

Mind and Religion

Psychological and Cognitive Foundations of Religiosity

Edited by
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and
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Memory and Analogical Thinking in High-Arousal Rituals

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Imagine that you are a teenage boy calmly sleeping one night. You are suddenly awakened and dragged from your bed to a dark location on the periphery of the settlement, along with other terrified boys. Your head is covered with a hood, and you are brutally attacked by the senior males of the village and herded onto a ceremonial platform. You are whipped with nettles and forced over a fire so that your skin is licked by the dancing flames before strange concoctions of disgusting substances are forced into your mouth and daubed over your skin. You are given no indication of the purpose of these experiences; you are simply required to endure whatever comes next. Such behaviors are quite typical of male initiation rituals in Papua New Guinea (see Whitehouse 2000). Moreover, rituals like these are found all around the world. This chapter sets out to explore how participants in highly emotionally arousing rituals make sense of their unique experiences.

In addressing this issue, we need to appreciate at the outset that *ritual* actions differ from nonritual actions by virtue of being irreducible to means-end technical motivations or to the intentional states of the actor. Reaching out to catch a ball is a qualitatively different kind of action from making the sign of the cross. It is different in part because there is a direct means-end connection between stretching out one's hand and the stopping and grasping of a ball, whereas self-crossing could be a means to almost any end, but never in a way that conforms to intuitive ideas about mechanical causation. People might cross themselves as an expression of relief or fear, or to show respect or piety. Sometimes they might have no idea why they do it. Of course, they might belong to a religious tradition that specifies exactly what this action means as well as when and why it should be carried out. But whatever ritual actors tell you about the meanings of their behavior, it will

not be based on the same kinds of cognitive operations that lead us to expect a ball to stop when a hand gets in the way.

Further, rituals involve alterations to our normal intuitive inferences about the *intentions* that lie behind actions. When somebody catches a ball, we naturally assume that the behavior is motivated by intentions located inside the catcher. By contrast, ritual actors are not the authors of their actions in any usual sense (Humphrey and Laidlaw 1994; Bloch 2004). They are not the ones who decided that the procedures should take this particular form rather than that, or what clothes should be worn, or any of the myriad other features of the ritual that are prescribed (as well as the things that are forbidden). Rituals are constructed out of clusters of actions that are stipulated in advance, rather than expressing the intentionalities of those who carry them out. It is not intuitively obvious why the particular stipulations take the form that they do, rather than some other form. Who was it who first came up with these rules for performing the ritual, and (even more puzzlingly) *why*?

The question of who made up the rules for a given ritual practice might elicit standard answers: it was God, or a messianic leader, or the ancestors, or "the tradition" (conveniently construed as an agent, for this purpose), or some such entity. But the *why*-type question can present more of a challenge to ritual participants. Whitehouse (2004) argues that the challenge is only taken on in rather special circumstances. If you perform the same ritual many times over to the extent that you can carry it out competently without having to reflect on how it is done, you are less likely to worry about why it has to be done in a certain stipulated way rather than in some other fashion. If, on the other hand, the ritual is performed in such a way that causes you to think a great deal at an explicit level about the nature of the procedures involved, then you are likely to be more exercised by the problem of what it means. Both hypotheses are potentially testable. The second, however, is the main focus of this chapter.

Whitehouse (e.g., 1992, 1995, 2000, 2004) has argued that the lower the frequency of a ritual, the more arousing it is likely to be, because if it were *not* arousing it would fail to elicit the right kinds of memories and motivations and would either die out or come to be more frequently performed. In response to this argument, much debate has focused on the question of what constitutes the "right kinds" of memories and motivations. Most researchers in this area agree that low-frequency, high-arousal rituals give rise to enduring episodic memories. In some of his early work, Whitehouse argued that the survival of rarely performed rituals depended on episodic memory for the procedures involved. More recently, McCauley and Lawson (2002) have developed a highly instructive theory of religious ritual transmission that is based partly on the same premise. Others, however, have criticized this line of argument on the grounds that low-frequency rituals are seldom reconstructed wholly (or even largely) with reference to episodic memory, and

more commonly depend on the guidance of elders and experienced experts who have developed general scripts for the rituals through repeated involvement (see, for instance, Barth 2002 and Houseman 2002). In light of these arguments, Whitehouse has started to focus his attention instead on the consequences of episodic recall for the way people think about the *meanings* of high-arousal rituals (e.g., Whitehouse 2002a, 2002b, 2004).

