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Remembering religious rituals: autobiographical memories of high-arousal religious rituals considered from a narrative processing perspective

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ABSTRACT

Autobiographical memory and religion both have the ability to guide us in our understanding of the world. One place where memory and religion intersect is in religious rituals, which have the potential to generate important memories. Religious rituals with high levels of arousal are expected to generate especially vivid memories. In this article, previous experimental anthropological work on memory and religious rituals will be discussed within the context of an extensive background of autobiographical and episodic memory research (including aspects like episodicity, emotionality, valence, and specificity), accompanied by recommendations for future research in the cognitive science of religion. Moreover, a novel perspective, based on the literature of narrative processing, memory reconstruction, and reflection, will be proposed. In this article, it is suggested that the experience of the ritual itself may be the goal of high-arousal religious rituals, giving rise to memories with high levels of emotionality. The subsequent narrative processing of these memories, in which interpretation rather than accuracy is pivotal, allows the memories to become an important part of the participants' life narratives, thus contributing to the participants' identities and sense of coherence and purpose.

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1. Introduction

Memory allows us to get a grasp on the world, to learn from it, and to live in it. Religion has a similar function of anchoring and stabilizing our understanding of ourselves and our lives – the intersection of memory and religion is therefore a highly important one. One way in which religion and memory meet is through religious rituals. Religious rituals are found all over the world, and hold important places in individuals' lives (Bell, 1997). Rituals[1] may be a crucial way for religions to instill memories in their followers, and high-arousal rituals[2] may do this to an even larger degree. These memories in turn might contribute importantly to one's identity and understanding of the world.

Research on religious rituals has seen a great surge in the past decade or so (e.g., the ESRC Large Grant "Ritual, Community and Conflict"). However, currently only one experimental anthropology study has tested memories of high-arousal religious rituals directly (Xygalatas et al., 2013). Moreover, as will be argued in this article, there are a number of gaps in the previous research, including an (incorrect) focus on the accuracy of memories of religious rituals, an underestimation of crucial

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aspects of these events such as their significance and emotionality, and the lack of a greater framework as to how these memories may be processed exactly, and why.

In this article it will be suggested that the experience of high-arousal religious rituals may be the goal of the rituals in itself, creating memories of high emotionality and significance. The emotionality and significance of these memories explain why such memories can be highly vivid and enduring, and are associated with high levels of confidence, but low levels of accuracy. Moreover, it is suggested that the interpretation of these memories rather than their accuracy drives how we remember and use such memories. By interpreting the events through narrative processing, we give structure to, and find meaning in, religious rituals. This narrative supports not only our autobiographical memory system but also our identity. Through this perspective, previous findings and theories on religious rituals can be understood in a larger framework, and new recommendations for future work are formulated accordingly.

The two main goals of this article are: (1) to critically assess previous experimental work on memory and religious rituals,[3] provide an extensive background of state of the art autobiographical and episodic memory research, and suggest recommendations for future work; and (2) to propose a new perspective through which the processing of memories of religious rituals may be understood. This article addresses these goals in sequential order, while following a division of two levels of examination: first, while primarily examining previous work and providing recommendations, the article will concern itself with the *nature* of the memories of high-arousal religious rituals (episodicity, emotionality/valence, and specificity), and second, the article will deal with the *processing* of these memories (narrative processing, reconstruction, and reflection), together providing a novel perspective on how we may understand such memories.

This article will focus on high-arousal religious rather than secular rituals, working primarily within the field of the cognitive science of religion. This raises the question of whether the phenomena described in this article pertain specifically to religious rituals, or whether these memory effects might be equally applicable to high-arousal secular rituals. A crucial difference between these rituals lies in the difference between secular and religious *experiences*. While both secular and religious rituals have the potential to generate intense emotional sensations, it is a consensus in the cognitive science of religion literature that secular experiences are fundamentally different from religious ones (Sosis, 2004), due to their lack of sacral symbolism or supernatural references (Rappaport, 1971). While there is no space here to discuss the differences between religious and secular experiences in great detail, the article will focus on religious experiences, which are experienced as "more real" and as highly vivid and significant, to the point of life-changing relevance (see Geertz, 2010 for a discussion). As we will see, these features are likely pivotal to high-arousal religious rituals.[4]

Moreover, this article will focus primarily on *episodic memories*. Both episodic and semantic memories are forms of declarative memory, or in other words memory that contains knowledge which we can consciously, explicitly verbalize, as opposed to procedural memory, which is implicit and includes memory for motor skills. However, episodic memories differ importantly from semantic memories in that they are recollections of personal events, rather than knowledge and facts about the world, which is what comprises semantic memory (Tulving, 1972). A crucial difference between these types of memories is that when we recall episodic memories, this recall is accompanied by a subjective temporal experience (i.e., we can recall being there) – termed "autonoetic consciousness" – which is not present during the retrieval of semantic memories (e.g., we do not recall where we learned that Paris is the capital of France; Tulving, 1993; Wheeler, Stuss, & Tulving, 1997). Thus, this subjective temporal experience reflects the awareness of an individual that an event is a part of one's own past experience (Tulving, 1993).

