The psychology of rituals: An integrative review and process-based framework

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Abstract

Traditionally, ritual has been studied from broad sociocultural perspectives, with little consideration of the psychological processes at play. Recently, however, psychologists have begun turning their attention to the study of ritual, uncovering the causal mechanisms driving this universal aspect of human behavior. With growing interest in the psychology of ritual, the current paper provides an organizing framework to understand recent empirical work from social psychology, cognitive science, anthropology, behavioral economics, and neuroscience. Our framework focuses on three primary regulatory functions of rituals: regulation of (1) emotions, (2) performance goal states, and (3) social connection. We examine the possible mechanisms underlying each function by considering the bottom-up processes that emerge from the physical features of rituals and top-down processes that emerge from the psychological meaning of rituals. Our framework, by appreciating the value of psychological theory, generates novel predictions and enriches our understanding of ritual and human behavior more broadly.

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Ritual actions do not produce a practical result on the external world—that is one of the reasons why we call them ritual. But to make this statement is not to say that ritual has no function ... it gives members of the society confidence, it dispels their anxieties, and it disciplines their social organizations.
—George C. Homans, *Anxiety and Ritual,* 1941

Rituals pervade human life. Whether through religion, business, politics, education, athletics, or the military, they are central to the most meaningful traditions and cultural practices around the world. In rituals, the most ordinary of actions and gestures become transformed into symbolic expressions, their meaning reinforced each time they are performed (van Gennep, 1909). The repeated kneeling and bowing of religious prayer signals commitment to God and provides solace; a team's pregame ritual of putting equipment on from left-to-right (and not right-to-left) empowers athletes to perform at their best; and marriage rites during the wedding ceremony seal the bond between two people. Rituals are a fundamental part of the human experience, and are therefore of interest to researchers who study human behavior across multiple disciplines.

Ritual has been a popular topic in the social sciences, particularly among cultural anthropologists and sociologists (e.g., Durkheim, 1915; Geertz, 1973; Levi-Strauss, 1955). Over the past century, the study of ritual has benefited primarily from broad cultural analyses and ethnographic research (e.g., Collins, 2004; Gerholm, 1988; Kapferer, 2004; Lewis, 1980). During this time, the micro-level perspective took a backseat to broader macro-level accounts. As a result, there is much less known about the psychological and neural bases of ritual, which operate at the level of the individual, compared to what is known about its social and cultural functions, which operate at a societal or group level.

To begin to address this theoretical and empirical gap, here we consider the individual-based regulatory functions of rituals, focusing on how they are represented psychologically. We take the position that the elaborate rituals observed in the real world, which have been central to shaping human experience, build on basic neuro-cognitive, affective, and motivational processes. We propose that the study of ritual should no longer be exclusive to anthropologists and cultural ethnographers. This view is gaining momentum as more psychologists and cognitive scientists, operating at lower levels of analysis, begin to test the underlying cognitive and affective underpinnings of ritual. To bring this research to the next stage, the principle goal of the current paper is to provide an organizing framework to situate the psychological functions of ritual. We apply our framework in order to: (a) develop a comprehensive definition of ritual, (b) propose a set of rituals' regulatory functions that will serve to organize prior and future empirical work, (c) review recent empirical findings related to these psychological functions, (d) propose a common set of underlying psychological processes involved in these functions and (e) generate novel ideas and testable hypotheses from these process-based accounts. With a growing interest in the psychology of ritual, the time is ripe for our integrative review and framework.

The defining features of ritual

Developing a framework for the psychological functions of ritual first requires a clear definition of what does—and does not—constitute a ritual. Definitions of ritual abound in the social sciences (Bell, 1997; Boyer & Liénard, 2006; Humphrey & Laidlaw, 1994), and differ widely depending on their focus (e.g., Bell, 1992; Bell, 1997; Collins, 2009; Turner, 1969), resulting in incompatible theoretical approaches (Beattie, 1966). Here we put forth a definition that we believe is compatible with most prior empirical research and theorizing, but that has the additional advantage of addressing the individual psychology of ritual.