According to Whitehouse, a major effect of vivid, enduring episodic memory for rituals is that it encourages long-term rumination on what it all means. We may assume that there is intelligent agency behind it all, but that is not what really commands our attention. What preoccupies participants in high-arousal rituals is the question of *why* the originator of the rituals insisted on certain prescriptions and proscriptions with regard to conduct, demeanor, dress, speech, and so on, as opposed to all the other possible ways of doing the ritual that could easily be imagined. Answers to this question constitute what anthropologists call "ritual exegesis." Exegesis presents a considerable challenge for human memory. Whitehouse argues that it may be quite easy to remember ritual procedures (what you must and mustn't do), but people have great difficulty remembering the official *meanings* of the acts unless these meanings are frequently repeated. In the case of high-frequency rituals, there are many opportunities to rehearse official exegesis, and this fact (combined with low rates of spontaneous reflection on the matter) explains why standardized authoritative exegesis is mainly found in routinized religious traditions. It simply could not survive in conditions of very low-frequency transmission. In the case of rarely performed rituals, exegesis is based not on verbal testimony but on independent reflection. What typically drives this reflection is episodic memory for intrinsically puzzling actions, that is to say, for *ritual* actions. According to Whitehouse, elaborate ritual exegesis generated in this way takes on the character of a body of revelations—that is, of initially surprising insights into esoteric mysteries that, over time, develop great motivational force. What drives the elders and ritual experts to reproduce the tradition is their deeply held conviction that the knowledge they have gained is valuable and necessary to preserve.

In his contribution to this book, Pascal Boyer expresses doubts about the capacity of low-frequency, high-arousal rituals to stimulate elaborate exegetical thinking and to motivate subsequent transmission. He argues that ritual ordeals may well "focus the mind," in the sense of causing people to pay attention to what is happening during the rituals. They may also give rise to vivid and haunting episodic memories. But what evidence is there, he asks, that these experiences give rise to revelatory religious knowledge based on personal rumination about the meanings of the rituals?

Whitehouse has based his case mainly on ethnographic evidence. Many social and cultural anthropologists have tried to show that participants in rare, traumatic rituals (such as violent initiation rites) gradually develop elaborate

esoteric insights into their meaning, culminating in cosmological expertise on the part of cult leaders (see Whitehouse and Laidlaw 2004). This view has more recently been reinforced to some extent by reports from historians, archaeologists, and classicists (see Whitehouse and Martin 2004). Still, evidence of this kind is not as precise and comprehensive as any of us would like. Ritual participants may be very reluctant to talk or write about their private ruminations on matters of ritual exegesis, particularly in traditions that regard rituals and their meanings as secret. If mystery cults are founded on personal revelations rather than publicly transmitted teachings, as Whitehouse maintains, then how are we to access those "private moments" of reflection? Ethnographic and historiographical evidence does this only indirectly, by pointing to cryptic hints from those involved, their insistence that they are driven by "deeper" forms of knowledge and insight, the often astonishing profusion and systematicity of cultic iconography, and patterns of behavior that seem to imply "hidden" generative schemes shared only by experts but never explicitly divulged. But all of this remains less than convincing if we cannot demonstrate the exact psychological mechanisms involved in the production of this kind of exegesis and the way in which it unfolds over time.

Whitehouse has argued that one of the most prominent psychological mechanisms involved in the production of exegesis is *analogical thinking* (see Whitehouse 2002a, 2002b, 2004). Psychological research on analogical thinking traditionally draws a distinction between source and target analogs. Analogies postulate links between a particular object, event, or state of affairs (the "target" analog) and some previously independent object, event, or state of affairs (the "source" analog). Analogical reasoning has been defined as "the process of understanding a novel situation in terms of one that is already familiar" (Gentner and Holyoak 1997, 32), suggesting that source analogs consist of familiar situations and target analogs consist of novel ones. This definition has serious drawbacks, however. Some instances of analogical thinking are based on the recognition of connections between two situations that are both novel or that are both familiar. We maintain that what is characteristic of spontaneous analogical thinking is that the *connections it proposes are novel*, insofar as the person is drawing parallels that he or she has not recognized before (even if others have already done so at least partly by independent means).

As is outlined below, research suggests that the production of analogies is a natural cognitive process and seems to be used often to impart information that is less easily conveyed in other ways. Although until very recently no attempt has been made to examine the role of analogical thinking in relation to emotionally salient *rituals*, we suspect that analogical reasoning plays a significant role in ritual participants' attempts to make sense of their experiences, at least in highly arousing rituals. Whitehouse refers to this process as "spontaneous exegetical reflection" (or SER).

SER AND ANALOGICAL THINKING

A key defining feature of SER is that of "analogic depth." According to Holyoak and Thagard's (1997) *multiconstraint theory*, there are three general constraints that guide the selection of analogical comparisons. These constraints are similarity, structure, and purpose. The constraint of similarity requires that analogies be guided by perceptual commonalities between the source and target. For instance, a spider web and a fishing net are similar in appearance insofar as both are comprised of interconnected strands of material. In terms of the ritual context, a superficial analogy might connect red paint used to cover a ritual instrument to blood—as both are red. Analogies based exclusively on similarities of this sort may be described as "superficial," in the sense that they have common outward appearances or visceral connotations rather than because they are formally or functionally similar. Source-target pairings based on *structure and purpose*, however, are capable of delivering much greater *depth* to analogical thought.