Finally, as this article is focused on past and future empirical research on episodic memories and high-arousal religious rituals, it will discuss declarative memory rather than procedural memory (cf. Whitehouse, 2004) or working memory (cf. Lienard & Boyer, 2006). Nor will the article discuss current theoretical treatises of memory and religious rituals in depth, such as the Modes of Religiosity Theory (Whitehouse, 2004), or the Ritual Form Theory (McCauley & Lawson, 2002); these theories

have previously been discussed elsewhere (Czachesz, 2010). Instead, the article aims to provide a perspective through which episodic memories of high-arousal religious rituals can be better understood, and which can inform future experimental anthropological work.

2. The nature of memories of high-arousal religious rituals

2.1. Experimental anthropology study

In their innovative experimental anthropology study on memory and rituals, Dimitris Xygalatas and colleagues examined the memories of participants in a fire-walking ritual in San Pedro Manrique, Spain (Xygalatas et al., 2013). The fire-walking ritual is part of the festival of San Juan, and involves participants climbing up a hill, circumambulating the fire, and finally walking across the hot coals, sometimes while carrying a beloved one on their backs. The ritual has both religious and secular aspects – while it is not bound to any Christian tradition, some participants believe that they receive religious protection during the walk. Within two days following the ritual, memory recall was tested through a free recall task and two structured questions, which asked who sat nearest to the participants immediately before and immediately after the fire-walk. Importantly, in the free recall task, very few specific facts were recalled, with 7 out of 10 participants unable to recall any specific details at all. Some described themselves as having "blacked out" during their walk, though they did recall strong emotions. In the structured recall task, people were able to give only few specific spatial and temporal details. When retested two months later, participants confidently provided more specific details (in the free recall test), but also details of lower accuracy than those of the first recall (in the structured recall test). Confidence was coded in the participants' reports by independent coders, and it was found that the number of facts rated as confident rose from 66% to 92% over the two months. Together, these findings seem to suggest that while individuals who participated in this high-arousal ritual retained very little specific spatial and temporal information (though spontaneous affective recall was frequent), the amount of details increased over time in line with the participants' level of confidence of the memory. While this was a trailblazing cross-disciplinary study, a number of important considerations remain, which will be addressed in the rest of this article.

2.2. Episodic versus semantic memories

It appears to be tacitly assumed by a number of researchers that the underlying function of religious rituals is to transmit religious knowledge (Durkheim, 1915; Geertz, 1973; Rappaport, 1999). It has been suggested that even in high-arousal religious rituals, ideas may be transmitted via narratives and interpretations targeting semantic memory (Schjoedt et al., 2013). The *transmission of ideas* hypothesis (Durkheim, 1915) has not yet been tested empirically however. Within this framework, testing memories of religious rituals for accuracy could be thought of as an appropriate measure, but if so, then researchers should also measure semantic memories before and after the ritual. Through rigorous testing, it should be investigated (both qualitatively and quantitatively) whether (and if so, how) ideas are being transmitted during rituals, and what kind of religious ideas these are – including to what extent this comprises semantic religious knowledge. However, semantic religious knowledge may be better conveyed by oral communication or, for example, Sunday school than rituals (see also Schjoedt et al., 2013), especially when compared to high-arousal rituals.

In Xygalatas et al.'s (2013) study, the authors focused on episodic memories. In the cognitive science of religion literature, two opposing views have been put forward with regard to episodic memories of religious rituals: that high-arousal religious rituals enhance (Whitehouse, 2002, 2004) or impair (Schjoedt et al., 2013; Xygalatas et al., 2013) episodic memory formation. Whitehouse argues that high-arousal religious rituals enhance episodic memories of the ritual through

the strong emotionality and the exceptionality of these typically infrequently performed rituals. He posits that the memories will trigger prolonged exegetical reflection (i.e., the process of consciously trying to understand the ritual), experienced as "personal inspiration or revelation" (Whitehouse, 2002, p. 305). Moreover, as episodic memories are conscious, explicit memories that include information about the people, location, and similar specific details of an event, this in turn should bring the community together, as people remember each other's participation in the rituals.

On the other hand, a group of researchers primarily from Aarhus University have suggested that high-arousal religious rituals impair the formation of memories. The so-called *Cognitive Resource Depletion* model (Schjoedt et al., 2013) suggests that many high-arousal religious rituals require demanding mental processes such as emotional suppression (e.g., not showing fear or excitement while walking over burning coals), which depletes cognitive resources, leaving few cognitive resources for memory formation or ritual interpretation. This in turn allows for religious authorities to cover this "attributional gap" after the ritual with suggested interpretations (Schjoedt et al., 2013), a hypothesis in line with current research on memory conformity (Harkness et al., 2015).

