



Self-grounding visual, auditory and olfactory autobiographical memories



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ABSTRACT

Given that autobiographical memory provides a cognitive foundation for the self, we investigated the relative importance of visual, auditory and olfactory autobiographical memories for the self. Thirty subjects, with a mean age of 35.4 years, participated in a study involving a three × three within-subject design containing nine different types of autobiographical memory cues: pictures, sounds and odors presented with neutral, positive and negative valences. It was shown that visual compared to auditory and olfactory autobiographical memories involved higher cognitive and emotional constituents for the self. Furthermore, there was a trend showing positive autobiographical memories to increase their proportion to both cognitive and emotional components of the self, from olfactory to auditory to visually cued autobiographical memories; but, yielding a reverse trend for negative autobiographical memories. Finally, and independently of modality, positive affective states were shown to be more involved in autobiographical memory than negative ones.

1. Introduction

A pivotal feature of human cognition is the possibility to remember and re-experience autobiographical events, which are personally and socially outlined in the form of life chronicles (Brewer, 1999; Fivush, 2011; Habermas & Bluck, 2000; Tulving, 2002). Autobiographical memory serves as a basis for the self as well as a regulatory function for current and future behaviors and goals (Conway, 2005; Neisser, 1988; Pillemer, 2003; Rathbone, Moulin, & Conway, 2008). It furthermore organizes autobiographical information at many levels of abstraction, from sensory details to conceptual life time periods (Williams, Conway, & Cohen, 2008). Importantly, mental time travel is enabled when autobiographical memories are mentally re-constructed and re-experienced. This gives individuals a sense of a personal ownership and an experience of a congruent self, corresponding to a continuing presence (Boyer & Wertsch, 2009; Fivush, Habermas, Waters, & Zaman, 2011) that results in the phenomenological experience of being someone; a person with a self (Klein, 2014).

The self can be viewed as “a powerful organizational structure in cognition” (Rathbone & Moulin, 2014, p. 1667) “that allows an organism to think consciously about themselves” (Leary & Tangery, 2012, p. 6). In other words, the self might be conceptualized as the psychological processes specifying a sense of self (Prebble, Addis, & Tippett, 2013), or elements of continuity, coherence, agency, time and self-consciousness in James’ (1890/1950) vocabulary. This suggests that self-related knowledge is not a reply of the past (Locke, 1690/1849), but a reconstructive endeavor (Bartlett, 1932; Hume, 1739/1967; Schacter & Addis, 2007) involving everything one recognizes and comprehends about one self. Thus: “The *I* who knows *me* is the same *I* who knows everything else, and the mental

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representation of this knowledge is no different, except perhaps intimacy and richness, than is the mental representation of anything else I know.” (Kihlstrom, Beer, & Klein, 2003 p. 69).

Self-related knowledge that is distributed across declarative memory is divided into a conceptual and a personal type of comprehension about oneself (Conway, Singer, & Tagini, 2004; Klein, 2001, 2012). Former includes self-related schemas, scripts, values, attitudes, and beliefs (Kihlstrom et al., 2003) and latter includes personal reminiscence sketched out as narratives (Conway et al., 2004; Demiray & Bluck, 2011; Thomsen, 2009). In line with, for example, Kant (1787/1929) and James (1890/1950), Klein, German, Cosmides, and Gabriel (2004) and Conway et al. (2004) suggested five cognitive processes accounting for a healthy and stable self operating on an autobiographical knowledge base (Conway & Pleydell-Pearce, 2000).

This implies a conceptualization of the self as involving several interrelated but distinct components (Klein & Gangi, 2010; Knez, 2016; Neisser, 1986) comprising psychological processes accounting for, for example, a context specific self (Knez, 2014, 2016; McConnell, 2011; Neisser, 1988). In accordance with this, Knez (2014) proposed six processes accounting for a context specific self. In other words, how *I* (knower) ground *me* (known) requires (Knez, 2014 p. 170): (1) that I represent autobiographical information over time as a *coherent* part of the self, (2) appropriately *corresponding* to the immediate ongoing reality, and (3) that I am *reflective* upon and (4) aware of me as *possessing* that autobiographical information in a (5) *time-related* unfolding of my experiences; and finally, (6) that I feel emotionally involved in, *attached* to, that autobiographical information.