Deep analogies capitalize on parallels in the *relational structure* of elements in the source and target domains (Gentner 1983; Gentner and Markman 1997; Holyoak and Thagard 1997). Although there may be many surface similarities between two analogs, the most meaningful and informative ("deep") analogies are those in which the source and target analogs share connected systems of relations, resulting in more elaborate parallels. A spider web and a fishing net may have superficial (perceptual) similarities, but deeper connections might be made between their trapping functions, allowing further analogical connections between spiders and fisherman, or between flies and fish, air and sea, and so on. In the case of the web-net analogy, superficial similarities might draw attention to "deeper" functional parallels. But since ritual behavior is not functional in the same way as spiders' webs and fishing nets (i.e., is not reducible to technical motivations), deep analogical thinking in relation to problems of ritual meaning cannot be triggered by a simple surface analog, taken in isolation. In puzzling over the question of what a particular ritual action means, we have to look for intentionality *not* in the functional properties of the action but in its place in a *wider nexus* of ritualized behaviors. If the instruments of ritual torture, for instance, are painted in random colors (or not painted at all), then their color is unlikely to be considered salient. If, however, such instruments used in rituals are always the same color, then a search for something rather like (but not of course the same as) a "function" is more likely to be activated. Perhaps the hooks and knives are red because they can draw blood, in which case they might be analogous to the teeth of carnivores that draw blood from their victims, or (more extravagantly) analogous to drawings of reddish waxing discs in the temple, alluding to lunar cycles that "draw" menstrual blood from women.

Purpose (in the sense of "motivation") also appears to contribute to the depth of analogical connections. A considerable body of experimental research on analogical thinking focuses on the question of what conditions make it likely for people to apply a given source analog to various target situations. Recently, Blanchette and Dunbar (2001) have studied the use of analogy in natural settings. In one study, they explored the types of source analogs people will choose in political debates, by extracting and coding political analogies from several newspapers (Blanchette and Dunbar 2001). The analogies were coded for the source category (the source of the analogy, which is then mapped onto the current situation, or target), the range (within-domain vs. other-domain), the goal of the analogy creator, and the emotional connotation. They found significant differences in the types of newspaper articles that contained analogies. In general, they found that analogies were most often used in opinion articles rather than articles meant to impart information. The large majority of the analogies (77 percent) were from domains other than politics, and these analogies tended to be more strongly emotionally charged than analogies that remained within the domain of politics. Furthermore, the large majority of analogies that were employed to support a given position had a positive emotional connotation, and analogies used to oppose a position had a negative emotional connotation. The findings suggested that analogies offer more than just factual information on a topic and seem to be well suited to the communication of emotionally colored meanings.

Whitehouse (2004) hypothesizes that ritual actions constitute a domain of activity in which the potential for the formation of deep analogical connections is considerable; the extent to which this potential is realized, however, depends on whether the ritual procedures become a focus of conscious rumination. The tendency for ritual procedures to spark conscious rumination is likely enhanced in high-arousal rituals by the prominence and diversity of what McCauley and Lawson call "sensory pageantry" (2002). But, according to Whitehouse, levels of conscious rumination are *also* determined by the relative frequency and emotionality of rituals. Frequently performed rituals give rise to implicit procedural fluency but low rates of explicit reflection. More rarely performed ritual actions, especially if they are arousing and personally consequential, are likely to be remembered consciously as unique episodes in one's life experience. In these conditions, problems of exegetical meaning cannot be so easily ignored and intermittently thrust themselves upon consciousness like a nagging puzzle that refuses to be solved. But these experiences are also different from profane puzzles. Participants in high-arousal rituals generally believe that the mysteries confronting them originate in powerful otherworldly agents, and that the consequences of misunderstanding the rituals are dire. So the motivation to gain some sort of mastery over problems of ritual exegesis, however provisional and specu-

lative, is much greater than that which drives us to tinker with crossword puzzles.

In general, we predict that levels of arousal during ritual performances will correlate directly with volume and structural depth in exegetical thinking. This prediction requires that our elements of SER be potentially measurable. We argue that they are. In any given ritual, it is possible in principle to determine what proportions of the actions are accorded exegetical meanings based on verbal testimony as opposed to independent inference, assuming one can determine exactly what participants are told about the ritual *and* that they are willing to report their conscious interpretations of it. We could measure the structural depth of SER by scoring exegetical commentaries according to whether or not they contain analogies. Given the minimal amount of research on this topic, we have no clear prediction about what, other than the creation of an analogy, should constitute depth in these circumstances. Depth could of course be defined in a number of ways: within-domain (e.g., one part of a ritual is analogous to another part of it) versus cross-domain (e.g., one part of a ritual is analogous to some process, object, or event in a nonritual setting), or concrete (e.g., ritual procedures that resemble other kinds of procedures) versus abstract (e.g., ritual cohesion resembles relations based on kinship). Combinations of these principles are also possible, of course (within-domain/concrete, within-domain/abstract, cross-domain/concrete, and cross-domain/abstract). Since the range of possible ways of categorizing structurally deep analogs is quite considerable, and the consequences of this for the construction of expert exegetical knowledge are not fully known, it is hard to determine appropriate scales of measurement in advance. Thus, in developing new methods of testing Whitehouse's predicted correlation between SER and arousal, we began by measuring sheer volume of reflection, as well as depth in the form of any analogic comparison. We report below on two experiments designed to test whether participants who have a strong emotional reaction to a ritual demonstrate greater volume and depth of spontaneous exegetical reflection than participants experiencing lower levels of arousal.