The findings by Xygalatas et al. (2013) seem to suggest that high-arousal religious rituals impair episodic memory formation as participants recalled very few memory details during the memory recall tests, in line with the Cognitive Resource Depletion model. However, this conclusion is based on the assumption that a high amount of recalled perceptual details in an episodic memory indicates a "good" episodic memory, which is an assumption we will return to later. Furthermore, the elicitation of memory details depends on the method of questioning, at least in part. In this case, researchers depended on free recall as well as structured recall tasks.

For future research, to elicit a larger number of memory details, to allow for a systematic categorization of these details, and to include more elaborations, the *Autobiographical Interview* method (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002) and the *Autobiographical Memory Questionnaire* (Rubin, Schrauf, & Greenberg, 2003) may be used. The Autobiographical Interview method can be used to investigate the level of semantic and episodic details in memories. In this memory research protocol, participants are asked to describe a memory for a predetermined amount of time (e.g., three minutes). Consequently, this memory report is transcribed and rated by independent coders for the amount of episodic and semantic detail. This measurement tool might be particularly interesting for those studying imagistic and doctrinal religious rituals (Whitehouse, 2004), which are rituals argued to be primarily episodic or semantic, respectively (Whitehouse, 2002, 2004). In addition, a measurement tool that combines episodic and semantic detail and that assesses the phenomenology of autobiographical memories is the widely used Autobiographical Memory Questionnaire (AMQ). In the AMQ, participants are asked to self-report a range of phenomenological qualities of their memories, including reliving qualities, visual detail, significance, memory rehearsal, etc.

2.3. Memory emotion and valence

In addition to arguing that high-arousal rituals enhance episodic memory formation, Whitehouse has maintained that these memories are "flashbulb memories" (Whitehouse, 1996, 2002, 2004; see also McCauley & Lawson, 2002, p. 38), which, when returning to the conscious mind of their carrier, evoke reflection. Flashbulb memories are memories of circumstances or context when an individual hears about an event (e.g., remembering where you were, how you felt when hearing about the event, etc.) and high levels of surprise, consequentiality, or emotional arousal are present (e.g., the assassination of President John Kennedy; Brown & Kulik, 1977). Whitehouse points out the exceptional vividness, emotionality, endurance, and ratings of low accuracy but high confidence typical of such memories (Conway, 1995), features which he argues occur in memories of rituals too. However, there is a problem with this definition: aside from the debate as to whether flashbulb memories constitute a special class of memories at all (Christianson, 1989; Neisser, 1982), flashbulb memories have generally been defined, since the initiation of flashbulb memory research, as memories of individuals

hearing about an unexpected or shocking event, like the death of Princess Diana, rather than experiencing it themselves (Brown & Kulik, 1977). This may be a crucial difference, and instead the properties of memories of high-arousal religious rituals may be explained by a common memory property – emotionality.

Emotional events are more likely to be remembered than neutral events (Talarico, LaBar, & Rubin, 2004). In addition, emotional memories are known to be associated with high confidence ratings relative to neutral memories, without necessarily enhancing the objective accuracy of the memories, but purely by virtue of their emotionality, which heightens the feeling of remembering (Kensinger & Schacter, 2006; Sharot, Delgado, & Phelps, 2004). Indeed, even for flashbulb memories, it has been shown that emotion predicts the confidence levels (presumed accuracy) of the memories, rather than the actual accuracy or consistency of recollection (Talarico & Rubin, 2003). Thus, any endurance, vividness, and high confidence but low accuracy of memories of high-arousal religious rituals may follow from the fact that they are emotional, something that could be tested through experimental studies.

In addition, valence influences how long memories are retained. Positive memories have been shown to fade more slowly than negative memories, an effect that has been called the *fading affect bias* (Walker & Skowronski, 2009), found across cultures (Ritchie et al., 2014). Valence also influences which types of details are remembered – for positive events, peripheral details are remembered best; for negative events, central details (Talarico, Berntsen, & Rubin, 2009). This effect on negative memories has been referred to as the "weapon focus" effect: crime witnesses remember details about the weapon used in the crime but not other contextual details (for a review, see Kihlstrom, 2006).

Thus, the weapon focus effect combined with a high confidence due to the emotionality of the memory may explain why individuals participating in negative high-arousal rituals may remember certain specific details of the emotional event very strongly, but "construct" contextual details.[5] The participants' experienced confidence leads them to believe that they remember the entire event clearly, which in turns leads them to accept contextual details that were inserted later. Indeed, in the Spanish fire-walking study (Xygalatas et al., 2013), participants gave additional but inaccurate details two months after the initial testing, suggesting additional memory constructions (Schjoedt et al., 2013). It is therefore pivotal to establish the valence and levels of emotion in various high-arousal religious rituals.[6] The effects of these features could be further investigated in future studies with appropriate control conditions such as comparable rituals that are not emotional, or of a different valence, or not religious, and other combinations of these parameters.

