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REVIEW ARTICLE

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Understanding the relationship between self and memory through the IAM task

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ABSTRACT

In this article we present a review of research on the IAM Task, whereby memories are cued by self-images in the form of "I am … " statements, such as I am a grandfather, I am a Bob Dylan fan, I am from Darlington, I am a Psychologist. Such cues are particularly successful at accessing memories associated with the formation of specific aspects of the self. We describe the conceptual and historical context for the development of our task and review findings from other researchers who have used the same basic design. We present aggregate data and examples from across several experiments, examining how these patterns change in psychological distress and dysfunction. We also discuss research on "I will be" statements and how these have been adopted to examine self-related future cognitions. We conclude that the working self operates to organise memory retrieval and make accessible episodic and semantic material for self-relevant periods across the lifespan. Moreover, accessibility of self-images can be modulated by retrieval of autobiographical memories, highlighting Conway's bidirectional relationship between memory and the self. We provide suggestions for future research and for the first time provide a standardised version of our IAM Task for use by researchers.

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Autobiographical memory; self; identity; imagining; future thinking

Introduction

> "I ams … " seem then to be marked in memory by highly accessible specific memories that come first to mind when the "I am … " is processed. Conway, 2005, p. 612

In some of the earliest thinking about memory retrieval, autobiographical or otherwise, one particularly difficult issue was famously summarised by Norman and Bobrow (1979, p. 109): "How does one know what is needed from memory? Is not the knowledge of what is sought in itself part of the knowledge that is being sought?" Conway's solution to this issue was that a control process created a "retrieval model" guided by a "working self", which accessed information pertinent to current goals. Conway postulated that the working self, so-called to emphasise the dynamic and constantly active nature of this system akin to Alan Baddeley's working memory (Baddeley, 1992), exists to " … maintain coherence … and it does so, in part, by modulating the construction of specific memories, determining their accessibility and inaccessibility, and in the encoding and consolidation of memories" (Conway, 2005, p. 597). This review aims to address the evidence base for this claim about the role of the self in autobiographical memory, focusing on one particular paradigm which Conway helped to develop: the IAM Task. This task, first published as Rathbone et al. (2008) is referred to in a pre-print stage in Conway's seminal paper "Memory and the Self" (from where the above quote comes), and we make particular reference to the studies which have emerged since the publication of that 2008 paper. Rather than undertake a systematic review, our strategy was to consider articles published after the original paper and draw out the main themes arising from this work, in each case focusing on a non-exhaustive review of key articles for each of these themes. The aims of this narrative review are to present: (i) the history of the task and a standardised protocol, (ii) aggregate data demonstrating the relationship between self and memory, and (iii) research that has developed the task to examine future cognitions and to elucidate the self-memory relationship in clinical groups and in experimental studies.

The IAM Task was designed to explore the temporal relationship between self and autobiographical memory, based on the bidirectional links proposed in Conway's self-memory system (SMS) model (2005; Conway & Pleydell-Pearce, 2000). In summary, the SMS comprises the working self (a dynamic control structure) and the autobiographical knowledge base (a hierarchy of episodic and autobiographical memory). The SMS is goal directed,

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such that the working self determines memory accessibility whilst the autobiographical knowledge base constrains the self by determining, for example, realistic beliefs and goals (Conway & Loveday, 2015).

Based on Conway's SMS model, we theorised that, if memories are made more salient by virtue of their self-relevance (e.g., the self-reference effect, Rogers et al., 1977), then any time in life that involves heightened activation of the self-concept (such as the development of new identities, e.g., being a mother, a student, retired etc.) should be associated with increased memory accessibility. This is one theoretical explanation for the reminiscence bump – the over-representation of young adulthood in retrieval of autobiographical memories across the lifespan (Munawar et al., 2018) – which coincides with a time of intense identity development (Erikson, 1950).

We were inspired by studies such as Conway and Haque (1999), that identified a second reminiscence bump in participants from Bangladesh that coincided with a time of war, supporting the theory that periods of change in identity are associated with increased retrieval of memories from that time. In our 2008 paper, across two studies, we found that memories clustered temporally around the emergence of new identities, and this pattern held regardless of whether those identities were concrete (e.g., being a parent, having a specific occupation, being a fan of Bob Dylan) or abstract (e.g., being a worrier, being kind, being adventurous). Essentially, the identities we hold dear are scaffolded by sets of autobiographical memories.[1] We, and others, have since often replicated this temporal clustering effect. In this paper we review the literature based on the IAM Task, summarising what it tells us about the complex relationship between self and memory to date and what we might explore in the future.

The IAM paradigm

Description of task

A very well-established method for surveying and understanding the identity of individuals is Kuhn and McPartland's (1954) Twenty Statements Test (TST). Originally presented as a tool for research in sociology, it is a simple task which asks participants to complete (twenty times) the statement "I am … ". There are a number of different schemes for classifying and summarising the responses given in the task, and the responses given are variously referred to as measures of self-attitudes (e.g., Kuhn & McPartland, 1954), self-concepts (e.g., Schwirian, 1964), the construct of the self (e.g., Grace & Cramer, 2003) and identities (e.g., Rhee et al., 1995). Conway was fond of describing these responses as "self-images" (e.g., Conway, 2005). It is a task with many research applications across disciplines and scientific topics including understanding identity across cultural differences (e.g., Rhee et al., 1995; Driver, 1969; Cousins, 1989), in development (Wang et al., 1998; Montemayor & Eisen, 1977) and in clinical samples (e.g., depression, Hards et al., 2020). The task has different scoring schedules, but its richness lies in being both qualitative, where the responses can be examined as ready descriptions of the individual, but also quantitative. Kuhn and McPartland (1954) themselves described it as an empirical measure and proposed scoring based on how many statements are generated, their order, and their repartition between different categories of response.

In cognitive psychology, two studies inspired our use of the task in autobiographical memory. A first study to make a concrete link between autobiographical memory and the self as measured by the TST was Wang et al. (1998), whose research goal was to understand growing up as an only child. They asked participants to provide ten responses to the phrase "I am", and coded only the first seven responses according to a method proposed by Bochner (1994). Each response was coded as referring to the private self, the collective self, or the public self. The mean number of statements generated for each of these classifications in their large sample of people from Beijing University and a Beijing high school were 4.5, 1.72 and 0.77 respectively. They pinpointed a number of interesting relationships between autobiographical memory and the TST, for instance that the higher participants' private self-description scores, the more likely their earliest memories referred to specific events and concluded that "These results are the first we know of that offer direct evidence of the relationship between the organisation of the self, which varies as a function of childhood environment, and adult autobiographical memory" (Wang et al., 1998, p. 92).