PROPAGATION RITUAL EXPERIMENT

In this study, participants enacted a particular ritual in one of two groups: a high-arousal form of the ritual or a blander version of the same ritual. To control for type of exegesis, both groups were provided the same minimal amount of information about the ritual. To recruit participants, announcements were made in large lectures that a study of rituals was being conducted and students could earn £20 for their help in reconstructing a ritual. Interested students were then contacted to participate on a given day and

Table 7.1 Source Analog Levels

Level	Definition
0	Repeats the symbolic meaning given in the ritual (e.g., rubbing earth on hands was a cleansing process)
1	Attributes a functional purpose to the action or element (e.g., rubbing earth on hands was preparing for the ritual)
2	Provided an analog in the same domain after a prompt (e.g., rubbing earth on hands was becoming one with nature)
3	Provided an analog in the same domain without a prompt
4	Provided an analog in a new domain after a prompt (e.g., rubbing earth on hands was cleansing your soul)
5	Provided an analog in a new domain without a prompt

participated in a large group with the other participants in that condition. We had a total of 29 participants (mean age = 21, 15 male, 14 female) broken into two groups (14 high arousal, 15 low arousal).

The ritual was conducted outdoors in a large field fringed by trees, owned by the university where the authors work. The participants gathered in a parking lot next to the field and were given a brief introduction to the project. Participants were told that they would be directed through some simple ritual actions and then asked to fill out some questionnaires following. They were also told that they would be asked to return at two other times to meet with one of the experimenters for follow-up interviews. They were told that they would receive £10 at the completion of the first follow-up interview, in one week, and an additional £10 upon completion of the second follow-up interview, two months later. Participants were then told some information about the ritual itself. The experimenter mentioned that he was interested in testing the efficacy of certain ritual procedures. Participants were told that this particular ritual was derived from propagation rituals in Amazonia, often conducted to increase hunting success. Participants were asked to maintain an attitude of respect toward the ritual procedures and not to discuss the ritual with anyone until after the final interview, scheduled two months later.

Following this introduction, participants were led through the ritual itself. Participants in the low-arousal condition performed the ritual in the afternoon, and participants in the high-arousal condition performed the ritual at dusk. Both groups of participants were instructed to stand in a line and then follow one of the authors (hereafter referred to as the "leader") across a field. As they were walking across the field, the leader shook a rattle. Participants were led into a circle of tree stumps and asked to bend down and "wash" their hands in the rotting leaves on the ground. Next, they were given cloaks made of Hessian fabric to wear. The leader then led the participants, again in a line, out of the trees and back into the field. As they walked toward the field, participants were handed a long stick. Participants were in-

structed to break a small piece off the top of the stick and throw it behind them. They were then asked to draw a circle around themselves with the stick. At this point, the leader gave each participant a small stone and instructed him/her to grind it into the earth. After all participants received their stone, the leader told them to plant their "spear" (i.e., stick) into the ground between their feet.

The next phase of the ritual varied for low- and high-arousal groups. Following the stick planting, the participants in the high-arousal group were given blindfolds to wear. Participants in the low-arousal group did not wear blindfolds. In both conditions, participants were led individually to a hole in the ground, beside which a torch was lit. As participants walked toward the hole, drums were played. Once participants reached the hole, the drumming stopped and participants were asked to kneel at the hole and place their hands on a piece of fur that was in the hole. The leader chanted the meaningless utterance "wadih nyalu ama asumga," and then participants were led back to their original position. Once all participants were back in line, they were instructed to remove the blindfolds (in the case of the high-arousal participants), throw their sticks as hard as possible into the trees, and follow the leader in a line back out of the field.

After the ritual, all participants were given two questionnaires: an emotional rating form and a feedback form. Our analysis here is based on the emotional rating form, which asked participants to indicate whether they had at any point felt any of six emotions (frightened, nervous, relaxed, confused, uncomfortable, and bored) and the intensity of that emotion. Two and a half months after their original participation, participants returned for a final follow-up interview. Six participants did not return for the follow-up interview, and thus the final sample consisted of 23 participants (mean age = 22 years). In the high-arousal group, there were eight women and four men. In the low-arousal group, there were four women and seven men.

For the purposes of this chapter, only one aspect of these interviews will be reported. Participants were asked to recall freely the events of the evening or afternoon that they participated in the interview. They were also asked to indicate what thoughts crossed their mind while performing the ritual and if any aspect of the ritual struck them as especially significant or important. If participants did not expand on the possible meanings of a ritual action, the interviewer questioned them directly on whether that action seemed important and for what reason.

Participants' responses to these questions were coded for volume of reflection and use of analogies. Volume was assessed by tallying the number of actions to which participants attributed meaning. To establish a measure of depth, each meaning was then coded as to whether it was a specific analog (e.g., the stone symbolized a seed, and pushing it into the ground was like planting it to grow) or not. The specific analogs were given a score of 2

each, and all other meanings were given a score of 1. These scores were then totaled for a cumulative SER score for the final interview.