Thus, the valence of the experienced event determines whether central or peripheral details are remembered best. Moreover, the central details that are typically remembered are those that are goal-relevant, capture attention, or that are perceptually, temporally, or conceptually integral to the emotional event (Levine & Edelstein, 2009). Note that the questions asked in Xygalatas et al.'s (2013) study likely did not target these features. Instead, the questions in the study targeted who sat next to the participants during the ritual, which may not have been relevant enough for the participants to remember, even after a short time span. Interestingly, if the participants did remember, this would be in support of Whitehouse's idea that it is central to the ritual that participants remember who was there, whereby spatial proximity may have been an important factor. However, it is likely that such information fades at a highly significant, emotional event such as the fire-walk itself. An example is one of the reports from the free recall given in Xygalatas et al.'s paper, where the participant describes his/her pride, contentment, and pleasure in having so many people around. When analyzing this recall by its phenomenological accuracy, the participant will score low on sensory details described (and, by the researchers' inference, retained).

It may be that the participants have a different idea to the researcher of what information is relevant to bring up in the recall session (Grice, 1975). Considering that the fire-walk is a very significant event for the participants, they are more likely to convey that significance than factual detail. Unfortunately, as such it is hard to determine what their episodic memories – in the sense of sensory

detail and accuracy – are like (measures such as the AMQ may come in handy here). Indeed, we must take care not to confuse the assessment of memory accuracy with the examination of the phenomenology of the memories, and accuracy may not always be the right primary standard to measure whether a memory is "good" or not. A (complementary) semi-structured interview may target what participants consider particularly significant during those events and would allow them to elaborate on any spontaneous affective recall; indeed, the (religious) experience itself may be of crucial importance.

2.4. General versus specific memories

As mentioned in section 2.2, the transmission hypothesis (Durkheim, 1915) emphasizes the importance of abstract knowledge of religious ideas. This idea is in line with a consensus in cognitive psychology that abstract, general knowledge is more crucial, or at least more useful, to people than personal memories (Srull & Wyer, 1990; Tulving, 1983). Similarly, general abstraction over multiple experiences (i.e., recall of general events) is considered more useful than memories of specific experiences, as it can apply to more future situations (Suddendorf & Corballis, 2007). However, more recent research has challenged these assumptions of the general over the specific: memories of specific events are considered to have a powerful effect on behavior, attitude, and understandings of the self (Pillemer, 1998). For example, when a memory is detailed and vivid (such as memories of turning points in people's lives), it may continue to attract attention and evoke feelings. Moreover, the event may become tied to a long-term goal or plan of action, and inspire people to continue following that goal. Thus, memories of these events may be enduring reminders of what to attend to (i.e., what is valuable) and what to avoid, and may guide behavior in the present (Levine & Safer, 2002; Pillemer, 2001).

Thus, the memory of a religious experience or event (specific information) may be just as important as the general memories of religious rituals, implying that religious rituals need not have the transmission of religious ideas as their main function – potentially, the specific, emotional experience of the ritual itself may simply be the function of the ritual. As religious experiences themselves step into the limelight, the embodiment branch of religion research will likely become more relevant (e.g., Klocová, 2014).

If memories of high-arousal religious rituals play a role as specific life events that continue to motivate individuals, then the question arises to what extent such life events are actually central to an individual's identity and life story. One way to measure the extent to which events are central to an individual's life is with the Centrality of Event Scale (CES; Berntsen & Rubin, 2006). Statements on this scale include: "This event has become a reference point for the way I understand new experiences," "This event tells a lot about who I am," and "I believe that people who have not experienced this type of event have a different way of looking upon themselves than I have" (Berntsen & Rubin, 2006, appendix). When memories are central to one's identity, they are likely self-defining memories. *Self-defining memories* are memories that evoke strong emotions at the time of recall, that are vivid and frequently remembered, are linked to similar memories, and that revolve around the most important concerns and conflicts in our lives (Blagov & Singer, 2004; Singer & Blagov, 2004). Indeed, self-defining memories are associated with goals that directly reflect *central themes* of identity, and remind the individual of these themes. They have been characterized as the "uniquely eloquent passages that dramatize the major themes of the overarching [life] narrative" (Singer & Blagov, 2004, p. 123).

Interestingly, many high-arousal rituals are focused around important transitional events, such as initiation rituals (Bell, 1997; Idler, 2013). Transitional events are major candidates for generating self-defining memories (McAdams, 2006), as reminders and explanations of one's identity, thus giving meaning, structure, and coherency to one's self-concept and life (Pillemer, 1998). To study self-defining memories, Singer and colleagues have developed an interview procedure (for an overview, see Singer & Salovey, 1993) in which participants are asked to generate self-defining memories and to

rate them for a number of features (e.g., vividness, significance, and several basic emotions). Given that this procedure is semi-structured – participants are asked specific questions but can still fill them in according to their own life stories – such a procedure could have great value in ethnographic settings. This type of research could determine whether high-arousal religious rituals are a good opportunity to create self-defining memories.