Secondly, an influential paper by Addis and Tippett (2004) aimed to directly test the relationship between memory and the self in Alzheimer's disease. Their TST used a modified version of the coding scheme used by Rhee et al. (1995). In this, responses were classified into four categories of identity: Attributes, social identities, evaluative descriptions, and physical descriptions. The measures they took were strength of identity (the total number of responses), a "quality" of identity measure (the percentage of responses that were coded as abstract) and a measure of the complexity of identity (the number of categories and subcategories in the responses). In addition, they used the Tennessee Self Concept Scale (Fitts, 1965), a more typical questionnaire scale, with 82 items which describe aspects of the self to which the person responds on a 5-point true-false scale. They found the typical differences between controls and people with Alzheimer's disease, with the measures of identity and memory showing impairments. Changes in the self were sometimes rather complex, with the people with Alzheimer's disease generating identities which were at once more likely to be abstract, but also more "vague" than controls. The autobiographical memory tasks showed that patients with Alzheimer's disease had poorer memory for personal semantics and autobiographical incidents (taken from the Autobiographical Memory Interview, AMI; Kopelman et al., 1989), and also generated fewer responses in

autobiographical fluency tasks (for names and events). The critical issue was how these measures related to each other. Addis and Tippett draw out a number of critical relationships between self and memory variables in the Alzheimer's group, such as the total number of responses on the TST and autobiographical fluency for early adulthood names, and for childhood events. Only one such correlation was found in the control group. This study was influential in developing the neuropsychological approach to understanding the relationship between memory and the self. It demonstrated that deficits in autobiographical memory were related to, or accompanied by, deficits in the ability to produce self-concepts.

Both of the above studies use the TST as it was intended, which is to in some way "measure" the self. Our intention was to use the TST to generate statements which we could use as cues for autobiographical memory, to more directly study the link between memory and the self. Our primary motivation was to better understand the formation of the reminiscence bump (for reviews see Munawar et al., 2018; and Koppel, 2013) to explore the idea that autobiographical memory is in general organised around critical periods of self-formation and that heightened accessibility is not just restricted to the reminiscence bump. Since the TST identifies different aspects of the self-concept, generating a set of what Conway called "self-images", we imagined that each aspect of the self as generated on the TST would have with it a set of highly accessible and self-defining memories (Singer & Salovey, 1993). According to the idea that novel, first-time experiences have been proposed to explain the reminiscence bump (e.g., Jansari & Parkin, 1996), we expected that these memories would be temporally clustered around the age at which this aspect of identity emerged.

The basic paradigm is relatively simple and is well represented in the standardised version of the task in the Appendix. Participants generate a number of I ams, e.g., *I am a Father, I am a downhill skier, I am generous, I am impatient, I am a qualified first-aider* and a subset of these statements are chosen (by the experimenter or by the participant) to use as memory cues, such as asking people to generate memories which are associated with the identity of being a father. Even in Rathbone et al. (2008), we varied some of the details of the administration between two separate studies, but Study 2 of Rathbone et al. (2008) is the most typical procedure adopted. In this, participants were asked to write down 10 enduring I am statements that they felt "defined their identity". They then selected four of these statements as the "most personally significant" to their identity and for which they could recall memories. These statements were then each used to generate eight memories. Participants were asked to give a brief title for each of the memories. We propose that retrospective dating of all memories (i.e., at the end of the whole procedure using these brief titles, and not during the retrieval phase) is the best practice, since this reduces possible cueing effects and contamination between the ages given for the self-images and the memories. Similarly, participants are asked to report their age at which each I am statement became self-defining only after all memory titles and dates have been generated. The data are reformulated so that the ages (and/or dates) reflect a temporal distance between the self-image and the memories generated. For instance, for the concept "I am a wife" which was dated as emerging at the age of 27, the memories *meeting my husband Ken for the first time*, aged 22, and *giving birth to my daughter*, aged 29 would be recoded as – 5 and 2 respectively. This paradigm yields a rich set of data (see Table 1 for some examples) and lends itself to collecting current and future self-images, as well as past and future events. For a database and full presentation of I am statements see Rathbone and Moulin (2017a).

Table 1. Examples of I am and I will be self-images and their associated autobiographical memories/future events.

I am	
A sister	Being chased by monkeys in India with my sisters
An animal lover	One of the cats being put to sleep
A loving granny	Being at the birth of my first grandchild
A World War 2 veteran	Discovering my troops called me "the cowboy" and sang a song to me during an inspection with a senior officer
I will be	
A father	Birth of a child
A wife	Our first Christmas
Old	Being neglected in an old people's home
Wacky	Dancing naked on Dartmoor

Key findings

Clustering/organisation

The main findings concern the temporal clustering of memories around the emergence of self-images. In Figure 1, we show aggregate data from several of our experiments and Table 2 shows the descriptive statistics.

Figure 1 shows the standard pattern of results, with two important characteristics. Firstly, the modal value is zero: i.e., a large proportion of memories generated (nearly

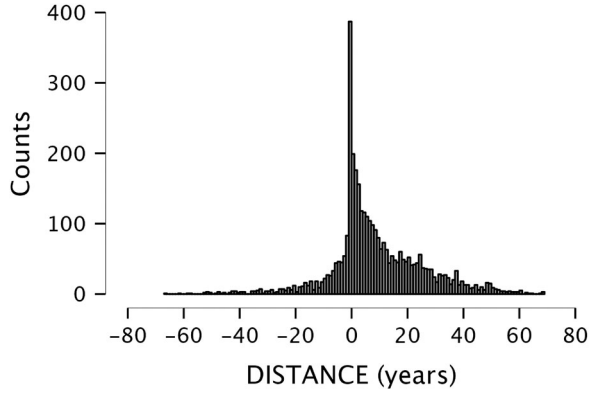

Figure 1. Temporal distribution around self-emergence for 3592 autobiographical memories across three datasets (Chessell et al., 2014; Rathbone et al., 2008; Rathbone, Holmes, et al., 2015).

Table 2. Descriptive statistics for 3592 autobiographical memories across three datasets (Chessell et al., 2014; Rathbone et al., 2008; Rathbone, Holmes, et al., 2015).

	Temporal Distance between Self-image and Memory (Years)
Mode	0
Median	6
Mean (Standard deviation)	9.23 (16.54)
Range	−67–69
Mean participant age	51.27

11%, 387/3592) are from the same year that the self-image is reported to have emerged and 32% (1152/3592) of all memories fall in the range of between 0 and 5 years after the self-image emerged. The second characteristic is that there is a skew towards the memories occurring after the self-image emerged. Only 17% (662/3592) of the memories were from before the emergence of the self-image to which they refer. We presented this as consistent with the idea that autobiographical memory was organised around the self and, in particular, that a set of self-defining memories clustered at the point at which an aspect of the self became salient. In support of this idea that memories close to periods of self-emergence are particularly important for the self, with this paradigm Rathbone et al. (2019) found a significant negative correlation between memory distance and self-relevance, such that memories dated closest to the period of self-emergence were rated as more personally significant than those dated further away.