Results and Discussion

Participants' responses to the initial emotional rating were analyzed to establish that our two groups of participants (high-arousal ritual condition and low-arousal ritual condition) indeed had significantly different emotional experiences. Immediately following the ritual experience, participants in the high-arousal ritual condition reported a significantly greater intensity of fright ($M = 1.83$, $SD = 1.90$) than participants in the low-arousal ritual condition ($M = .45$, $SD = .82$; $t[21] = 2.22$, $p < .05$). There was also a trend toward significance in reported levels of relaxation. Participants in the high-arousal ritual condition ($M = 1.50$, $SD = 1.57$) reported lower levels of relaxation than participants in the low-arousal ritual condition ($M = 2.73$, $SD = 1.56$; $t[21] = 1.88$, $p = .07$). Thus, our two groups reported different emotional reactions to the ritual experience, indicating that our two ritual experiences offered opportunities for varied emotional reactions to the ritual.

However, a key element of our hypothesis is that individual emotional reactions will predict volume and depth of reflection on the experience. Given that some of the participants in the low-arousal ritual condition reacted with fear to the ritual, and some participants in the high-arousal ritual condition reported no emotional reaction to the ritual, we created *post-hoc* arousal groups based on participants' original reports of intensity of fright. If participants reported not being frightened at all, they were placed in the low-arousal group ($n = 11$; mean age = 20; 4 female, 7 male), and all other participants were placed in the high-arousal group ($n = 12$; mean age = 24; 8 female, 4 male).

Since there were different gender breakdowns for the two groups (in the high-arousal group there were eight women and four men, compared to the low-arousal group where there were four women and seven men), we needed to ensure that any differences between our ritual conditions were not attributable to gender differences. Thus, all the following analyses were first conducted by comparing the two gender groups and revealed no significant differences by gender. The remaining analyses compared the two *post-hoc* arousal conditions.

To assess differences in SER for the two groups, the mean number of actions attributed meanings, as well as the cumulative SER scores themselves, were compared using independent-samples *t*-tests. The mean cumulative SER scores for the final interviews are demonstrated in figure 7.1. First, participants in the high-arousal group ($M = 11.25$, $SD = 8.44$) on average attributed meanings to a significantly greater number of actions than did participants in the low-arousal group ($M = 6.27$, $SD = 3.61$; $t[21] = 1.81$, $p < .05$).

Thus, participants in the high-arousal group demonstrated a greater volume of reflection than did participants in the low-arousal group.

To assess depth of reflection, the cumulative SER interview scores were compared for the two groups and again revealed a significant difference in the cumulative SER interview scores ($t(21) = 1.69, p = .05$). The mean score for the high-arousal group ($M = 18.92, SD = 15.07$) was significantly higher than the mean score for the low-arousal group ($M = 10.45, SD = 2.02$). In sum, participants who reported experiencing a stronger emotional reaction to the ritual experience also demonstrated greater volume and depth of reflection on that experience in an interview two months later.

There were two key limitations to this study. One limitation of this method was that our measure of participants' emotional arousal relied on participants' self-reports of their emotional reaction. It is conceivable that participants may have over- or underestimated their emotional reactions. In addition, our hypothesis was that participants with greater emotional arousal during the ritual would demonstrate a greater increase in volume and depth of reflection *over time*. In this case, however, we were only able to compare the final interview scores for the groups, rather than the *change* in reflection

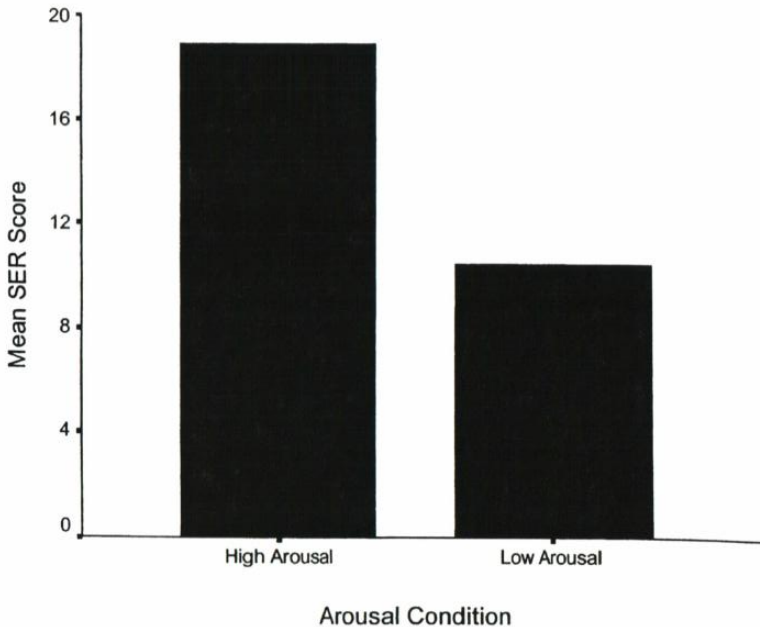


Figure 7.1 Mean SER score by arousal condition for propagation ritual

between the groups. To correct for these two issues in the propagation ritual experiment, a second experiment was designed.