3. Processing memories of high-arousal religious rituals

Generally, when we recall episodic memories, we are involved in narrative processing, reconstruction, and reflection to some degree. This section will elaborate on how these processes might influence memories of high-arousal rituals.

3.1. Narrative processing

In line with the recent shift in the focus from general to specific memories, researchers in the 1990s have suggested that *paradigmatic thought* (typically emphasized by researchers in the 1950s to 1970s) may be crucially complemented by *narrative thought* (e.g., Bruner, 1986). The paradigmatic mode of thought is an analytic and semantic mode of thought, engaged in creating categories and identifying abstract principles underlying the categorized entities (Bruner, 1986). The narrative mode of thought in contrast organizes thought by story devices (e.g., plot, intention, character, outcome, and theme) rather than abstract categories or concepts (Singer & Blagov, 2004).

The autobiographical narrative brings together an individual's remembered past, experienced present, and anticipated future into a unified whole (McAdams, 2001). That is, an overall coherent picture of the self is created through narrative processing (or "storied thought"). Thus, our autobiographical memory system underlies our (narrative) identity (and is sometimes considered synonymous with it; e.g., Singer & Blagov, 2004).

Narrative processing is likely crucially involved in the processing of religious rituals in a number of ways, including in the interpretation or meaning finding through the creation of narratives of experienced events (McAdams, 1993) and in *how* these memories are remembered, through reflection and reconstruction. These processes will be discussed in the following sub-sections.

3.2. Reconstruction and coherence

While Xygalatas et al.'s (2013) study focused on the accuracy of memories, it may be that narratives rather than the factual representations of the event are crucial to our identities and well-being. There are a number of reasons why interpretation rather than accuracy may be crucial in episodic memories (Barnier, 2015). First, memories are records of people's experiences of reality, rather than direct representations of reality itself. Second, memories are samples of that experience; they do not contain a complete record of the experience. Third, remembering memories is a constructive process (Bartlett, 1932). Memories are not recalled in isolation, but rather are combined with general knowledge and beliefs about what the event means. Finally, memories are recalled in the present, which means they are influenced by the person's cognitive, emotional, social, and cultural circumstances as they occur at the time of recall. These considerations will be addressed now.

Only fragments of every episode we experience are stored in memory (Schacter, 2006). Indeed, remembering typically involves merely retaining the meaningful gist of episodes rather than abundant detail (Bartlett, 1932), likely due to constraints for storage space and principles of efficiency. Thus, when we recall events, rather than bringing up a perfect record of the event (like a recorded video), we need to (re)construct the memories anew upon retrieval (Conway & Pleydell-Pearce, 2000).[7] We might think of memory as an extensive multimedia archive, from which the parts (stored in various parts of the brain) are put together again in a piecemeal fashion. This means that people's memories strongly depend on their prior and current knowledge (called "schemas" by Bartlett,

1932). In a sense, people "justify" the impression that was left by the original event in a current context. Thus, retrieval of memories can *change* the memories, depending on the individual's current goals and motivations (Conway, 1996; Conway & Pleydell-Pearce, 2000; Levine, Prohaska, Burgess, Rice, & Laulhere, 2001).

If memory is a fundamentally (re)constructive rather than reproductive system (Bartlett, 1932), then this gives way to memory distortions and false memories (Schacter, 2002; Schacter & Addis, 2007). Even though memory distortions may at first seem disadvantageous (as for example in confabulations), they commonly occur in healthy memory systems and the underlying flexibility of memory may make up for this in increased adaptiveness (Schacter & Addis, 2007; Suddendorf & Corballis, 2007). For one, memory flexibility allows for maintaining a positive and coherent view of one's self, and generating consistency in one's life story (Conway, 2005). Memories may be used and adapted to exaggerate consistency with the past, or to enhance a difference between past and present (positive and negative) feelings to reflect an improvement over time (Singer & Blagov, 2004). The desire for consistency is a strong built-in pursuit in humans (Abelson et al., 1968), which underlies many other mechanisms as well (e.g., cognitive dissonance). Conway and colleagues have argued that two main mechanisms drive the human memory system with which we make sense of our worlds: *coherence* and *correspondence* (Conway, Singer, & Tagini, 2004). Correspondence is the drive to represent past events accurately (aforementioned "accuracy"), while coherence is the drive to recall events that are coherent or consistent with one's sense of self (aforementioned "interpretation"). Together, these mechanisms allow the memory system to respond appropriately to current situations. Furthermore, Conway argues that over time, coherence influences (long-term) memory more than correspondence. In other words, we unknowingly sacrifice accuracy in favor of maintaining the self-image that we want – through creating a narrative identity that we want (McAdams, 1993, 2001). Such continuity has been shown to contribute to maturity, psychological health, and well-being (Lilgendahl & McAdams, 2011; Swann, 1983).

In the Spanish fire-walking study (Xygalatas et al., 2013), the lack of remembered perceptual detail but retention of affective states may have led participants to mentally construct scenarios that were consistent with those feelings, to create a coherent and consistent narrative despite the lack of perceptual details in their memory. Such a process may take place without the individual being aware of it. Thus, memories of religious rituals may be a way to confirm someone's religious identity.