In terms of our understanding of the reminiscence bump, the straightforward way of examining how identity shapes the lifespan retrieval curve is to simply plot the ages of emergence of the self-images given on the task, following a method used variously for semantic facts (Rybash & Monaghan, 1999), preferences (Janssen et al., 2007; Rathbone et al., 2017), public events (Janssen et al., 2008), and memories (Koppel & Berntsen, 2016). The curve produced (see Figure 2) resembles a reminiscence bump and the typical lifespan retrieval curve, with the exception that self-images such as "I am from Darlington" can be described as emerging from birth, i.e., year 0, which therefore does not produce an absence of data associated with infantile amnesia. Note that Figure 2 shows self-image lifespan distributions for both the whole sample and for participants aged over 40. This is to demonstrate that the bump is not artificially inflated by participants aged under 40, who are restricted to dating events within the reminiscence bump period due to their age. It is common to restrict reminiscence bump studies to participants aged over 40 for this reason (e.g., Koppel & Berntsen, 2019). This pattern of data fits with the theory that young adulthood is a period characterised by identity formation (e.g., Erikson, 1950; Fitzgerald, 1988).

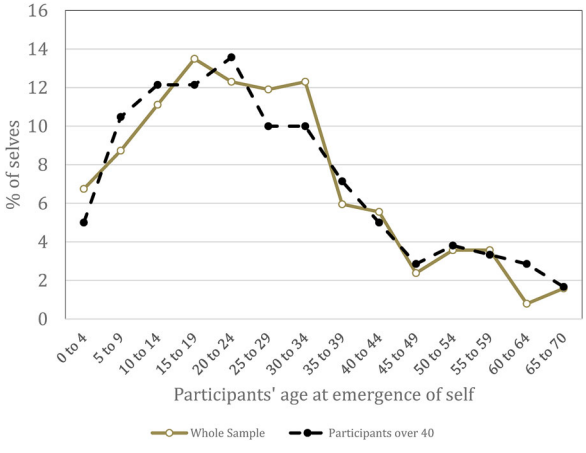

Figure 2. Lifespan retrieval curve for self-images across three datasets (Chessell et al., 2014; Rathbone et al., 2008; Rathbone, Holmes, et al., 2015).

I will be: imagining the self in the future

James (1913) introduced the concept of "potential selves", later developed by Markus and Nurius (1986) as "possible selves" – ideas of the self in the future, related to enduring goals, hopes and fears. Within this motivational context, future selves (and associated imagined events) might be considered as mental representations that underpin goal development related to achieving or avoiding these possible selves. For example, the future self-image of oneself as a runner might motivate starting a running for beginners training programme. D'Argembeau et al. (2012) introduced the concept of self-defining future projections – the future equivalent of self-defining memories (Singer & Salovey, 1993). Inherent here is the idea that some future events are more relevant to the self than others (achieving promotion compared to changing breakfast cereal, for example) – this reflects the motivational nature of the SMS (Conway, 2005). As with autobiographical memories, the relationship between imagined future events and the self is assumed to be bidirectional and goal-driven.

Based on the many established parallels between remembering and imagining (Addis et al., 2007; D'Argembeau, Stawarczyk, et al., 2010; Szpunar et al., 2007) we further developed the IAM Task in order to examine "I will be" statements and the organisation of imagined future events. The protocol for the I Will Be Task is very similar to that described above for the IAM Task – it is, in essence, a future-orientated version of the IAM Task. Participants generate a set of "I will be" statements and then use these to cue specific imagined future events. By dating both the future self-images and imagined events, a cluster score can be calculated to examine the temporal distribution of future events related to future self-images. In a sample of young adults, we found a tight temporal clustering of future events around associated future self-images (Rathbone et al., 2011) with self-images and imagined events dated mostly in the period from 0 to 10 years into the future. This clustering effect was replicated by Chessell et al. (2014), demonstrating that younger and older adults' memories and future events both cluster temporally around times of self-image formation.

There were also some age effects, with younger adults dating future self-images an average of 6.35 years into the future, whilst older adults' future self-images were dated an average of 2.60 years into the future. The dating of future self-images was later examined by Salgado and Berntsen (2018) in large scale study of 998 Danish adults aged 18-70. I will be statements tended to be dated between 5 and 10 years into the future, irrespective demographic factors such as age. Reflecting a self-enhancement bias, participants of all ages tended to generate positive (85%), rather than negative (5%), future self-images (there were 10% of neutral self-images). Furthermore, in line with self-enhancement biases such as temporal self-appraisal theory (i.e., the theory that people evaluate their past selves in a way that supports a positive evaluation of their current self; Ross & Wilson, 2002) negative self-images were dated further into the future (9.15 years; CI [7.80–10.50]) compared to positive self-images, which were dated closer to the present (6.55 years; CI [6.12–6.59]).

Subsequent studies have utilised the I Will Be Task to examine cross-cultural differences in future cognitions (Rathbone et al., 2016) and to measure the impact of the Covid-19 pandemic on young peoples' future self-images (Singh et al., 2022). The task has also been adapted to demonstrate the effects of thinking about the past and future on the content of self-images. As discussed later in this review (see section on experimental work), a number of research teams have manipulated conditions within the IAM Task in order to elucidate the relationships between self, memory and imagining the future. Together, the studies described above demonstrate the organisational role of the self in future thinking. The self-centred organisational features associated with thinking about the future (as well as the past) are suggested to aid the coherence and diachronic unity of the self (Conway, 2009). Whilst it is clear that in experimental tasks people generate representations of their personal future clustered around the development of future self-images, it would be a research priority to see if people also do this spontaneously without explicit prompts from the experimenter. For articles which develop the notion of self in future thinking see D'Argembeau et al. (2010, 2012).

Neuropsychological and clinical groups

When considering the proposed bidirectional relationship between self and memory (e.g., Conway & Pleydell-Pearce, 2000), an obvious question is what happens to the self when memory processes change or fail. Research with clinical groups has elucidated the link between self and memory in two main ways using the IAM Task. First there are studies with neuropsychological populations and case studies of memory impairment that enable us to examine which aspects of autobiographical memory are necessary for self-knowledge (see Klein et al., 2002). Second, research with neuropsychiatric groups that demonstrate *changes* in memory (e.g., over-general memory in depression, Williams et al., 1996) allow examination of the impact of changes in memory on the self.

Whether or not memory deficits exist as a result of a neuropsychiatric or neurological condition, our view is that the self acts as a powerful organisational process in memory (regardless of how few memories are accessible, or how episodic or semantic they are in nature). Below we describe some recent research that has used, or adapted, the IAM Task to investigate self and memory in a number of clinical and sub-clinical populations. These groups include Alzheimer's Disease, amnesia, schizophrenia, alcohol use disorder and dysphoria – in all cases the key area of investigation is the link between self and autobiographical memory.