ALTAR RITUAL EXPERIMENT

Our second experiment was designed to correct for some of the problems in the first experiment, more specifically group sizes, measurement of arousal level, and interviewing techniques. To address the issue of group size, we recruited over twice as many participants for this study. To correct for uncertainties about arousal level, we used extreme sound and lighting differences at Queens's Sonic Arts Research Centre (SARC) to vary arousal level, and we assessed participants' actual emotional arousal levels while performing the ritual through a galvanic skin response (GSR) measure that could then be compared to their subjective reports of emotion. GSR is a measure of skin conductivity. It is obtained by sending a small electric pulse between two fingers and measuring the skin's resistance to the pulse. Higher GSR levels mean that the skin is conducting greater levels of electricity, which constitutes a well-established indication of emotional arousal. Third, the interviews were designed to be more probing about participants' thought processes and were conducted at two different time points.

As in the propagation ritual experiment, participants performed a ritual in one of two conditions: high arousal ($n = 26$) or low arousal ($n = 27$). Participants were recruited by a paid recruiter through posters, e-mail announcements, and by word of mouth. In total, there were 53 participants ranging in age from 19 to 32 ($M = 22$). There were 29 women and 24 men (high arousal: 14 women and 12 men, low arousal: 15 women and 12 men). In contrast to the propagation ritual, participants performed the ritual alone, not in groups. Furthermore, the ritual was performed indoors in a sonic-arts research facility. This location, while admittedly not ideal for ecological validity, was chosen because of the extensive capabilities for manipulating sound and lighting.

Before performing the ritual, participants were told that the purpose of the experiment was to get their feedback about what purpose they thought this ritual may have served in its original cultural setting. They were told that while we knew the actions of the ritual, we were as yet uncertain about their meanings or the purpose of the ritual as a whole. Participants were then brought into a large room at the SARC and were led to the center of the room, where an altar had been placed. The altar was a table covered in a cloth made from Hessian fabric. Already on the altar were a round, flat piece of clay; a small bowl of oil; and a shell necklace. In front of the altar hung a sheet on which was back projected the instructions that participants followed. The index and middle fingers on the participant's left hand were connected to two sensors

that measured the GSR. For baseline comparisons, participants were asked to stand still for three minutes before the ritual actually began, and participants were instructed to use their right hand to perform all ritual actions, while keeping their left hand still. Once the three minute baseline was completed, participants were told that they should pay attention to the screen for instructions on how to carry out the ritual. In the high-arousal group, at this point the house lights were turned off, and the room became red. For the low-arousal group, the house lights remained on, and red lights were turned on at a very low setting.

The Altar Ritual

The actual steps of the ritual were quite basic. First participants were instructed (via projection on the screen) to dip their index finger in the oil and rub oil on their forehead and throat. They were then asked to draw a triangle around the necklace and recite a chant. After reciting the chant, participants put the necklace on, recited another chant, and were then instructed to keep their eyes focused on the object that would appear on the screen. At this point, some music was played, which constituted another key difference between the high-arousal and low-arousal groups. For the low-arousal group, the music was played quite softly through one small speaker in front of the participants. For the high-arousal group, the music was played very loudly and in surround sound.

While the music played, a man covered in cloth resembling fur entered the room carrying a box. The man approached the table and set down the box. In the high-arousal condition, he walked slowly, stood at the table until the music had ended, and then proceeded to walk behind the participant and shake a rattle. In the low-arousal condition, he walked more quickly and shook the rattle while standing in front of the participant. After the man left the room, some drums were played. Again, in the high-arousal condition, the sound emanated loudly from many speakers, whereas in the low-arousal condition, the sound was played at lower volume from just one speaker. In addition, for the high-arousal condition, the drumming steadily increased in intensity and pace. In contrast, in the low-arousal condition, the drumming maintained an unvarying tempo.

After the drumming stopped, participants were instructed to place their hand inside the box. In the case of the high-arousal ritual, the lid of the box could not be removed, and participants had to access the interior of the box by inserting their right hand through a hole in the side. In the case of the low-arousal ritual, the box was open (the lid removed) and participants could simply reach inside. All participants were instructed to remove the item from inside the box, which was a smooth, black stone. They were asked to place the stone in the clay, wrap the clay around the stone, and place the stone

back in the box. They were then instructed to remove the necklace and place it in the box.

The Interviews

Immediately following their performance of the ritual, participants responded to questions in a one-on-one verbal interview with a trained interviewer. Participants were asked to rate the intensity of nine emotions on a scale of 1 to 5. The two emotional ratings most relevant to this chapter were fright and surprise. Following the reports of their emotional reaction, participants were asked to recall freely the procedures of the ritual and to offer some suggestions as to what they thought the purpose of the ritual might have been and what the various steps of the ritual might have meant. In addition to being asked these same questions in the one-month follow-up interview, participants were also asked if they had any significant moments of insight about the ritual, and to reflect on the process by which they came to decide on particular ritual meanings.

