

# Use of the process dissociation procedure to study the contextual effects on face recognition in schizophrenia: Familiarity, associative recollection and discriminative recollection

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## Abstract

Contextual effects were explored in schizophrenia patients and paired comparison subjects during a long-term face recognition task. The objective was to investigate the contextual effects on face recognition by manipulating, in the same experiment, the perceptual context of the face (intrinsic vs. extrinsic) and the task context (inclusion vs. exclusion instructions). The situation was derived from the Jacoby's [Jacoby, L.L., 1991. A process dissociation framework: separating automatic from intentional uses of memory. *Journal of Memory and Language* 30, 513–541] process dissociation procedure. The results showed that schizophrenia patients ( $N=20$ ) presented lower performances than healthy controls ( $N=20$ ) in the inclusion but not in the exclusion task. This observation emphasizes the heterogeneity of recollection and suggests that the memory impairment in schizophrenia reflects an imbalance between two mechanisms. The first is a deficit in “associative recollection”, i.e., the failure to use efficiently associative information. The other is an enhanced “discriminative recollection” that impedes their capacity to process information separately from its perceptual context. In addition, correlation with symptoms suggest that the former is expressed in the loosening of associations characteristic of disorganization symptoms, whereas the latter reflects the lack of flexibility or the contextualization bias related to psychotic symptoms, i.e., delusions and hallucinations.

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## 1. Introduction

Since it was first shown that patients with schizophrenia are impaired in categorizing facial stimuli of

different emotional expressions (Shannon, 1971; Dougherty et al., 1974), research interest in face processing abilities has considerably increased. Subsequent investigations have confirmed that schizophrenia patients are impaired on varied tasks involving the analysis of faces, including familiar and unfamiliar face recognition and identity matching tasks (Berndl et al., 1986; Kring et al., 1993; Archer et al., 1994; Salem et al., 1996).

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Considering recognition, we have all had the uncomfortable experience of recognizing a person as familiar, yet being unable to recollect any qualitative or contextual information about the person such as her name or where we met the person before. Such experience suggests that face recognition can be based on an acontextual sense of familiarity, or on the retrieval of contextual details about previous events. Motivated in part by these phenomenological experiences, dual-process theories propose that recognition reflects the product of two distinct memory processes: familiarity and recollection (Mandler, 1980; Tulving, 1983; Gillund and Shiffrin, 1984; Jacoby, 1991; Hintzman and Curran, 1994; Yonelinas, 1994). Familiarity (*F*) is generally thought to reflect an assessment of global perceptual similarity between studied and tested items (Mandler, 1980; Murdock, 1982; Gillund and Shiffrin, 1984), whereas recollection (*R*) entails the retrieval of specific contextual information about studied items, such as physical attributes (Hintzman and Curran, 1994).

The simplest method used to dissociate these two processes consists in asking the subject whether he “remembers” or “knows” actually remembering seeing an item previously. The first type of response implies the encoding episode, i.e., the context of having seen the item, hence recollection, whereas the second implies only knowing himself to have seen the item without being able to say when or where, hence familiarity. To date, most of the dual process studies of recognition in schizophrenia have used the “remember/know” procedure and the results have shown a reduced number of “remember” responses compared with healthy subjects identifying a recollection impairment (Huron and Danion, 2002; Tendolkar et al., 2002).

Another method to explore the contribution of familiarity and recollection is the process dissociation procedure (PDP) developed by Jacoby et al. (1991, 1992). The PDP uses two tasks: an inclusion and an exclusion task. In the inclusion task, the subject is required to make a simple old/new recognition judgment. In this task, it is assumed that both familiarity and recollection contribute to the recognition decision. In the exclusion task, the subject has the specific instruction to recognize the test item as well as the context (e.g., the study list) in which it has been presented before. In this case, whereas item recognition can be based on familiarity, the context recognition requires conscious recollective processes; hence, familiarity and recollection act in opposition. Quantitative estimates of recollection and familiarity are then derived according to the assumption that familiarity and recollection contribute independently to recognition (see Section 2

for details) (Jacoby et al., 1993; Joordens and Merilke, 1993; Curran and Hintzman, 1995; Hay and Jacoby, 1996). Some studies using this procedure in schizophrenia patients have also confirmed an impairment in the recollective use of memory (Kazes et al., 1999; Linscott and Knight, 2001).

Obviously, the distinction between familiarity and recollection is closely related to the notion of context. Recollection involves the retrieval of specific and contextual information about the studied episode (e.g., source information), whereas familiarity does not. The concept of “context” is also central in one of the main theories of the memory impairment in schizophrenia whereby patients suffer from a degraded ability to construct and maintain an internal representation of the context (Schwartz et al., 1991; Cohen and Servan-Schreiber, 1992). This view has been reformulated recently as impairment in the mechanism that binds together the separate aspects of an event into a cohesive representation that is consciously retrievable (Danion et al., 1999).

If numerous studies have examined the effects of context during recognition, the term “context” has been given a number of different meanings across studies, such as clothing (Brutsche et al., 1981), encoding instructions (Baddeley and Woodhead, 1982), the background in which the face is presented (Davies and Milne, 1982; Klee et al., 1982; Pérès and Tiberghien, 1984), or as a characteristic of the person whose face is presented. In these conditions, the context-processing approach of schizophrenia needs to better specify what is exactly understood by “context”. From the visual standpoint alone, one can make the distinction between two types of “perceptual context” (Murdock, 1982; Baddeley and Woodhead, 1982). The intrinsic context refers to the whole set of visual characteristics that are automatically processed as integral parts of the item (e.g., facial expression during face recognition). It is opposed to the extrinsic context, which refers to the environmental aspects that are independent of but visually associated with the item (e.g., the place where the person was seen). On another hand, Baddeley (1982) distinguished between two types of “processing context” depending on the type of information the subject was required to process in the task. The “interactive” context is defined by the fact that it affects the meaning or the interpretation of the target event in the context of the task. By contrast, “independent context” does not interfere with the meaning of the target event and is contingent to the task. The processing context (i.e., interactive vs. independent) and the perceptual context (i.e., intrinsic

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