Dementia

Multiple studies suggests that when episodic memory fails, self-knowledge – semantic facts about one's own life – come to the fore (e.g., Klein et al., 2002; Grilli & Verfaellie, 2015). As is often the case in neuropsychology, much can be learned from groups of patients with the opposite deficit. One such population is people with semantic dementia, who have relatively intact episodic memory, but a significant impairment of semantic memory. Duval et al. (2012) adapted the IAM and I will be Tasks with a group of semantic dementia patients. Compared to controls, the SD patients demonstrated reduced semantic self-knowledge across all time periods except the present and impairments in both episodic and semantic future thinking. In contrast, the SD group's episodic accounts of personal past events were no different from controls and strength of self (measured by the amount of information yielded when generating "I am" statements) was the same across groups.

Building on Addis and Tippett's (2004) work on self and memory in Alzheimer's Disease (AD), discussed above, we used the IAM Task to collect self-images and associated autobiographical memories from 16 people with AD and 29 healthy older adults (Rathbone et al., 2019). As expected, the AD group generated fewer self-images (Cohen's $d = 1.33$) and memories ($d = 1.49$) compared to controls and their memories were less episodic in nature ($d = 1.30$). However, in both AD and control participants, memories associated with self-images clustered temporally around times of identity formation. We propose that these self-supporting memories may provide a scaffold, enabling people with memory loss to maintain access to important, self-defining details about their lives. We further suggest that it might be these self-supporting memories that persist the longest in AD, rather than those that are simply from early adulthood per se (e.g., Greene et al., 1995), although it is common for many self-supporting memories (and indeed the emergence of selves) to be dated in the reminiscence bump period of 15–30 in any case (e.g., Rathbone et al., 2008), as we showed above in our aggregate data set.

Amnesia

Research with amnesic case studies has also demonstrated the persistence of self-knowledge in the face of episodic deficits. Case PJM (Rathbone et al., 2009) developed focal retrograde amnesia following a bicycle accident, which left her unable to recall episodic memories for many important life events including the birth of her second child and a house move. Focal retrograde amnesia (FRA) is a form of memory loss restricted to the period before brain injury. FRA is particularly relevant to the study of semantic and episodic memory as many reported cases demonstrate a dissociation between these memory systems (e.g., Conway & Fthenaki, 2003; Nadel & Moscovitch, 1997; Tulving et al., 1988). Furthermore, a growing body of work with amnesic patients points toward a complex relationship between self and memory. For example, Klein et al. (1996) reported case WJ, who lost access to episodic memories covering a seven-month period prior to a concussion. During the period of amnesia, and after her full recovery, WJ was asked to describe her personality during her first semester at university (a period inaccessible by memory). Despite severe deficits in episodic memory, WJ's descriptions of her personality were stable over time, indicating that information about the self can persist without access to specific autobiographical memories. Whilst WJ's amnesia only covered a short period (and thus self-knowledge could arguably be supported by memories from other periods of life), other cases demonstrate that accurate self-knowledge can persist even when amnesia covers the lifespan. Patient KC's amnesia spanned his entire life, however he accurately rated traits for self-descriptiveness over two separate occasions, and in a way that was consistent with his mother's ratings of his personality (Tulving, 1993). Thus, KC possessed accurate self-knowledge despite an inability to recall any autobiographical memories to support this knowledge.

Building on this earlier work with amnesic cases, we used the IAM Task to examine whether PJM's deficits in episodic memory would affect her sense of self (Rathbone et al., 2009). This study was the first to examine the extent to which someone with amnesia could generate memories associated with self-images, and how these self-supporting memories are organised temporally.

PJM demonstrated a pronounced episodic deficit and using a Crovitz word cue task to test autobiographical memory (generating memories to cue words such as "Letter" and "Restaurant"; Crovitz & Schiffman, 1974) she generated semantic "facts" rather than specific episodic events. In the IAM Task, PJM also tended towards generation of semantic rather than episodic memories. For example, when generating memories to the self-image "I am the survivor of an accident" PJM recalled: "I remember being in the hospital, and I remember things like changing my room, but I have no definite events that I can describe". PJM was clearly aware of her inability to recall specific details, however, when we plotted her IAM Task memories around ages of identity formation, her memories showed a similar temporal clustering distribution as the matched control group. To gather more information about PJM's self-concept, she also completed the full Twenty-Statements Test (Kuhn & McPartland, 1954). Although unable to generate a full set of 20 statements, PJM's 12 self-images were similar to the range of statements given by participants across studies using this task. We propose that semantic autobiographical memory supports the self in the same way as episodic autobiographical memory, and that when episodic memories are inaccessible (via organic amnesia, AD, or as a result of memory deficits associated with disorders such as epilepsy or dysphoria), semantic autobiographical facts may organise and support knowledge about the self to aid a coherent sense of identity.

In support of this idea, Grilli and Verfaellie (2015) suggest that personal semantic memory plays a key role in supporting the self-concept, whether or not episodic memories are accessible. In their study, Grilli and Verfaellie tested a group of eight people with medial temporal lobe amnesia and compared them with 12 healthy controls. All participants generated eight self-images and, for the four highest ranked, completed an open-ended narrative task in which they spent up to four minutes describing why they described themselves as each self-image. After this, they generated a set of six autobiographical memories per self-image. Results from the narrative task showed that personal semantic memory was the most common form of self-supporting information in both groups. The autobiographical memory task results showed a group difference – whilst the control participants tended to recall unique (episodic) events when probed to do so, the amnesic participants did not (seven of the eight participants recalled a total of one or fewer unique events).

The idea that personal semantic memory forms a scaffold for the self is also supported by evidence from a case of transient epileptic amnesia (TEA) – a more subtle memory deficit characterised by a subjective complaint of memory loss, alongside normal results on clinical tests of episodic memory. This memory deficit is more nebulous than in amnesia caused by dementia or head injury, so we were interested in the organisation of memories and self-images in TEA (Illman et al., 2011). Patient EB was a 73 year old man with TEA. He characterised his problems as "memory attacks" (periods of forgetfulness) that spanned 20 years. Although these "attacks" were successfully treated with epileptic medication, EB complained of memory loss from periods of his life since retirement (e.g., being unable to recall details of holidays in New Zealand and Fiji) and that his memories lacked the vividness they once had. Similar to PJM, EB's memories were less rich and episodic compared to controls, but in the IAM Task the semantic facts about his life still clustered around periods of self-emergence, demonstrating a robust self-centred organisational pattern in his memories.

