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Schizotypy and mental time travel

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ABSTRACT

Mental time travel is the capacity to imagine the autobiographical past and future. Schizotypy is a dimensional measure of psychosis-like traits found to be associated with creativity and imagination. Here, we examine the phenomenological qualities of mental time travel in highly schizotypal individuals. After recollecting past episodes (autobiographical memory) and imagining future events (episodic future thinking), those scoring highly on positive schizotypy reported a greater sense of 'autonoetic awareness,' defined as a greater feeling of mental time travel and re-living/'pre-living' imagined events. Furthermore, in contrast to other sensory domains, imagery of the past and future episodes contained more olfactory detail in these high scorers. The results are discussed in relation to previous reports of anomalous olfactory experiences in schizotypy and heightened vividness of olfactory imagery in post-traumatic stress disorder, for which schizotypy is a risk factor.

1. Introduction

Mental time travel refers to "the faculty that allows humans to mentally project themselves backwards in time to re-live, or forwards to pre-live events" (Suddendorf & Corballis, 2007, p. 299). Re-living is a general property of autobiographical memory and, in humans, is accompanied by a particular type of consciousness, referred to as 'autonoetic awareness' (Tulving, 1985). It is this awareness which forms the basis of our sense of temporally extended beings, stretching from an autobiographical past to a hypothetical future. The creative activity of imagining future episodes has been the basis of a number of recent experimental studies in cognitive psychology, and intriguingly, involves not only similar psychological processes (Conway & Pleydell-Pearce, 2003; Greenberg & Rubin, 2003), but also, overlapping neural substrates as remembering past events (Addis, Wong, & Schacter, 2006; Szpunar, Watson, & McDermott, 2007). The subjectively experienced qualities of mental time travel have also been examined (D'Argembeau & Van der Linden, 2004), and more recently, the personality and mood variables associated with particularly vivid autobiographical or future-episodic thinking have been delineated (e.g. Quoidbach, Hansenne, & Mottet, 2008). For example, the ability to form vivid visual images and the use of certain emotion regulation strategies influence the sensory vividness with which past and future images are imagined (D'Argembeau & Van der Linden, 2006). Aspects of trait dissociation may also determine a tendency to generate future mental images (Vannucci & Mazzoni, 2009).

The capacity for mental time travel forms the basis of our sense of a continuous self. It is a capacity which allows us to generate personally meaningful goals (Conway, 2003). While mental time travel can be a deliberative, goal directed activity, it may also occur involuntarily, for example during reminiscing, day dreaming or fantasising. Moreover, involuntary re-experiencing of past events may occur following emotionally arousing events in the form of vivid intrusive images, for example, in post-traumatic stress disorder (PTSD; Brewin & Holmes, 2003). Importantly, a number of personality traits may act as vulnerability factors in the development of psychopathology, including PTSD (for meta-analysis, see Brewin, Andrews, & Valentine, 2000). Among these risk factors is schizotypy (Marzillier & Steel, 2007).

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Schizotypy is a personality trait associated with psychosis-like experiences. Furthermore, it is strongly correlated with dissociation (Giesbrecht, Merckelbach, Maartje, & Sluis, 2007), fantasy proneness (Merckelbach, Rassin, & Muris, 2000) and mental imagery vividness (Aleman, Nieuwenstein, Bocker, & de Haan, 2000). Schizotypy and dissociation may represent separate risk factors for a number of psychological disorders, such as schizophrenia-spectrum disorders (Mason et al. (2004) and post-traumatic stress disorder (PTSD; Holmes, Brewin, & Hennessy, 2004; Marzillier & Steel, 2007), both of which, in different ways, involve a breakdown in autobiographical recollective experiences. While being phenomenologically distinct constructs, dissociation and schizotypy overlap in some important respects, even when self-report items common to measures of both are removed. One proposal is that they both, at least partly, have their origins in childhood adversity or trauma (Startup, 1999), which forms a diathesis for adult psychopathology. This possibility has yet to be fully explored.