Responses to these interview questions were then coded as a measure of participants' spontaneous exegetical reflection (SER) on the ritual. The coding system used was the same as that used in the propagation ritual experiment. Each meaning attribution was given a score of 1, and specific analogic connections were given a score of 2. These scores were then tallied for a cumulative SER score. In contrast to the propagation ritual experiment, however, both the initial and follow-up interviews were coded in this way, and a change score for each participant was also derived by subtracting the follow-up interview score from the initial interview score.

Results and Discussion

The first step in analyzing the results was to ensure that our two arousal groups actually demonstrated different levels of arousal. This was assessed through the GSR measures, participant self-reports, and the relation between the two. In order to compare the GSR readings from the two groups, a baseline average was established for each participant by taking the average of the last minute (60 s) of the initial three-minute period where participants were asked to stand still for the baseline readings. Two other segments of GSR readings were also averaged for each participant: the 50 seconds while the music was playing and the man entered the room and the 20 seconds while the drums were playing. These two segments were chosen because in both cases participants were motionless while staring at an object on the screen (thus minimizing interferences to the GSR readings attributable to bodily movements), and because these particular aspects of the ritual were in place specifically to increase arousal for our high-arousal group. Participants' base-

line averages were then subtracted from each segment average for a measure of the average change in GSR for each of those segments.

For both segments, participants in the high-arousal ritual condition had a significantly greater increase in GSR than did participants in the low-arousal ritual condition. For the music segment, participants in the high-arousal ritual condition demonstrated a large mean increase ($M = 142.65$, $SD = 89.58$), which was significantly greater than the increase for the low-arousal ritual participants ($M = 87.69$, $SD = 75.84$) over the same time interval ($t[51] = 2.43$, $p < .05$). The same pattern was true for changes in GSR during the drumming. Participants in the high-arousal ritual condition ($M = 125.73$, $SD = 91.51$) had a significantly greater change in GSR than did participants in the low-arousal ritual condition ($M = 71.30$, $SD = 63.22$; $t[51] = 2.52$, $p < .05$).

These differences in GSR changes were mirrored in participants' self-reports on their emotional reaction. Participants were asked if they ever felt frightened or surprised over the course of the ritual. For each time point that participants reported being frightened or surprised, they were asked to rate the intensity of that emotion on a 5-point scale, with 1 being very low and 5 being very high. The intensities for each time point were then summed for a total measure of fright and surprise for each participant. Participants in the high-arousal ritual condition reported significantly greater intensities of fright ($M = 7.19$, $SD = 3.23$ v. $M = 1.13$, $SD = 1.48$) and surprise ($M = 4.15$, $SD = 3.72$ v. $M = 1.73$, $SD = 1.66$) than did participants in the low-arousal ritual condition ($t[51] = 8.78$, $p < .001$ and $t[51] = 3.13$, $p < .01$, respectively). Furthermore, the changes in GSR at the music segment were significantly correlated with both reports of fright ($r[50] = .33$, $p < .05$) and of surprise ($r[50] = .36$, $p < .05$), as were changes in GSR at the drum segment (fright: $r[50] = .32$, $p < .05$; surprise: $r[50] = .36$, $p < .01$). Based on the strength and consistency in these differences, we are confident that our two ritual-procedure conditions provided the opportunity for varied emotional reactions to the ritual itself.

Given that our hypothesis claims that an individual's personal emotional reaction to the ritual will affect their reflection on the experience, we again created *post-boc* low-and high-arousal groups based on our three measures of emotional reaction (i.e., the two GSR difference scores and participants' self-reports of fright intensity). To create these groups, the three measures were compared for consistency. A participant was placed in the low-arousal group if at least two of the three measures indicated an emotional reaction below average in intensity, and a participant was placed in the high-arousal group if at least two of the three measures indicated an above-average emotional reaction. This *post-boc* division was done with the participants who returned for the follow-up interview one month after participation ($N = 41$, mean age = 23; 23 female, 18 male). The low-arousal group ($n = 21$; mean age = 23) consisted of 11 women and 10 men; the high-arousal group ($n = 20$; mean age = 22) consisted of 12 women and 8 men.

As was described above, participants' reflections during both the initial and follow-up interviews were coded by rewarding general interpretive reflections each with a score of 1 and analogic connections with a score of 2. These scores were then summed for an initial-interview score and a follow-up-interview score. As the hypothesis is that there should be a greater increase in reflections for those participants with high-arousal emotional reactions to the experience, a difference score was computed by subtracting participants' initial-interview scores from their follow-up-interview scores. The mean changes in cumulative SER scores are shown in figure 7.2.