First, rituals are distinguished by a specific set of physical features pertaining to the characteristic aspects of the individual actions that compose them, which tend to be structured in rigid, formal, and repetitive ways (Foster, Weigand, & Baines, 2006; Rossano, 2012; Tambiah, 1979). Unlike other behaviors, rituals are typically chunked into units of segmented action, which then become sequenced, patterned, and repeated in fixed or bounded ways (Boyer & Liénard, 2006; Liénard & Boyer, 2006; Nielbo & Sørensen, 2011, 2015). In contrast to habits or routines, which may change each time they are performed, rituals tend to be invariable in their performance (Rappaport, 1999; Smith & Stewart, 2011). Because of this invariability, rituals typically require a "scrupulous adherence" to rules, whereby sticking exactly to the script is imperative (Dulaney & Fiske, 1994, p. 245).

Second, the invariability of its performance is also linked to certain psychological elements that come with performing the ritual, typically enhancing its meaning. Consider, for instance, the animal slaughter rituals common to the Islamic and Judaic traditions: preparations are performed using exactly the same set of steps in exactly the same order. Here, the specificity of the ritual is linked to the purpose of purifying the meat. When even the smallest detail is missing or out of place, such as a quick blade movement in the wrong direction, the entire ritual fails and the meat becomes forbidden to eat (for an anthropological account of ritualistic food restrictions, see Douglas, 1966). In this way, the rules of the ritual cannot be relaxed because the actions themselves have significant meaning to the performer.

To constitute a ritual, a set of behaviors must include characteristic physical features (e.g., rigid, repetitive action sequences) as well as certain psychological features (i.e., the user must interpret the ritual to have a purpose or meaning). Moreover, the meaning inherent in ritual is often acted out through overt symbolic expression (Radcliffe-Brown, 1939; Turner, 1967).

Unsurprisingly then, they are often associated with the idea of self-transcendence and sanctity, with strong links to religion and spiritualism (Bell, 1997; Geertz, 1973; Turner, 1967). Consider, for example, that a habit and ritual action might appear, at first glance, identical in structure, but the ritual is different (and thus considered to be ritual) because it is imbued with a sense of meaning, whereas the habit is not. Indeed, some of our most important rituals would simply appear arbitrary and trivial if the symbolism and meaning were removed. The 21- gun salute during a military funeral service, rather than bestowing the highest honor to a fallen comrade, would be nothing more than group of soldiers firing into the air.

The final element of ritual serves as the connecting piece between the physical and psychological features. By having (i) segmented, rigid, formal, and repetitive actions (physical) and (ii) symbolic value (psychological), rituals also tend to be goal-demoted (Boyer & Liénard, 2006). That is, rituals either lack overt instrumental purpose, or their constitutive actions themselves are not immediately causally linked to the stated goal of the ritual (Herrmann, Legare, Harris, & Whitehouse, 2013; Legare & Souza, 2012; Rappaport, 1999). This "causal opaqueness" (Kapitány & Nielsen, 2015, 2016; Legare & Souza, 2012, 2014) results in features that are impervious to rational hypothesis-testing, often displaying features that appear arbitrary, characterized by unnecessary repetition and stereotypy (Rutherford, 2006; Smith & Stewart, 2011; Sosis & Ruffle, 2004). For example, setting a table to prepare for a meal is typically not considered to be a ritual. The specific placement and ordering of silverware and plate ware is unimportant, just so long as they are arranged on the table in a practical manner for eating. Contrast this with the same behavior of table-setting that occurs during religious holidays such as Jewish Passover. The Passover Seder dinner is a lengthy ritual feast involving a table-setting practice – called the Seder table – that requires precise placement of certain items that are

utilized at exact times over the course of the dinner (in fact, Seder is roughly translated as "order, arrangement"). This example illustrates how, on ordinary occasions, a mundane behavior may be non-ritualistic, but at another time becomes highly ritualized with the addition of certain non-instrumental features.

Combining these separate features, then, we define ritual as (a) predefined sequences characterized by rigidity, formality, and repetition that are (b) embedded in a larger system of symbolism and meaning, but (c) contain elements that lack direct instrumental purpose. Importantly, though all three features are present in ritual, they may be weighted differently depending on the context and the function served, as we will later see. Some rituals, for instance family rites during the holiday season, may be highly symbolic and meaningful but less rigid; whereas others, like those marked by certain psychopathologies, may be less meaningful but completely invariant and rule-bound. As dissimilar as these features appear to be, we argue that disparate forms of rituals share common psychological processes (for similar views see Dulaney & Fiske, 1994; Lang, Krátký, Shaver, Jerotijević, & Xygalatas, 2016).

