NeuroImage 13, Number 6, 2001, Part 2 of 2 Parts IDEAL®

MEMORY

Identification of famous faces: from the detection of familiarity to the access to people's identity. An fMRI study.

Stéphane Simon*, Christoph Segebarth*, Hadyn Ellis†, Stéphane Rousset‡

**UM INSERM/UJF, LRC CEA,CHU Grenoble, France*

†Department of Psychology, Cardiff University, United Kingdom

‡Laboratoire de Psychologie Expérimentale, UPMF, UMR CNRS 5105, Grenoble, France

Introduction.

The recognition of a famous face can be followed by an access to the corresponding identity of the individual. Two fMRI experiments, dealing with the recognition of highly famous people, have been aimed at identifying the neural correlates of these two processes. In experiment I, the neural correlates of the processing of face familiarity were compared with those of the processing of proper name familiarity. Experiment II was aimed at identifying the correlates of access to people's identity.

FMRI experiments.

Ten subjects were retained for analysis, on the basis of their performance of a face recognition test. Whole brain fMRI was performed at 1.5 T, with GRE EPI MR sequences. Group analysis were performed by means of SPM 96 and 99.

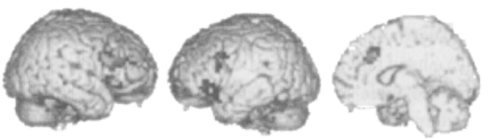

Figure 1. Experiment I: (FF–UF)

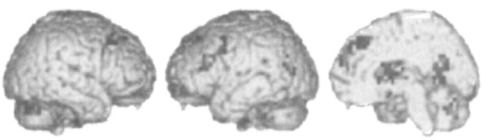

Figure 2. Experiment II: (Id–FF)

Experiment I.

Subjects were presented photos of faces in a first session, and the corresponding proper names in a second session (three months later). Stimuli were displayed during 500 ms without inter-stimulus interval. Thus the performance of semantic judgements by the subjects was reduced to a minimum. Two conditions block paradigms were applied. In conditions 1, the faces or names shown were mainly famous (conditions identified as FF or FN - respectively for famous faces or names), while in conditions 2, the stimuli were mainly from unknown people (conditions identified as UF or UN). In conditions 1, subjects had to detect the rare, non-famous targets, while in conditions 2, the rare, famous ones were to be detected. Thus, the load of the familiarity detection was much larger during the FF and FN conditions than during the UF and UN conditions.

(FF – UF) contrast has revealed activations in the prefrontal cortex, in the fusiform gyrus and in the cerebellum (Fig.1). The {(FF - UF) - (FN - UN)} interaction has shown that the right fusiform gyrus activation was specific for the detection of face familiarity. The involvement of the fusiform gyrus, an area often associated with the mere face discrimination,thus constitutes an interesting result, in line with another recent fMRI study [1].

Experiment II.

Subjects were presented faces during a three conditions block paradigm. Stimuli were displayed during 1000 ms. The two first conditions were the same ones as described above (FF and UF conditions). In condition 3 (condition referred to below as Id), subjects were shown famous faces, but this time, they had to detect the few of them corresponding to deceased individuals. This condition was designed to trigger access to people's identity.

(Id – UF) contrast has revealed activations also found with the (FF – UF) contrast, as well as additional foci of activation. Activations from the (Id - FF) contrast were mainly located within the left hemisphere (Fig.2), in the prefrontal cortex, in the hippocampus, at the temporo-parietal junction, and in the lingual gyrus. These additional areas are thus engaged when the identification process involves more than the mere detection of face familiarity. They are presumably part of a network, recruited during semantic associations [2].

References.

1. George N.*et al*, 1999 Nature Neurosci. 2: 574-580.
2. Vandenberghe R.*et al*, 1996 Nature 383: 254-256.