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Metamemory knowledge and beliefs in patients with schizophrenia and how these relate to objective cognitive abilities

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ABSTRACT

Subjective reports and theories about memory may have an influence on other beliefs and behaviours. Patients with schizophrenia suffer a wide range of deficits affecting their awareness of daily life, including memory. With the Metamemory Inventory in Adulthood (MIA) we ascertained patients' memory knowledge and thoughts about their own cognitive capacities and about several aspects of cognitive functioning: personal capacities, knowledge of processes, use of strategies, perceived change with ageing, anxiety, motivation and mastery. The participants' ratings were correlated with their intellectual, cognitive and psychiatric data. Patients felt they had a lower capacity and marginally lower mastery over their memory than comparison subjects. They reported less recourse to strategies, and higher levels of memory-related anxiety. However, their knowledge of basic memory processes, motivation to succeed, and perception of ageing effects were similar. So patients with schizophrenia do not suffer a general and non specific impairment of their metacognitive knowledge.

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1. Introduction

There is a large body of evidence from neuropsychological studies which shows that patients with schizophrenia display objective memory impairments in respect of many aspects of cognition and memory (Danion, Huron, Vidailhet, & Berna 2007; Dickinson & Harvey, 2009; Fioravanti, Carlone, Vitale, Cinti, & Clare, 2005; Gold, Hahn, Strauss, & Waltz, 2009; Keefe, 2008; Raffard, Gely-Nargeot, Capdevielle, Bayard, & Boulenger, 2009). Regarding memory, declarative memory (which can be consciously recalled, comprising episodic memory which stores specific personal experiences and semantic memory which stores factual information) seems to be more impaired in patients than non-declarative or procedural memory (unconscious memories such as skills) (Cirillo & Seidman, 2003; Kern, Hartzell, Izaguirre, & Hamilton, 2010). At the same time, patients with schizophrenia also exhibit a wide range of deficits affecting their awareness of suffering from a mental disorder, of the social consequences of their illness, of the need for treatment, and of the repercussions for several aspects of daily life, etc. (Freudenreich, Deckersbach, & Goff, 2004; Lysaker, Bryson, Lancaster, Evans, & Bell, 2002; Lysaker, Buck, Salvatore, Popolo, & Dimaggio, 2009; Lysaker et al., 2009; Mc Glynn, 1998; Nakano, Terao, Iwata, Hasako, & Nakamura, 2004; Raffard et al., 2008a,b).

The awareness deficits displayed by patients with schizophrenia may also include memory function, and their introspective capabilities in terms of their own knowledge and memory skills appear to be poor (Mc Glynn, 1998; Medalia & Lim,

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2004; Medalia, Thysen, & Freilich, 2008; Medalia & Thysen, 2010; Prouteau, Verdoux, Briand, et al., 2004; Sevy, Nathanson, Visweswarajah, & Amador, 2004). One critical question here is whether or not patients can accurately assess their current ability to remember information in everyday contexts. The literature shows that the studies which have explored how patients with schizophrenia apprehend their own thoughts and thoughts of others, and/or some aspects of self-awareness relating to their own cognitive abilities have often used questionnaires specially designed for psychopathology and, for the most part, have focused on patients' subjective complaints about their own memory and self-reports of cognitive failures (Bayard, Capdevielle, Boulenger, & Raffard, 2009; Donohoe et al., 2009; Keefe, Poe, Walker, Kang, & Harvey, 2006; Lecardeur, Briand, Prouteau, et al., 2009; Medalia et al., 2008; Prouteau et al., 2004; Semerari, Carcione, Dimaggio, et al., 2004; Stip, Caron, Renaud, Pampoulova, & Lecomte, 2003; Van der Linden, Wyns, Coyette, Von Frenkel, and Seron, 1989).