Organizing a framework of ritual: Bottom-up and top-down processing

We organize our working framework as follows. A combination of the three definitional features generates a ritual experience (distinguishable from non-ritual one). The ritual's physical and psychological features lead to bottom-up and top-down processing, respectively, and the combined processing regulates one or more psychosocial states, which results in both individual and social-based outcomes (see Table 1). There are many other frameworks in psychology that use this type of bottom-up and top-down categorization of psychological mechanisms (e.g., Reicher, 1969; Navon, 1977; Ochsner et al., 2009; Chiesa, Serretti, & Jakobsen, 2013; Awh, Belopolsky, & Theeuwes, 2012). Here, we propose that the integration of both bottom-up and

top-down information processing can explain the varied psychosocial consequences of ritual. In other words, we propose that ritual is the convergence of the two levels of mental processing – 'where top-down meets bottom-up.' (Sarter, Givens, & Bruno, 2000, p. 147).

Bottom-up perception refers to the processing of stimulus features as they come in, combining the individual parts to create a whole (data-driven). Bottom-up processing includes the recruitment of perceptual, attentional, and memory stimulus features tied to the ritual or the surrounding environment. These processes derive from the sensorimotor elements of ritual – the experience or enactment of particular physical actions. Because they are comprised of highly stereotyped action sequences (characterized by rigidity, formality, and repetition), rituals tend to be parsed into segmented action units. This form of event segmentation, akin to object segmentation, is a naturally occurring cognitive process that economizes perception and guides attention (Newtson, 1976; Zacks & Swallow, 2007; Zacks, Tversky, & Iyer, 2001). We suggest that the sensory experience of engaging in sequenced actions that are rigid, formal and repetitive, as well as the motor control required to enact these actions with care, leads to a regular stream of event segmentation, which makes ritual more attention-grabbing and more memorable than non-ritualized actions (Boyer & Liénard, 2006; Nielbo & Sørensen, 2011).

Top-down perception, on the other hand, refers to information-processing that is first driven by cognition and goals, in which a stimulus is first framed by various expectations and interpretations (rule-driven). Top-down processing is associated with the integration of these physical motoric features into broader narratives, appraisals, and interpretations. This context-dependent processing that is done before, during, and after ritual performance involves the elaboration of stimulus properties into meaning appraisals, which often reaffirms the purpose of completing the rite in the first place. Ritualistic sequences, by virtue of being perceived as

special, are more than the arbitrary physical movements that comprise them. Instead, the actions are interpreted as a practice that is meaningful, providing context and connecting a person to something that is bigger than themselves – their ancestry, familial traditions, cultural and religious groups, nature, immortality, and more. The separation of ritual from other ordinary, more mundane behaviors affords it a special status (Bell, 1997; Berggren & Stutz, 2010). This unique quality of ritual means that the behaviors performed are inherently more valuable than other behaviors. This heightened value or meaning communicates a clear signal to oneself (self-signaling) or other people (social signaling) that something of significance has been done.

Recent computational modeling offers insight into how the bottom-up and top-down processes combine during ritual. Using data simulation techniques, the basic action units of ritual i) allow for greater allocation of attentional resources (i.e., bottom-up) and ii) can be modulated by culturally- mediated meaningful experiences (i.e., top-down), what researchers call "cultural priors" (Nielbo & Sørensen, 2015). This enhanced integration distinguishes cultural rituals from, say, the ritualized behaviors typical of pathology.

We can look at the behavior of ritualistic prayer as an example of a combination of bottom-up (i.e., biased attention and physical movement) and top-down (i.e., value signaling and meaning transference) psychological processing. A person who prostrates during the Islamic Salat at precisely timed moments is engaging in rigid, fixed physical actions. The stereotyped, repeated movements segment the prayer event and automatically grab the person's attention, focusing their experience on the precise completion of the correct sequences. In other words, the bottom-up sensorimotor processing of the controlled segmented ritual actions leads to biased attention. At the same time, doing the ritual correctly signals to the person, and perhaps to others, that they are a devoted Muslim who prays the right way according to the Quranic scripture. In

this way, when done properly, the basic movements that comprise the prayer become much more than mere physical movements; they are imbued with sanctity and meaning, *each time* they are performed. This enhances the value of the ritual experience. In the rest of the paper we show how such cases of ritual can be dissected into their constituent psychological processes.[i]