On the basis of a 'deficit model,' which views schizotypy on a continuum of psychotic experiences, cognitive impairments similar to, but milder than those seen in psychotic illnesses might be expected in people with high levels of schizotypy (e.g. Park, Holzman, & Lenzenweger, 1995). Alternatively, schizotypy has also been associated with enhancement in performance, seen for example in high levels of imaginative and creative abilities (e.g. Claridge, Clark, & Davis, 1997; Folley & Park, 2005). As such, one hypothesis is that mental time travel might be experienced with particular vividness in people who score highly on schizotypy.

Regardless of the pattern of cognitive performance in people scoring highly on measures of schizotypy, it is clear that these individuals are predisposed to experiencing unusual perceptual experiences and beliefs (Eckblad & Chapman, 1983). Furthermore, they appear to be particularly vulnerable to experiencing intrusive images following traumatic or emotionally-charged experiences (Holmes & Steel, 2004; Marzillier & Steel, 2007; Steel, Fowler, & Holmes, 2005). It is unclear however, the extent to which intrusive thoughts in high schizotypy are due to greater sensory- or data-driven-memory encoding and retrieval (Ehlers & Clark, 2000), rather than simply a tendency to encode or retrieve ordinary ('conceptually-driven') autobiographical memories more vividly, that is, with a greater subjective sense of re-living. One way of examining this is to investigate the self reported phenomenological features of volitional autobiographical experiences in people scoring highly on schizotypy.

The phenomenological qualities of autobiographical memories and imagined future episodes have been examined in detail by D'Argembeau and Van der Linden (2004, 2006). Their approach has also allowed a thorough characterisation of autonoetic experiences of past and future episodes. This characterisation has included ratings of olfactory detail in past and future episodes. Olfaction is a sensory domain which seems to have been neglected in much of the recent research on imagery.

Here we planned to compare the phenomenological aspects of autobiographical and future episodic images (D'Argembeau and Van der Linden, 2006) in participants scoring high and low on a measure of 'positive schizotypy,' specifically 'unusual experiences.' Previous studies exploring the relationship between mental imagery and schizotypy have tended to use either standardised self-report instruments such as Bett's Questionnaire upon Mental Imagery (Sheehan, 1967) or tasks which require the manipulation of mental images (for example, asking participants to mentally rotate pictures of gloves to judge whether they were for right or left hands; De Vignemont et al., 2006). However, personally meaningful imagery (in the form of autobiographical memories or future episodes) which is likely to be affected by individuals' current concerns and goals has not, to the best of our knowledge, been explored in relation to schizotypy.

2. Method

2.1. Participants

Participants were recruited through an online psychological study recruitment site, and posters around central London. Ninety-two healthy participants (n = 34 males) aged between 19 and 64 (m = 32, ±10.5) took part in the study. Twenty two were university students. The rest were in full-time employment. Participants received payment.

Two groups of participants was created using the upper (n = 30) and lower quartile scores (n = 24) on the Unusual Experiences sub-scale of the O-LIFE (see below; upper quartile cut off score: >14; lower quartile: <6 on Unusual Experiences). The two groups were compared on age, verbal fluency, social desirability, anxiety and depression (see below) and were well matched (all $p > .05$).

2.2. Procedure

As part of a larger study examining autonoetic memory judgements, participants individually completed all materials in one sitting, with the researcher present. The session lasted ~80 min and each participant was tested individually. In addition to the tasks and questionnaires below, participants also completed a false memory task, results of which are not reported here.

The project received Ethical Approval from the UCL Research Ethics Committee.

2.3. Measures

2.3.1. Verbal fluency

A verbal fluency task was used as a simple measure of cognitive ability (particularly memory retrieval ability). The number of words beginning with the letter '*B*' belonging to the category of 'fruits' (avoiding proper nouns and inflection of the same word) were recorded within 30 s.