Attachment, as emotional investment (Marris, 1982) is fundamental for the development of a self-concept and its socialization (Sedikides & Skowronski, 2003); involving perception of oneself and others, as well as being perceived by other persons in social interactions. Coherence and correspondence are basic cognitive processes accounting for the self's striving for regularities. They are “invaluable means of... organizing experience, predicting future events, and guiding social interaction” (Swann, Rentfrow, & Guinn, 2003, p. 369). In addition, the self must also be aware of its mental states (reflection and agency) across time (Klein et al., 2004; Suddendorf & Corballis, 2007); meaning that “through inner *experience* I am conscious of *my existence* in time.” (Kant, 1787/1929, p.35).

1.1. Present study

As mentioned above, autobiographical memory is a goal-directed system (Conway & Pleydell-Pearce, 2000; Knez, 2014) containing sensory and emotional information (Conway, 2009; Conway et al., 2004; Knez, 2016). In line with this, Singer and Salovey (1993) reported that feelings of pride and happiness were positively associated with personal goal-attainment, and Knez (2006) showed that place-related autobiographical memories included emotions of pleasantness and activation. In addition, Knez (2014, 2016) suggested that in constructing a context-specific self, emotional information may precede cognitive information, because emotion modulates better retention and enhances recall from the autobiographical memory knowledge base (Knez & Eliasson, 2017; Phelps, 2006; Welzer & Markowitsch, 2005).

Autobiographical memories may be retrieved using different assessment methods. Focus of the present study is cued sensory-perceptual details of particular autobiographical memories (Barsalou, 1988; Conway, 2009; Singer, 1995) related to a theme. Karlsson, Sikström, and Willander (2013) found that content of retrieved autobiographical memories was dependent on modality of a retrieval cue (visual, auditory, olfactory or multimodal). More specifically, the semantic representation of visually cued autobiographical memories differed from both olfactory and auditory cued memories, whereas latter two only differed marginally. This suggests that the overlap between the visual system and the olfactory and auditory is less than that between the olfactory and auditory with regard to the content of the retrieved events. These differences are in line with several studies that have demonstrated phenomenological differences between visually, olfactory and verbally evoked memories. For example, odor-evoked memories have been found to be more emotional than verbally evoked memories (Chu & Downes, 2002; Herz & Schooler, 2002; Willander & Larsson, 2007). Further, odor-evoked memories are thought of and talked about less often than memories evoked by other modalities (Rubin, Groth, & Goldsmith, 1984; Willander & Larsson, 2006). This finding is of notable interest to present study because it may potentially and indirectly indicate that we share odor-evoked memories to a lesser extent with each other compared to visually or verbally associated memories.

A difference in age distribution and phenomenological experience of autobiographical memories cued by different modalities has also been shown, indicating that odor-evoked memories peak in the first decade of life, whereas memories cued by visual and auditory information peak between 10–30 years (Chu & Downes, 2000; Willander & Larsson, 2007, 2006; Willander, Sikström, & Karlsson, 2015; for a review see Koppel & Berntsen, 2015). Typically, olfactory cues result in fewer retrieved memories compared to other modalities (Larsson, Willander, Karlsson, & Arshamian, 2014). Taken together, these findings suggest that sensory information plays a significant role in autobiographical memory recall and that memories cued by visual information could be more important to the self, compared to memories associated with other modalities.

Given that autobiographical memories provide a personal narrative in conjunction with modality specific effects detailed above, we hypothesized that memories evoked by cues of different modalities may be rated as having differing levels of importance to the self; in particular, we predicted a primacy for memories cued by visual information compared to auditory and olfactory information (Holmes, Mackintosh, Mathews, & Dalgleish, 2008; Koppel & Berntsen, 2015; Larsson et al., 2014). Thus, the aim of the present study was to investigate the links between visually, auditory, and olfactory cued autobiographical memories and the two emotional and cognitive components of the self, conceptualized and operationalized as a context specific self (Knez, 2014); as well as the form and intensity of affective information involved in these autobiographical memories (Knez, 2006). All this is in line with previous research suggesting that several interrelated but distinct components comprising different types of psychological processes might account for the self (Klein & Gangi, 2010; Knez, 2016; Neisser, 1988; Prebble et al., 2013).

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