3.3. Reflection and meaning finding

In order for (self-defining) memories to be integrated into a coherent representation of ourselves, we need the ability to give some kind of *meaning* to the memories. Narrative or autobiographical reasoning processes that give meaning to events, such as self-reflective thinking or talking about past events, are used to form links between events and the self.[8] This in turn is used to create a link between a person's past, present, and future (McAdams, 2001), thus creating life narratives.

These effects may be driven in part by our innate instinct to look for causes of events. Indeed, it appears that humans are natural "cause seekers," intuitively believing that things have purposes and happen for a reason. As shown by Deborah Kelemen's work, children are natural teleologists, reasoning about natural phenomena in terms of purpose (Kelemen, 1999, 2004), but adults also provide more teleological explanations (even if they are scientifically unwarranted) when tasks are speeded and participants are put under time pressure (Kelemen & Rosset, 2009).

How do individuals make sense of the rituals they partake in? The causal opacity of religious rituals leaves participants in the dark. Ritual opacity is the lack of a causal explanation for the ritual's effects; in other words, opaque rituals cannot be understood in terms of their physical-causal effects. Whenever we lack causal background memory where we expect it (and are unaware of this absence – as in amnesic patients), *confabulations* may occur to fill in the gaps. Confabulations are memories that are either fabricated or distorted, without the conscious intention to deceive (Moscovitch,

1995). In addition, (unaccounted) levels of arousal also lead people to spontaneously look for reasons for their arousal (Mills & Mintz, 1972; Schjoedt, 2012), and arousal may be misattributed to other causes such as attraction (White & Kight, 1984). In sum, both causal opacity and high levels of arousal may induce reflection and meaning finding.

There has been one experimental study investigating the search for meaning in rituals so far. Richert, Whitehouse, and Stewart (2005) ran two studies with experimental rituals. In these experiments, individuals participated in either a high-arousal or low-arousal version of an experimental ritual. After the ritual, participants were categorized in post-hoc groups based on the level of emotion or arousal experienced during the ritual. It was found that participants in the high-emotion/arousal group provided more meanings for aspects of the ritual than the low-emotion/arousal group, and that they used more analogies as well (reflecting the "depth" of the reflection according to the authors). Furthermore, there was a greater increase in the reported number of meanings for high-arousal participants than low-arousal participants over time. Together, these studies suggest that, when participants experience high levels of arousal, they reflect more (and more deeply, in terms of analogies) on their experiences. These findings are in line with the aforementioned research.

Thus, the arousal or emotionality of an event might further encourage meaning finding. Whitehouse has suggested that negative events in particular encourage reflection (Whitehouse, 2002). There are several findings that support this idea. When individuals experience a significant and highly emotional event, this event creates a lasting episodic memory in their minds (Holland & Kensinger, 2010). Due to the memory's intensity, individuals experience frequent flashbacks, reminding them of the event – and while both negative and positive events generate flashbacks, negative events produce significantly more than positive events (Berntsen, 2001). Such reminders may then lead individuals to reflect further on the event. Moreover, from a narrative point of view, positive events readily fit into one's life story, whereas negative events demand an explanation. Positive events are expected; this is reflected in our rosy view of the future (we expect good things to happen to us, as per the optimism bias; see also Szpunar, Addis, & Schacter, 2012), and in the way cultures prescribe only positive events (in life scripts; Berntsen & Rubin, 2004). Negative events are suggested to generate more reflection and provoke more engagement in causal reasoning than positive events do (McAdams, 2008). That is, individuals attempt to grasp what happened to them and why; they try to make narrative sense of the event. After all, no one questions why they were the one to win the lottery.[9] Within the framework of narrative processing, the opacity of events may be conceptualized as the degree to which the event and its associated emotions is comprehensible within one's life story.

4. Discussion

This article has examined how we may understand and investigate memories of high-arousal religious rituals. A pioneering experimental anthropological study on episodic memory and high-arousal religious rituals has shown that participants confidently recall few sensory details, but spontaneously report on their affective states (Xygalatas et al., 2013). Over time, participants add contextual details to the stories, though these were typically inaccurate. In this article, through a review of current memory research, it was suggested that these findings may result from the ritual being experienced as highly *emotional*, which typically leads to memories that are high in vividness and confidence but low in accuracy, and *significant*, which influences how the memories are processed. Memories are typically reconstructed in a way that allows the bearer to maintain a consistent identity and life story, and to fit his/her current goals and knowledge. By creating a highly emotional, specific and personally significant memory, religious rituals may continue to inspire and guide participants in their lives.

