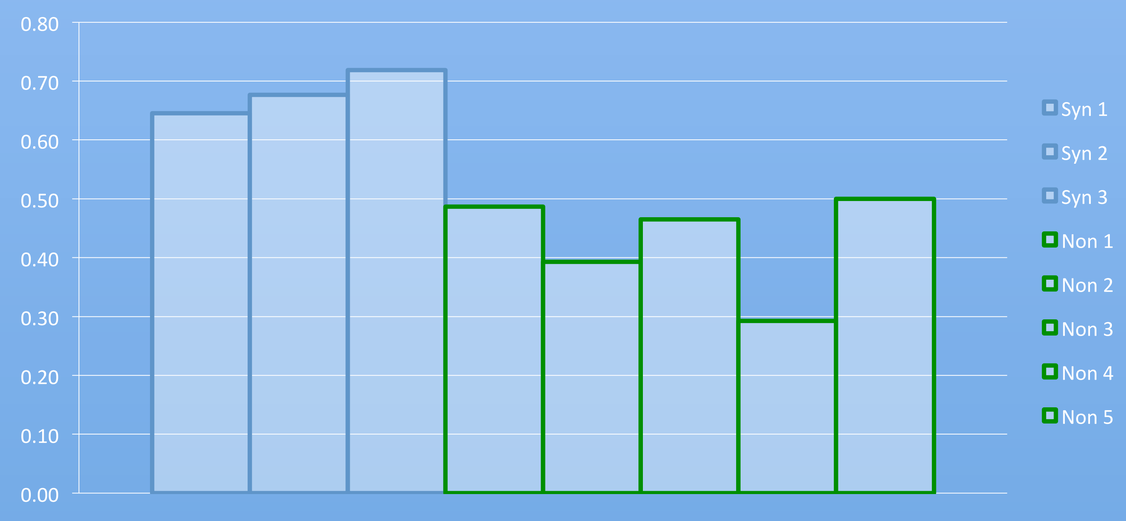

Figure 2: Ratio score the two groups of observers, observers with synaesthesia in blue and without in green.

Based on previous reports [Duchaine, Germine & Nakayama, 2007, Cognitive Neuropsychology, 24(4), 419-430] ratio scores of 0.565 and 0.816 have been estimated for normal observers and observers with prosopagnosia, respectively. The mean ratio scores for the present groups was somewhat lower at 0.427 for normal observers, and 0.680 for observers with colour-grapheme synaesthesia. Nevertheless, as the two groups significantly differed from each other indicated a smaller upright advantage for observers with synaesthesia compared to normal observers; $t(6) = 4.719$, $p = 0.003$. Moreover, by comparing a third group based on 9 observers with prosopagnosia reported by Duchaine, et al. [2007], with the colour-grapheme observers it is shown that they seem similar.

	Synaesthesia			Prosopagnosia		
Synaesthesia	MD	SE	p	-0.14	0.08	0.382
Non-synaesthesia	-0.25	0.09	0.046	-0.39	0.07	0.000

Table 2: Post hoc comparisons between the three groups using a Bonferroni correction for multiple comparisons.

Conclusion

- Preliminary results suggest that observers with colour-grapheme synaesthesia in fact have decreased performance in perceptual tasks involving faces, and further investigations are needed to test the robustness of these results.
- Moreover, it may be of interest to investigate in greater detail how people with colour-grapheme synaesthesia process emotional information.

Some reservations

- These data are still based on fairly small groups (N=8 and N=3). Furthermore, two of the observers with synaesthesia are from the same family, and as developmental prosopagnosia is suggested to have a genetic component it could turn out to be an underlying confounder. Moreover, as one of the observers with synaesthesia is very young (12 years) this may affect her performance as measured by the upright-inverted faces ratio.