The IAM Task has also been used to elucidate the link between self and memory in psychogenic amnesia, a rare form of memory loss in which psychological trauma is thought to trigger loss of access to autobiographical memories and self-knowledge (Staniloiu et al., 2010). We reported the case of JH, a 60-year-old male whose psychogenic amnesia covered the period from early childhood to age 53. He was tested both before and after recovery (following hypnotherapy) allowing us to examine the impact of psychogenic memory loss on both identity and ability to image the future (Rathbone, Ellis, et al., 2015). Prior to recovery, JH showed impaired performance for both semantic and episodic AM components (measured using the AMI and Crovitz tasks) whereas he performed at the same level as controls post-recovery. IAM Task results from the period before recovery showed that JH's memory deficits also extended to his self-supporting memories. He was unable to generate as many memories as controls, and these were not organised in the same way as controls when first tested. However, following recovery, JH's IAM Task results matched those of controls – he generated a full set of 32 self-image cued memories (compared to only 23 when amnesic) and these were organised in a broadly similar distribution to control participants. Furthermore, following recovery these self-images were organised in a similar lifespan retrieval curve to controls, dated as most frequently emerging in young adulthood. In contrast, prior to recovery JH dated all of his self-images as emerging within his fifties – the only period accessible to him in memory. Importantly, these findings suggest that psychogenic autobiographical impairment can limit our ability to access pertinent semantic information about ourselves from across the lifespan – which is in contrast to the extant literature on organic memory disruptions. Crucially, research using the IAM Task showed this patient was unable to construct a coherent life narrative that is supported by knowledge of the self through time; something that is of critical importance in exploring further psychogenic amnesia and its relation to organic memory disruptions. This "blanket" disruption to self-relevant information in psychogenic amnesia is consistent with the proposal of it being a "malady of the constricted self" (Staniloiu et al., 2010). It is important to note the controversy around the diagnosis of psychogenic amnesia and the difficulty in ascertaining whether memory impairments in such cases are genuine or malingering (see Mangiulli et al. (2021) for analysis of beliefs about and self-reported dissociative amnesia in the general population). In JH's case, we consider it unlikely that he was malingering. He did not perform below chance on any of the standardised tasks used and his performance on most areas of the cognitive battery was similar to controls. His amnesia lasted six years and he and his wife reported that it had caused the family a great deal of distress. He returned to work soon after the onset of his amnesia and did not receive any financial benefits that may have provided an incentive to malinger.

We next turn to research on a number of clinical and sub-clinical groups that demonstrates the impact of changes in autobiographical memory on the self.

Schizophrenia

Although a disordered sense of self has frequently been described in patients with schizophrenia (e.g., Freedman, 1974), there is still uncertainty about which components of the self are most impacted and the extent to which self-related processing might be related to autobiographical memory impairment (e.g., episodic memory deficits, Riutort et al., 2003; Cuervo-Lombard et al., 2007; Danion et al., 2005). In order to directly examine the relationship between self and autobiographical memory in schizophrenia, Bennouna-Greene et al. (2012) used the IAM Task with 25 schizophrenic patients and 25 controls. Participants generated twenty self-images and then selected the four that they considered most central to their identity. These self-images were then each used as cues for six memories, thus cueing 24 memories in total. In addition to examining temporal organisation (i.e., clustering of memories around associated self-images), Bennouna-Greene et al. also assessed *thematic organisation* of memories in terms of how thematically-linked each memory was to the self-image that cued it. This was measured by both participants and the researcher; the participants' score was generated as a rating between 1 (very weak) and 5 (very strong) to indicate their perception of the strength of the thematic link between each memory and its related self-statement, whereas the researcher used a two-point scale in which a strong link was scored as 1, and an absent or vague link was scored as 0. Whilst the temporal organisation of memories cued by self-images was much the same in schizophrenic participants and controls, results on the thematic organisation revealed some intriguing differences. No differences were found between patients and controls in terms of the thematic link scores rated by the participants, however there was a significant difference in the researcher-generated thematic ratings. Here the thematic link score between schizophrenic patients' memories and self-images was rated as significantly lower than for controls (Cohen's $d = 1.11$), despite the researcher being blind to participant group. As a methodological innovation, whilst being time-consuming, this notion of evaluating the thematic link between the memory generated and the initial self-image would be of value for future research in evaluating the narrative and content-based relationship between memory and the self.

Alcohol use disorder

More recent work has used the IAM Task to elucidate the self-memory relationship in alcohol use disorder (AUD). This work built on earlier research using a self-defining memory task to demonstrate alterations in highly self-

relevant autobiographical memories in AUD (Nandrino & Gandolphe, 2017). De Groote et al. (2023) asked a group of participants with alcohol use disorder (AUD) and a group of control participants to generate sets of self-images and associated autobiographical memories. The self-images were coded by the researchers as positive, negative or neutral and the memories were rated by participants for emotional valence and by researchers for episodic specificity. Whilst there was no group difference in terms of the proportion of positive self-images, the AUD group generated significantly more negative self-images (23% versus 13% of all self-images), and significantly fewer neutral self-images than controls (23% versus 33%). The AUD group also demonstrated an impairment in autonoetic recollection (characterised by less episodically rich self-supporting memories), suggested by the authors to contribute to a poorer diachronic unity of the self. Furthermore, the AUD group generated fewer memories (and these memories were more semantic in nature) for their positive self-images compared to controls. This suggests a lack of support for positive conceptions of the self in AUD, which may be related to the increased tendency to produce negatively valenced self-images seen in this group. Hierarchical regression indicated that use of adaptive emotional regulation strategies was a significant predictor of the use of positive or negative self-statements in the AUD group. The results are consistent with our notion of semantic information being used to structure the self-concept in the absence of episodic detail, although the pattern is more nuanced, with a failure to generate specific episodic memories in support of positive self-images, consistent with the idea of overgeneral autobiographical memory in depressive syndromes (Williams et al., 1996).

Dysphoria

Similarly, Grace et al. (2021) examined the relationship between self-images and self-supporting memories in dysphoric (scoring $\geq$16 on the Center for Epidemiological Studies Depression scale – Revised; CESD-R; Eaton et al., 2004) compared to nondysphoric (scoring <16 on the CESD-R) individuals. In their first study, participants were asked to generate positive and negative self-images and to use these as cues for autobiographical memories which were rated for emotional valence, vividness and centrality to their life story. There was no significant difference in the number of memories that nondysphoric participants generated to positive and negative self-image cues, suggesting that both positive and negative aspects of identity are supported by clusters of autobiographical memories. This replicates our earlier findings (Rathbone & Steel, 2015). Whilst the same effect was found in the dysphoric group, the ratings indicated that participants with dysphoria rated their positive self-supporting memories as less vivid than nondysphoric participants (Cohen's d = 0.75), and their negative self-supporting memories as more central to the life story than nondysphoric participants (d = 0.60). In a second experiment the order of tasks was reversed, such that participants first generated positive or negative autobiographical memories and then used these to cue self-images. Intriguingly, retrieval of a positive memory led to generation of more positive self-images in the nondysphoric group only, suggesting that positivity biases inherent to the goal-directed SMS may be disrupted in dysphoria. This work has important implications, particularly given the fact that positively valenced self-images have been shown to be correlated with higher scores on range of well-being measures in both younger and older adults (Rathbone, Holmes, et al., 2015). It also might suggest a therapeutic use of (positive) autobiographical memories, which might be retrieved in order to cue a more positive evaluation of the self-concept. Indeed, experimental research has investigated to what extent access to self-images and memories can be manipulated in IAM Task designs, which we review now.

