Facilitated Detection of Social Cues Conveyed by Familiar Faces

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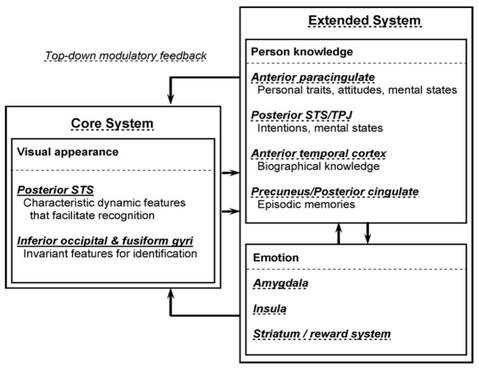
Introduction

Face perception involves a set of distributed pathways with differentiated processes [1]. For example, the FFA and the Anterior Temporal Face Patch seem to process invariant aspects that aid the recognition of identity [1-3]. On the other hand, pSTS and IPS seem to encode changeable aspects such as gaze direction [1,4].

Familiar faces enjoy a prioritized processing in the absence of awareness and under conditions of reduced attention [5]. We tested whether social cues, supposedly processed by a different pathway than that of identity, are detected faster when conveyed by familiar faces.

We predicted that the familiarity of a face not only affects its detection, but also the detection of the subtle yet socially informative cues that signal changes of internal states, such as head and gaze orientation.



Gobbini and Haxby's model of Face Perception
figure adapted from [1]

Methods

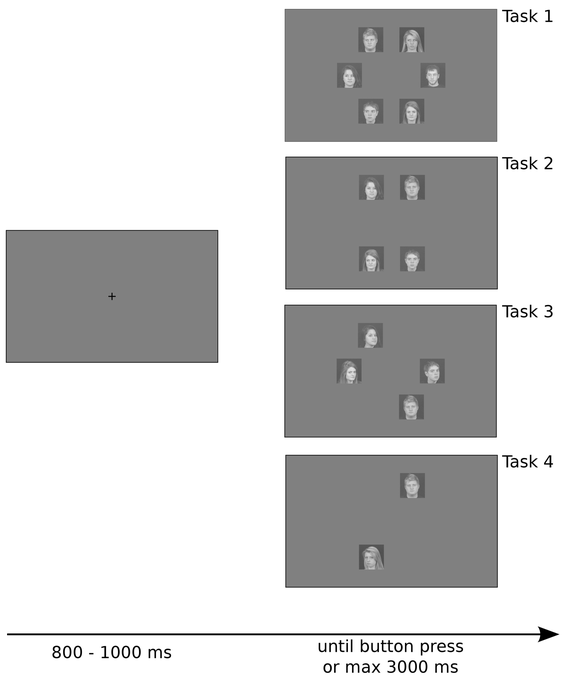
Visual search paradigm

Factors: Task, Set Size, Familiarity

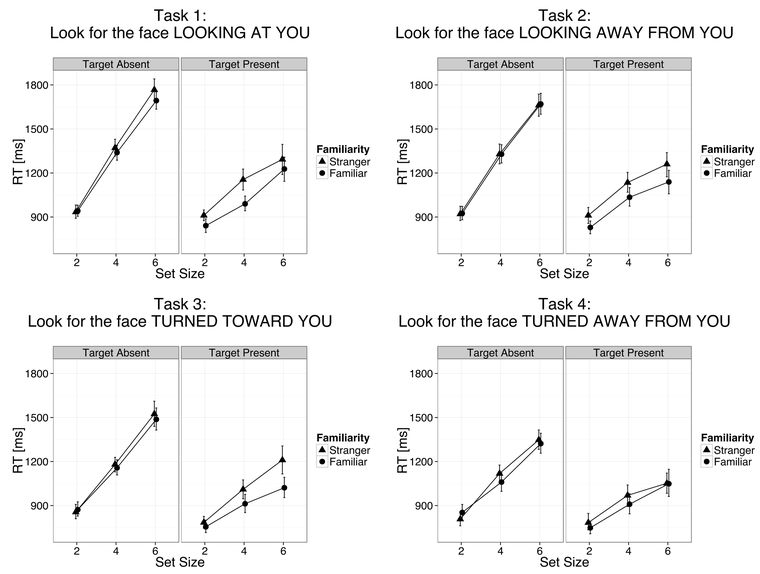
Four tasks controlling head and gaze orientation
- Task 1: Look for the face LOOKING AT YOU
- Task 2: Look for the face LOOKING AWAY FROM YOU
- Task 3: Look for the face TURNED AT YOU
- Task 4: Look for the face TURNED AWAY FROM YOU

Different set sizes: 2, 4, 6
Familiarity of the target: familiar/stranger
Status of the target: present/absent

8 subjects, two sets of four friends
Stimuli matched in luminance and contrast
Targets equally likely in the left/right hemifield



Results



Analyses on RTs

Linear Mixed-Effects Model (LMM) with subjects and target items as random effects (random intercepts).

Target Absent
Main effect of
- Task ($X^2(3) = 215.88$, $p << 0.0001$),
- Set Size ($X^2(1) = 1443.3$, $p << 0.0001$).

No effect of Familiarity ($X^2(1) = 1.3$, $p = 0.26$).
No significant interactions.

Slope for Gaze: 192ms/item
Sloper for Head: 143ms/item

Target Present
Main effect of
- Familiarity ($X^2(1) = 21.07$, $p << 0.0001$),
- Set Size ($X^2(1) = 385.35$, $p << 0.0001$), and
- Task ($X^2(3) = 73.94$, $p << 0.0001$).

No significant interactions.

Slope for Gaze: 89ms/item
Slope for Head: 79ms/item

Mean Familiarity Effect Size for Gaze: 109ms
Mean Familiarity Effect Size for Head: 65ms

Analyses on d'

LMM with subjects as random effects (random intercepts).

Main effect of
- Set Size ($X^2(1) = 10.26$, $p = 0.0014$),
- Familiarity ($X^2(1) = 14.32$, $p = 0.0002$), and
- Task ($X^2(3) = 7.83$, $p = 0.0497$).

No significant interactions.

Discussion

We found that subjects were faster at detecting social cues in familiar faces than in faces of strangers (mean effect size for gaze 109ms, for head orientation 65ms). Moreover, subjects were more accurate when detecting these cues in familiar faces.

The parallel slopes suggest that the facilitation involves faster processing of the social cues when conveyed by familiar individuals, and it is not due to a difference in salience of the stimuli. In fact, we found no evidence for a pop-out effect for familiar faces.

Faces can be detected as fast as 100ms when compared to objects [6]. This facilitation seems due to low-level visual properties, such as Amplitude Spectrum information, although not entirely [7]. Petro et al. [8] showed that gender and expression information can be decoded from patches of V1.

In early visual cortices, detectors of diagnostic face features might thus exist and aid the detection of different aspects of faces.

Familiar faces are processed faster than unknown faces in the absence of awareness and in conditions of reduced attentional resources [5]. In this experiment we showed that this facilitation extends to the social cues conveyed by familiar faces, such as head and gaze orientation.

The detectors of diagnostic features could be tuned over the course of repeated interactions, and the extended system of person-knowledge might work in concert with the visual system through feedback connections to strengthen and stabilize the visual representations of familiar faces. These detectors could allow a 'pre-recognition' detection, without explicit activation of face identity.

References

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