



Schizotypy and emotional memory

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ABSTRACT

Background: Emotional dysfunction is a core feature of psychotic disorders. One expression of such dysfunction is a reduction of the emotion-induced enhancement of memory which is normally found in healthy individuals. Less severe disruption of emotional processing may also be present in individuals prone to 'unusual' psychosis-like experiences. In this study we investigate *voluntary* declarative (i.e. explicit or episodic) emotional memory performance, primarily in relation to positive schizotypy (as measured by the unusual experiences scale of the O-LIFE). The effect of negative schizotypy (introvertive anhedonia scale of the O-LIFE) was also explored. We hypothesized that schizotypal individuals (scoring highly on Unusual Experiences) would show reduced memory enhancement.

Methods: One hundred and two healthy participants viewed a narrated slide-show containing neutral and negative emotional content. They rated the story on a number of affective dimensions and completed a variety of trait measures, including a multi-dimensional measure of schizotypy. Seven days later, a memory test was performed and frequency of involuntary memories related to the slide-show assessed.

Results: The voluntary declarative emotional memory advantage in recall seen in low scorers (25%ile) on unusual experiences was absent in high scorers (75%ile), despite greater subjective fearfulness and emotionality in that group. However, the high scoring group did report experiencing more involuntary memories related to the story. There was no effect of negative schizotypy on declarative emotional memory.

Conclusions: The emotional memory difficulties seen in studies of schizophrenia may extend to those with a vulnerability to positive psychosis-like experiences. This vulnerability may be expressed in both voluntary declarative – as well as involuntary – emotional memory performance.

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1. Introduction

Psychotic experiences are a core feature of schizophrenia (Kapur, 2003). In addition, people diagnosed with schizophrenia show a wide range of cognitive impairments (Mueser, 2000). Emotional impairments however, may be a more central feature of schizophrenia (Aleman & Kahn, 2005). These difficulties appear to be present in vulnerable individuals before the onset of the disorder (Pinkham, Penn, Perkins, & Lieberman, 2003) and affect a broad range of domains of emotional functioning (e.g. Cedro, Kokoszka, Popiel, & Narkiewicz-Jodko, 2001; Edwards, Jackson, & Pattison, 2002; Lane, Ahern, Schwartz, & Kasznaik, 1997).

Psychotic experiences occur on a continuum (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). The severe psychotic experiences of schizophrenia form one end of this

continuum, with milder perceptual and cognitive anomalies also occurring within the general population. For example, positive schizotypal traits – which are relatively stable aspects of personality reflecting attenuated aspects of positive psychotic psychopathology (delusions and hallucinations) – occur on continua of frequency and severity in the normal population (Claridge, 1997). The presence of such traits is assessed by measures such as the Oxford–Liverpool Inventory of Feelings and Experiences (O–LIFE: Mason, Claridge, & Jackson, 1995). Those diagnosed with schizophrenia, as well as healthy individuals scoring highly on measures of positive schizotypy such as the Unusual Experiences scale of the O–LIFE (referred to here as 'schizotypal (high UE) individuals'), may share an underlying vulnerability (Meehl, 1990). Indeed, some have suggested that very high levels of schizotypy may represent a vulnerability to psychotic disorder (Chapman, Chapman, Kwapil, Eckbald, & Zinser, 1994). Furthermore, a number of studies have demonstrated similarities in psychometric features and cognitive performance between patients with positive symptoms of schizophrenia on one hand, and schizotypal individuals on the other (e.g.

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Aguirre, Sergi, & Levy, 2008; Henry, Bailey, & Rendell, 2008; Morgan, Bedford, & Rossell, 2006). Emotional processing and emotional memory have also been investigated in relation to schizotypy (e.g. Kerns, 2005) and, more extensively, in schizophrenia (see Herbener, 2008 for review).

Emotional stimuli consistently demonstrate a memory advantage in laboratory studies using visual and verbal stimuli (e.g. Bradley, Greenwald, Petry, & Lang, 1992; Cahill & McGaugh, 1995; Kensinger & Corkin, 2003), a pattern absent or significantly attenuated in people diagnosed with schizophrenia (Herbener, 2008).

In addition to generalized cognitive deficits, other confounds, such as the effects of medication or institutionalization, may affect findings in clinical samples when examining a specific domain of functioning (e.g. Pomarol-Clotet et al., 2010). For example, a significant number of patients in a study by Hall, Harris, McKirdy, Johnstone, and Lawrie (2007) were taking benzodiazepines and all were taking antipsychotic medications. Benzodiazepines and drugs with anticholinergic action (such as some antipsychotics) significantly disrupt emotional memory (Kamboj & Curran, 2006), and this may partially account for the effects found in schizophrenic patients. These confounds may be avoided through studying either non-medicated first-episode patients or schizotypal individuals.