Experimental work – manipulating the self-memory relationship

In this section we consider how experimental manipulations demonstrate the relationship between the self-images generated in IAM tasks and autobiographical memories. As a basic notion, for instance, more accessible aspects of the self-concept should be related to more highly accessible autobiographical memories. In short, such experiments go beyond the original notion of temporal organisation around self-images to consider aspects of access to self-images and their related autobiographical representations. The IAM Task lends itself to basic experimental work using standard cognitive paradigms such as task-switching and fluency measures. The first study of this nature was designed to examine the accessibility of autobiographical memories associated with self-images that were ranked by serial position and ratings of personal significance (Rathbone & Moulin, 2014). Here, accessibility was measured via a fluency task (the number of memories generated over two minutes). We found that the most salient self-images (featuring earlier in the list and rated as most personally significant) were associated with more accessible sets of autobiographical memories (r = −.23). Further support for the executive function of self via the SMS was found in subsequent task-switching studies (Rathbone & Moulin, 2017b) in which participants completed an autobiographical memory fluency task, using either alternating self-image cues or the same cue repeatedly. Across two experiments we found a clear switch cost – when switching between two different self-images participants took longer to generate autobiographical memories than when generating multiple memories to the same self-image (Cohen's d = 0.42). In line with Conway's hierarchical structure of autobiographical memory (Conway & Pleydell-Pearce, 2000),

we propose that self-images feature at the general event and life-time period level of autobiographical memory, indexing access to the event-specific knowledge contained in specific autobiographical memories. Task switching and fluency studies demonstrate the executive function of self-related information, with task switch costs indicating the processes involved in retrieving memories according to the current goals of the self.

Later work by Charlesworth et al. (2016), reversed the order of the IAM Task by asking participants to generate self-images after generating a particularly self-relevant autobiographical memory. In a between subjects design, half the participants first generated a personally relevant autobiographical memory and half took part in a control task (describing the solar system). After this, all participants generated as many self-images as they could for 1 minute. The participants who first described an autobiographical memory generated significantly more self-images during the self-image fluency task than those who first completed the control task (d = 0.74). Furthermore, the content of the self-images generated also differed across conditions, with participants in the autobiographical memory condition more likely to generate psychological trait-based self-images than those in the control condition.

Replicating Charlesworth et al. (2016), D'Argembeau and Garcia Jimenez (2023) found that thinking about a past self-defining event (compared to describing the solar system) resulted in participants generating a higher proportion of trait-related self-images. Furthermore, this effect was also demonstrated for future self-defining events, compared to both the solar system description control task and, in an additional study, when the control condition involved describing an ordinary (as opposed to self-defining) future event. Experimental work on the relationship between future self-images and associated imagined events was also carried out by Hamilton and Cole (2017). They used the I Will Be Task in a sample of young adults, manipulating temporal distance in a near versus far design. They found, consistent with construal level theory (Trope & Liberman, 2010), that imagined future events cued by self-images dated far in the future were less vivid and more likely to be viewed from a third-person observer perspective, compared to future events cued by self-images dated in the near future. Construal level theory is based on the idea that greater distance between the self and an object (whether temporally, spatially or socially) is associated with greater abstraction. Here, the greater temporal distance between current self and imagined future events in the far (compared to near) future was associated with more abstract and less vivid imagery.

These studies which look at how self-images and memories can be experimentally manipulated are also coherent with general accounts of how semantic information can activate relevant memories in autobiographical memory (e.g., Mace, 2010). The process of generating "I am … " statements in the IAM Task may also be viewed as generating cues with which to interrogate the memory system. Given that self-images are conceptual representations of the self, they may be thought of as like semantic information which then primes associated autobiographical memories. This aligns with findings from Mace et al. (2019), who demonstrated that semantic primes activate related autobiographical memories. As such, self-images may act as semantic primes, organising autobiographical retrieval through relational processing within the self-memory system.

Limitations

Experimental studies, such as those described above, allow researchers to manipulate aspects of self and/or autobiographical memory and thus test some of the theories posed by the SMS (Conway & Pleydell-Pearce, 2000). Since the SMS is bidirectional in nature it is therefore difficult to avoid circularity when trying to tease apart the relationship between self and memory. Whilst we propose that self-images organise clusters of autobiographical memories, it is equally possible that clusters of autobiographical memories give rise to self-images. This lack of clarity over the direction of effects is one limitation of the IAM Task design, but notably the SMS would predict that such organisational processes exert effects in both directions. This bidirectionality is clearly demonstrated in studies that have reversed the order of the IAM Task (e.g., Charlesworth et al., 2016; D'Argembeau & Garcia Jimenez, 2023; Grace et al., 2021).

Perhaps more importantly, one concern is that this circularity leads to anchoring effects in our experiments: participants are primed to think about their self-concept in a certain way by the memories that they generate, and vice versa, such that it may be simply an artefact of the design that dates cluster around the same time point. One way of addressing concerns that participants are primed to date self-images in accordance with a set of associated memories is to incorporate long delays within studies. Our 2008 paper included data from a follow up study, collected four years after participants first completed the IAM Task. We wanted to rule out the possibility of age of self-image formation being anchored by the dates of memories generated in the IAM Task, so we asked participants at follow up to simply date the age of emergence for the three self-images used as memory cues four years previously. Results revealed no significant difference between ages of self-image emergence at the two time points, suggesting that the dating of self-images was not primed by memories generated when the IAM Task was initially completed. We propose that thinking about the lifespan in terms of self-images is actually a rather natural thing to do, and people tend to generate a consistent and replicable set of self-images with stable dates across time. In this way, self-images can be thought of as idiosyncratic and self-relevant aspects of the self which fit into culturally disposed life scripts (e.g., Thomsen &

Berntsen, 2008). As well as having prescribed culturally-shared norms about life events such as falling in love, getting married, or having children, which fall into a "script", we annotate these events with our own memories and dates, such that we think of ourselves falling in love at a certain age and a certain point in our lives.

A final limitation concerns the accuracy of the dates (both for ages at events recalled and for self-image emergence) that participants generate. Participants may find it difficult to accurately date events that happened many years previously and the process of self-image dating can be subjective (e.g., there is not necessarily an objective date at which someone becomes "a worrier", as opposed to a more concrete self-image such as "a mother" – although note that we found the same clustering pattern for concrete and abstract self-images in our 2008 analysis). The IAM Task protocol does not include any form of verification for the content or dates of recalled events or self-images (in common with many studies of autobiographical memory). Furthermore, previous research has established that various cognitive processes are involved in memory dating (e.g., Betz & Skowronski, 1997; Skowronski et al., 2007) and the inherently reconstructive nature of memory generation (Conway, 2005) means there are likely to be some inaccuracies when people date past events. However, studies have shown that people are relatively accurate at dating self-events (e.g., compared to other-events; Betz & Skowronski, 1997) and, given the consistent pattern of results shown across multiple studies reviewed, we think it is reasonable to assume that the dates generated correspond to underlying memories and self-images.