This article began with a study concluding that high-arousal rituals do not seem particularly conducive at instilling episodic memories in their participants (Xygalatas et al., 2013). However, this may depend on what constitutes a "good" episodic memory: vivid, emotional, and confident but

inaccurate, or detailed and accurate but not necessarily significant? In this article, it has been suggested that what defines a "good" memory of high-arousal religious rituals may depend on a number of factors, and that in some cases interpretative rather than accurate memories may be important. Drawing from research in experimental psychology and cognitive neuroscience, the idea that memory is inherently (re)constructive was put forward: autobiographical memory is continuously appraised and adjusted based on current context and goals. Thus, rather than veridical accounts of past experiences, memories may be fictions that are continuously revised and shaped in the service of ongoing ideas and attitudes. While at first this may seem maladaptive as it means we do not necessarily have a highly accurate account of the past, it also means that memories and ideas may be updated in light of more recent knowledge and appraisals. Arguably, this results in a more optimal "knowledge base" to guide current and future behavior (Levine & Safer, 2002).

Another way in which we may be better prepared for the future thanks to the flexibility of memory is through *future event imagination*. The flexibility of memory allows details gleaned from various past experiences to be selected and recombined in a novel way (suggested to be supported by narrative processing; Singer & Blagov, 2004), allowing us to imagine novel events that have not yet happened and that are in a different space spatially and temporally (Schacter & Addis, 2007; van Mulukom, Schacter, Corballis, & Addis, 2015). Mental simulation gives us the opportunity to play out scenarios (with imagery and plot) that have not yet happened, or may never happen, leaving us prepared for a wide range of potential future scenarios without the cost of having to act them out – a process similar to storytelling (Singer & Bluck, 2001). As memory flexibility allows us to imagine ourselves in a different place or time, this suggests that it also underlies the possibility of imagining life after death, the ultimate form of future thinking. While such a capacity seems a prerequisite for supernatural beliefs and thus highly important for our understanding of the cognitive processes underlying religious thinking, episodic simulation has surprisingly not yet received attention in the literature.

The focus on "accurate" data may stem from a tendency in research to only consider observed facts that are objectively measured as true scientific data. Indeed, ever since memory has been investigated experimentally (since Ebbinghaus, 1885/1964), researchers have been focused primarily on accurate recall. While initially it made sense to investigate memory in controlled trials with predetermined stimuli (to avoid confounding variables), even Ebbinghaus planned to return to the study of more personal memories (Kihlstrom, 1981). The focus of memory research remained list-learning experiments for 50 years (Singer & Salovey, 1993), and only recently have researchers begun to investigate personal memories. As research on narrative processing is starting to gain more ground, it may prove very useful for the experimental anthropology of religious rituals, due in part to its format of semi-structured interviews.

Aside from reconstruction on the basis of current knowledge and appraisals, reconstruction also occurs on the basis of cultural and social factors (Bartlett, 1932). It has been suggested that for religious rituals, participants may be under a strong social desirability bias to answer questions according to "culturally transmitted expectations" (Schjoedt et al., 2013, p. 81). Prima facie, this may seem problematic – participants are not responding with what they remember, but rather what is culturally or socially expected from them. However, this is likely a ubiquitous phenomenon that is perhaps overlooked. The researchers' Western point of view takes an individualistic stance herein, whereby it is assumed that an individual's memories are as it were isolated within the person him/herself. Indeed, many theories of autobiographical memory have traditionally focused on the level of the individual, without taking into account the impact of culture on both the content and structure of memories (Berntsen & Rubin, 2004).[10] However, culture likely plays an important role in memory retrieval. For one, as we have seen, memory recall depends on a person's goals (Conway & Pleydell-Pearce, 2000), but these goals in turn depend on social context and culture. Similarly, the prior information which shapes the constructive process of memory might stem in part from shared knowledge, acquired through socialization.

In sum, research focusing on the influence of culture on memory will likely become more important to the experimental anthropology of religious rituals in the coming years (for an overview, see Wang & Ross, 2007).

Another point to keep in mind is that, as researchers, we are inherently interested in the "meaning" of rituals as well as why people participate in them. It may be a bias to assume that the ritual participants ask themselves the same questions. Some of the reasons that participants have given before they participate in the ritual include following their parents or peers, following social pressure to belong to a group, or plain curiosity (Xygalatas, 2012). In accordance, when we ask ritual participants about the meaning of their ritual immediately afterwards, we may be answered with scripted answers or expressions of ignorance.[11] Notably, participants in Richert et al.'s (2005) experimental ritual study were explicitly told that the researchers were interested in what they thought the purpose was that the ritual might have had in its original cultural setting. This may have influenced levels of (reported) reflection. It would be very interesting to have experiments following up on this study measuring *spontaneous* reflection, such as through a diary method noting involuntary memories (Berntsen, 1996, 2001).