One approach to studying the effects of individual differences, such as schizotypy, on emotional memory is to examine memory for narrative elements of emotional stories presented in the form of a video or narrated 'slide-show' (Brown, Brignell, Dhiman, Curran, & Kamboj, 2010). In contrast to unrelated word lists, narrative tasks result in measurable increases in arousal and have the advantage of allowing additional complex memory phenomena to be examined, such as 'confabulation'. Candel, Merckelbach, and Kuijpers (2003) found that trait dissociation – which correlates strongly with positive schizotypy (Merckelbach, Rassin, & Muris, 2000) – was associated with an increased rate of commission errors in an emotional story (see also Merckelbach, Zeles, Van Bergen, & Giesbrecht, 2007). Trait dissociation and positive schizotypy are associated with greater levels of traumatic intrusions using the 'trauma video' procedure (Holmes & Steel, 2004). The vulnerability to relatively frequent traumatic intrusions in schizotypal individuals essentially represents a 'memory advantage' of the perceptually-based, sensory-driven memory system over a verbal or conceptually-based memory system under conditions intended to produce *high levels of emotional arousal* (Holmes & Steel, 2004). This 'memory advantage' is expressed as frequent *involuntary* declarative thoughts and images following the viewing of a 'trauma video'. On the other hand research using negatively valenced stimuli with *relatively low* arousal value (such as those typically used in emotional memory research) suggests that the voluntary, declarative emotional memory advantage is dampened in individuals diagnosed with schizophrenia (Herbener, 2008). This may mean that people who are vulnerable to psychotic experiences potentially have a double vulnerability in memory encoding of emotional experiences: low-level sensory stimuli are 'over-encoded,' (Holmes & Steel, 2004) while salient *episodes* are 'under-encoded' (Herbener, 2008) leading to difficulties in distinguishing these from less salient episodes. As such, autobiographical narratives of people prone to psychotic experiences may be more likely to lack structure and cohesion, and even meaning (Lysaker, Clements, Plascak-Hallberg, Knipscheer, & Wright, 2002). It is suggested that this is another expression of 'aberrant salience' seen in people diagnosed with schizophrenia (Kapur, 2003).

While there are a number of studies examining the effects of schizophrenia on emotional memory, there are very few such studies with schizotypal individuals. The latter tend to focus on the memory processes and phenomena relevant to PTSD, namely

trauma-like intrusive emotional memories (e.g. Holmes & Steel, 2004). Indeed, people with a diagnosis of schizophrenia are at relative risk of experiencing PTSD (Mueser, Rosenberg, Goodman, & Trumbetta, 2002). Here, we investigate the potential for a broader level of emotional memory dysfunction. In particular, we are primarily interested in whether schizotypal (high UE) individuals show a similar pattern of voluntary declarative emotional dysfunction to that seen in schizophrenia.¹ Since we were primarily interested in conceptual/verbal memory (Brewin, Dalgleish, & Joseph, 1996), rather than sensory/perceptual memory we used stimuli consisting of neutral and emotional (negative) audio and visual elements to create a narrative which was not intended to simulate trauma, but were nonetheless sufficiently arousing to generate an emotional memory advantage (Adolphs, Tranel, & Buchanan, 2005; Brown et al., 2010).

Using this narrative task, we hypothesized that in comparison to non-schizotypal (low UE) individuals, schizotypal (high UE) individuals would show a reduced voluntary declarative memory enhancement for the emotional stimuli in line with some of the literature on schizophrenia. This would be observed as a smaller difference between recall/recognition for non-emotional vs recall/recognition for emotional narrative elements in the schizotypal (high UE) group. Secondly, since contextual processing deficits seem to have an important role in psychotic symptoms (Phillips & Silverstein, 2003) we investigated the balance between local processing of detail, and global processing of 'gist' (Adolphs et al., 2005) in these schizotypal (high UE) and non-schizotypal (low UE) individuals. We also examined involuntary (intrusive) memory by asking participants to *retrospectively* report the frequency of non-deliberate memories of the emotional story. Finally to determine the specificity of effects of positive schizotypy, we also compared the emotional memory performance of high and low scorers on the introvertive anhedonia scale of the O–LIFE, which taps mild 'negative' symptoms of psychosis.

2. Methods

2.1. Participants and design

Participants were recruited through advertisement and word of mouth at University College London and surrounding areas. They were telephone screened for exclusion criteria which included: any formal contact with psychiatric services (including use of psychiatric medication), previous neurological injury or illness and English not a first language. One hundred and two participants completed two test sessions, seven days apart. A concurrent study examining attentional bias was also run.

Two groups were formed according to lower and upper quartiles scores on the Unusual Experiences subscale of the O–LIFE (≤ 2 : non-schizotypal (low UE); ≥ 14 : schizotypal (high UE); Mason et al., 1995). All participants gave written, informed consent and were paid £10. The study received ethical approval from the institutional (UCL) ethics committee.

¹ Our approach is to compare *high* (upper quartile) scorers with *low* (lower quartile) scorers on the O–LIFE Unusual Experiences and introvertive anhedonia subscales, representing prototypical positive and negative schizotypy respectively. While we acknowledge the dimensional quality of the schizotypy construct, our main concern is to explore potential similarities between high scorers and individuals' diagnoses with schizophrenia. We have therefore adopted a categorical approach, which assumes a continuity between high scorers and people diagnosed with schizophrenia. This approach is also highly represented in the schizotypy research literature.

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