Future directions

The work reviewed above opens up a number of avenues for future research. First, the finding that the emotional valence of self-images is highly correlated with well-being (Rathbone, Holmes et al., 2015) suggests that self-images could potentially be manipulated to improve well-being. In support of this proposal, Niveau et al. (2022) developed a lexical association technique, showing that self-esteem can be increased by focusing on positive self-related statements and associated episodic memories. Across two intervention studies, Niveau et al. compared change in self-esteem scores in two groups, both of whom completed multiple sessions of a computerised task (six sessions of five minutes every two days). The experimental group were shown a set of 19 positive self-statements (e.g., I am intelligent; I easily find solutions) and instructed to read each carefully then visualise detailed situations corresponding with each statement before moving onto the next. The active control group did the same task, the only difference being the switch from self to other within the statements shown to participants (e.g., parents easily find solutions). Results from two studies showed a greater increase in global self-esteem scores (assessed using the Rosenberg Self-Esteem Scale; Rosenberg, 1965) in the group that completed the task for self-focused statements compared to the control group. Further, in the second study, medium-term effects were observed at a follow-up five days after the end of the intervention. This emerging line of research could inform the development of new therapeutic and clinical interventions with valuable real-world impacts.

Another avenue for future research is to continue to develop applications of the IAM Task to understanding the self-memory relationship in neurodevelopmental and clinical groups. For example, emerging work on Developmental Coordination Disorder (DCD; Rathbone & Wilmut, Submitted) suggests that increased wellbeing in DCD is associated with more positive self-images, which are in turn associated with more positive self-supporting memories. Further work could also build on the finding that, in cases of memory impairment and in healthy adults, self-images seem to be supported by semantic autobiographical knowledge rather than specific episodic memories (e.g., Grilli & Verfaellie, 2015; Rathbone et al., 2009; 2019). Klein et al. (2002) proposed that there is something "special" about self-knowledge, demonstrating its dissociation from both episodic and non-autobiographical semantic memory. For healthy functioning it is important to maintain a stable, coherent sense of self that persists through time by whatever means available. We suggest that the driving force to achieve personal continuity can be supported by either episodic or semantic systems (see also Prebble et al., 2013) and that clusters of memories/future events that support knowledge of past, present and future self-images play an important role in this process.

Finally, the IAM Task lends itself to adaptation to examine the emerging field of collective identity, collective memory and collective future thinking (Heux et al., 2023) via "We are … " and "We will be … " tasks. These methods could provide valuable insights into factors related to long-term future cognitions around, for example, protecting the environment, healthy behaviours, financial planning, and career progression amongst others. Multiple studies using the I will be Task have replicated the finding that people of all ages tend to only think about themselves in the future within a 5–10 year timeframe (e.g., Chessell et al., 2014; Rathbone et al., 2011; Salgado & Berntsen, 2018). Understanding what processes underlie such short-term temporal horizons and, potentially, developing experimental manipulations that enable us to picture a longer-term future for ourselves and society could be a fruitful and impactful avenue for future research.

Conclusion: bringing it all back home

Conway's major contributions to memory research were theoretical, in particular in *The Construction of Autobiographical Memories in the Self Memory System* (Conway &

Pleydell-Pearce, 2000) and *Memory and the Self* (Conway, 2005). In these articles he proposed dynamic processes by which specific memories of the past are shaped and reconstructed, with a central concept being the working self. His empirical work is much less focused and takes on a range of methods, interests and scientific concepts, ranging from the very long-term memory for knowledge acquired at school and university (Conway et al., 1992) to the use of wearable cameras in memory enhancement and rehabilitation (e.g., Mair et al., 2019). Conway's earliest experimental work centred on the notion of a hierarchy in autobiographical memory, inspired by Rosch's notion of the semantic network (Rosch, 1975; Conway & Howe, 2022; Moulin et al., 2023) and drew upon reaction times (e.g., Anderson & Conway, 1993; Conway, 1987). His diverse publications after the publication of his two theoretical contributions in part addressed the models and ideas he outlined in those works, notably with research programmes into the remembering-imagining framework (e.g., Conway & Loveday, 2015) and the use of memory concepts in the justice system (e.g., Hohl & Conway, 2017). The research represented in this review fits into his work seeking to flesh out the self-memory relationship, and we were inspired by the notion of the working self as being somewhat "executive" in its functioning in the experimental approaches we describe here: the working self acts to make available a population of relevant memories and other forms of information in the here-and-now. Primarily, we have shown this in the temporal clustering of memories around the emergence of self-images, but also in tasks which look at the accessibility and fluency of memories, and other researchers have used this approach in memory impairment and psychological distress to better consider self-related processes in cognition.

It seems to us that Conway's notion of the relationship between memory and self is well supported by data from the IAM paradigm, but whilst we are on firm ground in terms of an empirical relationship, the actual workings of the working self remain a little descriptive, and as we have pointed out, circular. The executive nature of the working self, just like as in working memory, can fall foul of criticisms of a homunculus (e.g., Hazy et al., 2006). What is it really in the self which is doing all this organisation, making accessible and controlling? The interested reader is directed towards reviews by Klein (2010), Sui and Humphreys (2015) and Frewen et al. (2020). We are not proposing to solve this problem here, but we will at least point out that the notion of the self seems somewhat independent from memory in more than a handful of neuropsychological studies, and this is where there is perhaps most scope for addressing the bidirectional relationship between memory and the self. That is, people with episodic memory impairment draw upon semantic content to support their self in the absence of other information and produce coherent justifications of their self-concept. Conway (2005) proposed that this was achieved by "conservatism" the working self simply acts to reduce goal change which may destablise the self. Note that the working self, according to Conway, will bring to mind only information pertinent to the current goals, and it may even distort memories of events in order to maintain coherence. These self-related distortions reflect the highly reconstructive nature of autobiographical memory (for recent work elucidating the role of the self in false associations in memory, see Wang et al., 2021). The working self is thus not responsible for anything other than activating information pertinent to current goals, according to projected and idealised representations of the self. It is as such a fundamental part of goal orientated cognition and possibly therefore exists independent of (episodic) memory retrieval. In one of Conway's last academic works, Conway and Howe (2022) emphasised the role of *inference* in memory retrieval, a concept that has somewhat fallen from view in cognition. They stated that at least part of the content of any memory retrieved will be inferred from what is known, rather that what was experienced. For us, the working self acts to guide *inference* and it will draw upon whatever information comes to mind to justify the current goal.