In the context of memory processes, awareness may be related to *metamemory*, which is traditionally defined as our experiences and knowledge of our cognitive processes (Flavell, 1971, 1979). J. Flavell was the first to coin the term metamemory: "intelligent structuring and storage of input, (...) intelligent search and retrieval operations, and (...) intelligent monitoring and knowledge of these storage and retrieval operations, a kind of "metamemory". His 1971 paper is regarded in experimental psychology as the foundation paper for active and fruitful research into metamemory (for reviews, see Dunlosky & Bjork, 2008). Flavell highlighted two categories of metamemory (1979), namely *metamemory knowledge*, which is the general knowledge and beliefs about memory processes, and *metamemory awareness*, which refers to the monitoring and regulation of memory tasks in progress (Perfect & Schwartz, 2002). Two different experimental approaches correspond to these two aspects of metamemory, *knowledge* and *awareness*. Experimental studies of metamemory awareness involve asking patients to predict some aspect of their memory performance during a given memory task and to register their strategic control over the task (Dunlosky & Bjork, 2008; Nelson, 1996; Nelson & Narens, 1990; Perfect & Schwartz, 2002). There have been a number of studies on metamemory awareness in schizophrenia, which have shown that patients display some impairment, but also some preservation of their monitoring and control abilities when engaged in a memory task (Bacon & Izaute, 2009; Bacon, Izaute, & Danion, 2007; Danion, Gokalsing, Robert, Massin-Krauss, & Bacon, 2001; Donohoe et al., 2009; Koren et al., 2004; Medalia & Lim, 2004; Moritz & Woodward, 2006; Moritz, Woodward, & Ruff, 2003; Souchay, Bacon, & Danion, 2006).

Metamemory knowledge on the other hand refers to the explicit knowledge and beliefs one has about one's own cognitive strengths and weaknesses in particular, and about human cognitive functioning in general. It is the knowledge, understanding, and beliefs about situations, environments, and variables affecting memory in a given situation, and usually it is declarative. We may know, for example, that we are good at retaining dates, but not at remembering names, that for most people, things that are interesting are more likely to be remembered than facts that are not, and that we may become flustered when put on the spot to remember new things. *Metamemory knowledge* has been the subject of important research in the field of fundamental experimental psychology, where researchers consider knowledge about cognition comprises more than just knowledge and awareness about one's own memory. They regard *metamemory knowledge* as a multidimensional construct embracing other beliefs and statements about memory (Dixon and Hultsch, 1983a,b; Dixon, Hultsch and Hertzog, 1988; Dixon, 2000). This approach to memory takes into account the fact that memory performance in a given situation is affected by many different factors, including motivation, beliefs and perceptions, prior knowledge and skills, practice, mood states, and characteristics of the external context, and that some account should be taken of ecological relevance. *Metamemory knowledge* is composed of related but separate dimensions of knowledge and subjective beliefs about memory.

Subjective representations of the memory requirements are precursors of memory-related behaviour (Dixon & Hertzog, 1988). Subjective reports and theories about memory are important insofar as they often provide the basis for regulating one's performance and behaviour. True memory performance may be affected by the negative beliefs we have in the self-efficacy of our memory (Lineweaver & Hertzog, 1998), but also by the anxiety that can build up about possible memory failures (Cavanaugh, Grady, & Perlmutter, 1983; Davidson, Dixon, & Hultsch, 1991). Besides, patients who are unaware of their cognitive impairments are unlikely to be motivated to embark on rehabilitation, or to benefit from any kind of treatment (Mc Glynn, 1998). Nor is there any point proposing cognitive remediation to someone who has no motivation to improve his/her memory (Velligan, Kern, & Gold, 2006). In addition, of course, mnemonic and external aids cannot be used unless they are somehow known. Subjective beliefs about general memory functioning can also exert powerful influences on other beliefs and behaviour. *Metamemory knowledge* involves the selection, accumulation, and evaluation of experience and, thus, in the process, the construction of individuality.

Studies exploring adult metamemory knowledge usually included use of questionnaires (Fort, 2005). One of the most widely used methods for measuring self-referent beliefs about cognition is the MIA questionnaire (*Metamemory In Adulthood*, Dixon & Hultsch, 1983a, 1983b), which asks subjects to rate their own memory functioning and knowledge of general memory processes. The version most frequently used (Dixon, Hultsch, & Hertzog, 1988) has 108 questions spread over seven domains of daily cognitive function: Capacity (beliefs about one's own memory capacities), Task (knowledge of basic memory processes), Strategy (knowledge and reported use of strategies), Change (perceived change in one's capacity to remember), Anxiety (perception of the relationship between anxiety and memory performance), Motivation (perception of one's motivation to perform well in memory tasks), and Mastery¹ (perceived feeling of being in control of memory skills).

¹ Dixon et al. (1988) used *Achievement* to describe Motivation and *Locus* to describe the sense of mastery over memory skills. For the sake of clarity we shall use the terms Motivation and Mastery throughout.

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