In terms of volume of reflection, an independent samples *t*-test comparing the change in the number of meanings that participants reported indicated a significant difference in the change in volume of reflection ($t(39) = 2.38, p < .05$). Participants in the high-arousal group ($M = 4.85, SD = 3.36$) demonstrated a greater increase in the mean number of meaning attributions than did participants in the low-arousal group ($M = 2.38, SD = 3.28$). In terms of cumulative SER scores (which reward analogic comparisons), participants in the high-arousal group ($M = 5.15, SD = 3.90$) again demonstrated a significantly greater increase in reflection than did participants in the low-arousal

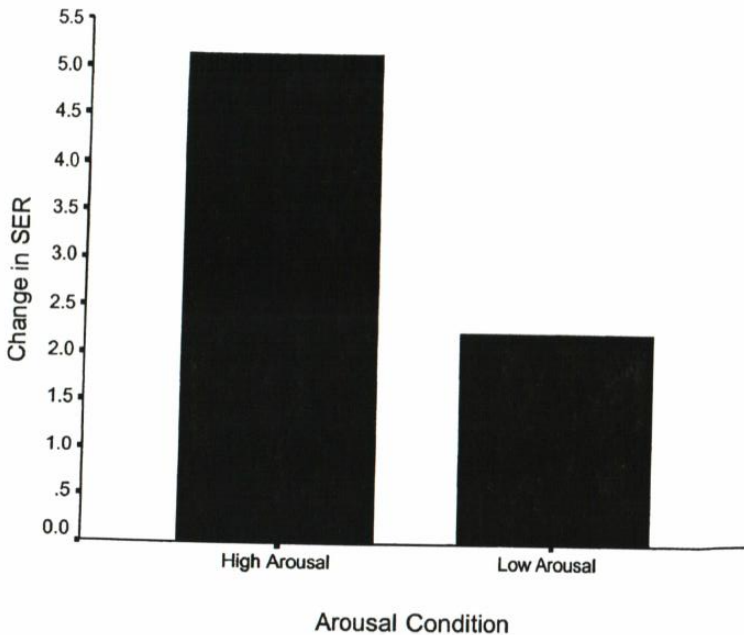


Figure 7.2 Mean change in SER score by arousal condition for altar ritual experiment

group ($M = 2.23$, $SD = 4.13$; $F[1, 39] = 5.37$, $p < .05$). In other words, as was predicted, participants who had a stronger emotional reaction to the ritual also demonstrated a greater increase in their volume and depth of reflection on the ritual between their initial interview and the follow-up interview.

CONCLUSION

The purpose of this chapter was to operationally define Whitehouse's concept of spontaneous exegetical reflection (SER) and to test Whitehouse's prediction that high-arousal rituals spur deep SER on ritual experiences. SER, which Whitehouse claims occurs following participation in low-frequency, high-arousal rituals, has implications not only for an individual ritual participant's life, but also for the motivation to continue to transmit low-frequency, high-arousal rituals across generations. According to Whitehouse, spontaneous exegetical reflection is characterized by sudden insights into ritual meanings, which eventually contribute great motivational force in transmission. In other words, elders and ritual experts reproduce rituals because they are deeply convinced that they must preserve the knowledge and insight gained by performing the ritual.

Boyer (this volume) questions whether there is any evidence that low-frequency, high-arousal rituals actually stimulate this form of elaborate exegetical thinking that could motivate subsequent transmission. To address this concern, we designed two experiments to directly assess participants' reflections on rituals. Participants' emotional reactions to the rituals were assessed both through self-report and biological methods (i.e., GSR). The volume and depth of participants' reflections on the rituals were assessed by coding face-to-face interviews for the volume of meanings that participants attributed to the rituals as well as the analogic connections that participants made in their meaning attributions. In the first experiment, we found that participants with stronger emotional reactions to the ritual demonstrated greater volume and depth of reflection on the meaning of the ritual two months later. Furthermore, in the second experiment, we found that participants with stronger emotional reactions to the ritual demonstrated a greater *increase* in volume and depth of reflection on the ritual over a one-month time period. These findings suggest that indeed both volume and depth of reflection on rituals vary with level of emotional arousal.

Admittedly, there were some limitations to this research. First, one could argue that the participants in our rituals lacked any sense of personal consequentiality, given that the rituals were not "real" rituals and that the social circumstances for participants were quite different from those we would expect in more natural settings. However, we expect that personal consequentiality would increase the volume and depth of reflection, not decrease it. Thus, the

fact that we found significant differences based on emotional arousal even in the absence of personal consequentiality is quite suggestive. Whether personal consequentiality would indeed increase the volume and depth of SER is a question for future research. Second, our results do not speak directly to the issue of motivation for transmission. We have begun to develop an answer to the first half of the puzzle. High-arousal rituals do indeed appear to encourage spontaneous exegetical reflection, at least as defined in terms of volume of reflection and analogic depth. But whether spontaneous exegetical reflection is a motivating force in itself is another question to be explored in the future. Lastly, further analysis of these reflections will seek to tease apart whether certain kinds of analogic comparisons (e.g., cross-domain, abstract) are more likely to be reported by participants with strong emotional reactions to a ritual experience, and what features of reflections may provide more fine-tuned indications of SER.

Despite these limitations, we found that participants who had strong emotional reactions to rituals were more likely to engage in the process of reflecting on exegetical meaning. They exhibited more and deeper reflections on their ritual experiences, which evolved over time, as compared with participants who experienced little emotional arousal while performing the ritual.

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