Another consideration here is that when we approach this phenomenon as researchers, we do so in an *analytic thinking* style. Dual-process theories of human thinking suggest two systems underlying thought: *analytic thinking*, which is deliberate and involves abstract reasoning and hypothetical thinking, and *intuitive thinking*, which relies on rapid automatic, intuitive responses (Evans, 2008). There are reasons to believe that religious individuals think intuitively rather than analytically about their belief (e.g., Gervais & Norenzayan, 2012; but also in the sense that sacred propositions are unfalsifiable by essence; Rappaport, 1971). Thus, when researchers investigate religious rituals from a rational, analytic perspective, they are in a different mindset to the participants, who may lack the drive to investigate the cause of the rituals when in an intuitive mode of thinking (see also Alcorta, 2013).[12] This idea in a way slightly reframes the Cognitive Resource Depletion Model: through processes of lowering executive function and/or cognitive control, but also of heightening emotional processing, religious rituals may be crucially "intuitive thinking inducing." This idea is supported by findings of increased religious belief and/or experiences through decreased activation in brain regions involved in executive function and cognitive control (Cristofori et al., 2016; Holbrook, Izuma, Deblieck, Fessler, & Iacoboni, 2016; Schjoedt, Stødkilde-Jørgensen, Geertz, Lund, & Roepstorff, 2011). Thus, in addition to processes such as emotion suppression, causal opacity or high levels of arousal might be ways to induce intuitive thinking, but this remains to be investigated empirically.

In conclusion, caveats for the experimental anthropology studies of religious rituals may be that we as researchers may have a focus on the participant as an isolated individual, on accuracy, and constant cause/meaning finding, but we cannot ignore that memory is inherently reconstructive, influenced by additional knowledge and by social and cultural factors, and that religious experience may inherently rely on intuitive thinking. Keeping this in mind and using measures that take these facts into consideration may be of significant advantage to future research.

Summarizing, memories of high-arousal religious rituals are crucially high in emotionality and significance, contributing to life narratives that provide an overall sense of coherence and meaning within individuals' lives. Considering this, future research would benefit from focusing on interpretation and memory coherence (through narrative processing, reconstruction, and reflection) rather than accuracy and memory correspondence. The recommendations for future research that are put forward in this article in accordance with those ideas include the self-defining memory interview (Singer & Salovey, 1993), the Autobiographical Interview (Levine et al., 2002), and the Centrality of Event Scale (Berntsen & Rubin, 2006). Semi-structured interviews may be particularly efficacious for studies in experimental anthropology, as they allow for both quantitative and qualitative data. Considering that the experimental research of religious rituals has really only just begun, I look forward to future studies in this exciting field.

Notes

1. Religious rituals will be defined here as formal, traditional performances, governed by rules and subject to invariance, and as including sacral symbolism (Bell, 1997).
2. High-arousal religious rituals are taken to refer to those religious rituals that comprise strong arousal or a strong emotional component for the participants or individuals who experience the ritual (Russell, Dunbar, & Gobet, 2012).
3. I would like to point out that I appreciate Xygalatas et al.'s (2013) study as great pioneering work that paves the way for future research on memory and ritual, and that I realize that such studies are a highly challenging endeavor. In this article, I mainly bring forward results from years of laboratory work, whereas in fieldwork settings complications are likely to arise. I have to leave these adjustments to experts (i.e., anthropologists such as Dimitris Xygalatas), and would instead like to present the perspective of experimental psychologists specializing in autobiographical memory. Please refer to the discussion for further considerations of this approach.
4. That is not to say, however, that memories of religious events are fundamentally different from other memories. Rather, the experiences on which the memories are based might be different in the features noted here.
5. Note that in this case I make no reference as to where these contextual details come from – they might follow from self-reflection but also in part be gathered from religious authorities' narratives, fellow ritual participants, and other individuals with whom the ritual has been discussed, such as friends or family.
6. This is not an easy endeavor, however. While a ritual may be euphoric or dysphoric (which in itself may be hard to define; one could take it to broadly reflect "experienced as giving pleasure or pain"), the resulting evaluation of the memory may be positive or negative. The way that memories are assessed to be positive or negative in the literature is through participants' self-report; it is suggested that the same procedure is adhered to in the study of memories of religious rituals.
7. Explicit emotional memories are reconstructed just like neutral memories (for a review, see Levine & Pizarro, 2004). Knowledge acquired after the event, or changes in the evaluations of and feelings towards the events, can lead to changes as to which emotional details are remembered (Levine & Safer, 2002).
8. These ideas are in line with Whitehouse"s suggestion that memories of high-arousal rituals may trigger prolonged reflective processes (Whitehouse, 2002).
9. This is likely also partly due to the self-serving bias (Larson, 1977): we attribute positive events or success to ourselves, but negative events or failures to external factors. Thus, in the case of negative events, a search for the external factors that contributed to the negative event might be initiated.
10. While this article has focused primarily on the individual and his/her narratives, it has also been suggested that these narratives are based on contextual information, interpretations and life goals that are likely gathered socially, at least in part.
11. It may take time, during which reflection and discussion can take place, before the (personal) meaning of a ritual is established by a participant.
12. Intuitive thinking is hypothesized to occur during the ritual; when some time has passed after the ritual, it is possible that the participant returns to an analytic mode of thinking regarding the ritual.

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