The IAM Task has opened up a new way of examining the relationship between the self and memory, and in its simplest form it consists in harvesting a set of self-images which can then be provided back to the participants as cues to retrieve autobiographical memory. At least in a neuropsychological context, such cues have been shown to be more likely to retrieve autobiographical details than more generic cues (e.g., travel, work, relationships; Ernst et al., 2016) and we propose here that they are a particularly direct and powerful cue for generating self-defining memories. Over and above this contribution to the memory researcher's toolbox, the IAM Task has provided support for the mechanisms at play in the self memory system and has also illuminated how these processes work in psychological distress and dysfunction, something which was never far from Conway's preoccupations:

> It is significant because memories are an intrinsic part of us – they are the database or the content of the self. They ground it in a remembered reality that constrains what the self can be now and in the future, and what it could possibly have been in the past. Because of this, memories are not some sort of mental wallpaper that merely provide a backdrop for the self. They are alive, free, sometimes alien, occasionally dangerous mental representations, that can overwhelm as easily as they fulfil. Conway, 2006, p. 548

Note

1. Martin Conway provides his own example: "In a flat I used to live in I see myself sitting on a wooden kitchen chair at an old Formica-topped kitchen table I used as a desk. On the table/desk stands a small bookcase with wooden sides and one shelf. It houses my (very) modest collection of books. … I am wearing a checked grey, black and white shirt, jeans, and have a very strong sense of myself. … It was about this time, shortly after in fact, that I decided to study psychology

at university and much that occurred subsequently in my life stemmed from that decision. In fact I now vividly remember the moment when the idea of becoming a psychologist came to me, and that remains a memory of a self-defining moment of enduring significance for me." (Conway, 2006)

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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Appendix

The IAM Task – Standardised Questionnaire
Clare Rathbone & Chris Moulin 2024
Please give your age: _____ years
SECTION 1 – Identities
Below is a list of 4 identity statements starting with the words "I am … " Please complete each of the 4 statements by writing about an aspect of your identity that you feel is essential to defining who you are. These might be roles, personality traits, or anything that you feel defines your sense of identity in some way (e.g., *I am a mother; I am an extrovert; I am a thrill-seeker*). Please try to make them enduring aspects of your sense of "self", rather than just how you feel today. Please bear in mind that this questionnaire will later ask you to recall memories based on some of these statements.
I am _____ [IAM 1]
I am _____ [IAM 2]
I am _____ [IAM 3]
I am _____ [IAM 4]

SECTION 2 – Memories
Using IAM 1 from above, please give 8 memories of times when you feel this identity was significantly present in your life history. They should be memories where this particular aspect of your sense of identity is present, and they can be from any time in your life. It is very important that the memory is of a *specific event* that you can bring to mind, lasting minutes or hours, but *no longer than a day*. The memory should be at least 1 year old. For each of the 8 different memories you think of, please write a brief title. This title needn't be long, or include sensitive or personal information, but it should enable you to identify the memory later if you are asked, e.g., *trip to watch a band with my sister*
IAM 1, Memory 1:
_____
IAM 1, Memory 2:
_____
IAM 1, Memory 3:
_____
IAM 1, Memory 4:
_____
IAM 1, Memory 5:
_____
IAM 1, Memory 6:
_____
IAM 1, Memory 7:
_____
IAM 1, Memory 8:
_____

Now using IAM 2 from above, please give 8 memories of times when you feel this identity was significantly present in your life history. They should be memories where this particular aspect of your sense of identity is present, and they can be from any time in your life. It is very important that the memory is of a *specific event* that you can bring to mind, lasting minutes or hours, but *no longer than a day*. The memory should be at least 1 year old. For each of the 8 different memories you think of, please write a brief title. This title needn't be long, or include sensitive or personal information, but it should enable you to identify the memory later if you are asked, e.g., *trip to watch a band with my sister*
IAM 2, Memory 1:
_____
IAM 2, Memory 2:
_____
IAM 2, Memory 3:
_____
IAM 2, Memory 4:
_____
IAM 2, Memory 5:
_____
IAM 2, Memory 6:
_____
IAM 2, Memory 7:
_____
IAM 2, Memory 8:
_____

Now using IAM 3 from above, please give 8 memories of times when you feel this identity was significantly present in your life history. They should be memories where this particular aspect of your sense of identity is present, and they can be from any time in your life. It is very important that the memory is of a *specific event* that you can bring to mind, lasting minutes or hours, but *no longer than a day*. The memory should be at least 1 year old. For each of the 8 different memories you think of, please write a brief title. This title needn't be long, or include sensitive or personal information, but it should enable you to identify the memory later if you are asked, e.g., *trip to watch a band with my sister*
IAM 3, Memory 1:
_____
IAM 3, Memory 2:
_____
IAM 3, Memory 3:
_____
IAM 3, Memory 4:
_____
IAM 3, Memory 5:
_____
IAM 3, Memory 6:
_____
IAM 3, Memory 7:
_____
IAM 3, Memory 8:
_____

Now using IAM 4 from above, please give 8 memories of times when you feel this identity was significantly present in your life history. They should be memories where this particular aspect of your sense of identity is present, and they can be from any time in your life. It is very important that the memory is of a *specific event* that you can bring to mind, lasting minutes or hours, but *no longer than a day*. The memory should be at least 1 year old. For each of the 8 different memories you think of, please write a brief title. This title needn't be long, or include sensitive or personal information, but it should enable you to identify the memory later if you are asked, e.g., *trip to watch a band with my sister*
IAM 4, Memory 1:

IAM 4, Memory 2:

IAM 4, Memory 3:

IAM 4, Memory 4:

IAM 4, Memory 5:

IAM 4, Memory 6:

IAM 4, Memory 7:

IAM 4, Memory 8:

SECTION 3 – Dating

Please go back to the 8 memory titles you wrote for each statement (so 32 memories in total) and write next each memory the age you were when each memory is from. For example, if the statement "I am a daughter" generated a memory of a shopping trip with your mother to get an outfit for a party when you were 15, you should write "15" next to that memory. If you cannot remember exactly what age you were, please make as accurate a guess as possible, and give an age for each memory.

Age when identities began:

Finally, for each of the 4 IAMs that you gave memories for above, please give an age at which you feel it became a defining part of your identity. This means an age at which you feel you truly became a person who would define themselves by using that statement. For example, if you generated the identity of "I am a student", and if this began when you were 18, you should write 18 next to the relevant statement.

Next to the appropriate statement, please write what age you were, in years, when each of the 4 IAM statements became a central part of your identity.

1st I am started at age: _____

2nd I am started at age: _____

3rd I am started at age: _____

4th I am started at age: _____

This is the end of the questionnaire. Thank you for taking part.

Scoring (do not show to participants).

To investigate temporal relationships between identity statements and the memories they cue, all memories can be reformulated as the number of years distance from the identity that cued them. For example, if someone generated a memory from age 22 which was cued by an identity that began at age 15, this memory would be reformulated as 7 (22 minus 15). If another memory for the same identity was dated age 12, this would be reformulated as – 3 (12 minus 15). Thus, all memories will be given either a positive score (occurring after the age of the associated identity's emergence) or a negative score (occurring before the age of the associated identity's emergence), or 0 if they occurred in the same year as the age of identity emergence.

This questionnaire is free to use. Please cite using the reference for the article this questionnaire is appended to in Memory (Rathbone & Moulin, 2024).