We intend to show that all forms of ritual, no matter how different they may appear on the surface, are a result of some combination of these bottom-up and top-down psychological processes. Thus, rather than seeing the various expressions of ritual as distinct cultural phenomena merely called by the same name, our framework will allow researchers to think about a common underlying psychological basis that unites *all* types of ritual. Our position is that each ritual will involve varying degrees of bottom-up and top-down processing, rather than a fixed amount in every context. These relative weightings, which are determined by the specific purpose served by the ritual, will alter the psychological experience for the person, and ultimately lead to different outcomes in the ritual experience.[ii]

Ritual's regulatory functions

Despite rituals' lack of clear instrumental purpose, it is now well-known that rituals serve many psychological functions (e.g., Boyer & Liénard, 2006; Watson-Jones & Legare, 2016). Leveraging this past work, we propose that rituals' diverse functions can be categorized into three regulatory categories. Rituals can regulate (1) emotions, (2) performance goal states, and (3) social connection to others. Though listed separately for the purpose of our conceptual framework, there is considerable overlap between the three functions. We address this point throughout the paper and offer examples of when a ritual may serve multiple functions simultaneously.

Rappaport formally pieced together the notion of ritual as a type of regulatory process,

recognizing that rituals are enacted at times as a way to monitor and maintain various psychological and sociocultural states (1967, 1971). He saw rituals as a type of cybernetic or monitoring control system – not unlike the feedback system of a thermostat – for individual and group behaviors. This thinking closely aligns with cybernetic control models in psychology and neuroscience (Carver & Scheier, 1981; Friston, 2002; Gray & McNaughton, 2000; Powers, 1971): Fluctuating psychosocial states are first detected and then compared against an ideal (future) reference state. If a discrepancy is found to exist, the ritual is triggered, closing off the loop and resolving the discrepancy (Rappaport, 1971).

Here, we draw on cybernetic control theory to better understand the regulatory function of rituals. If rituals indeed function to regulate emotions, performance goal states, and social connections, at least two propositions must be true: first, experiencing an emotional, goal-driven, or social deficit should elicit more ritualistic behavior ("Proposition 1"), and second, enacting rituals should thereby reduce such aforementioned deficits ("Proposition 2").[iii] Although many studies demonstrate beneficial consequences of rituals for improving emotional well-being, performance, and affiliation, fewer test the strong version of these propositions, which requires examining the consequences of rituals under conditions of deficit. For example, performing interpersonal rituals can improve closeness in groups even when the group members do not reveal any explicit need for connection or belonging (Páez, Basabe, Ubillos, & Gonzalez-Castro, 2007; Ruffle & Sosis, 2007; Sosis & Ruffle, 2003; Wen, Herrmann, & Legare, 2016). Although these studies and others do not provide strong evidence for rituals' regulatory functions via cybernetic control processes (that is, they do not directly address one of our two propositions), we believe they still provide suggestive evidence that rituals might be functional. We therefore categorize the empirical studies in each proceeding section as

providing relatively stronger or weaker evidence for ritual's regulatory functions. Stronger

evidence satisfies one of the two propositions that directly follow from a cybernetic control

model; weaker evidence simply shows a beneficial consequence of ritual. Experimental data are

particularly valuable for demonstrating causality in either category.

For each function, we describe the bottom-up and top-down psychological processing

most likely responsible. After each section, we discuss testable predictions that follow from the

identified processes. We consider, for example, how manipulating a ritual's physical and

psychological features will be useful for understanding how bottom-up and top-down processing,

respectively, lead to the proposed regulatory functions. Moreover, we leave room for rituals to

evolve over time. Because rituals are done frequently (sometimes every day for a person's life),

the experience will be different as changes in psychological processing unfold. From a

psychological perspective, a ritual being done for the first time is dramatically different than the

same ritual being done for the thousandth time. Our framework accounts for the dynamic nature

of ritual and makes specific predictions related to these changes.

Emotion regulation

Multiple bodies of literature suggest that rituals can act as a buffer against the deleterious

effects of strong negative emotions. Ritualized behaviors seem particularly likely to emerge

under circumstances characterized by negative emotions such as high anxiety, uncertainty, and

stress (Celsi, 1993; Keinan, 1994; Lang et al., 2015; Padgett & Jorgenson, 1982). Perhaps the

earliest description of the link between anxious uncertainty and rituals is Bronislaw

Malinowski's (1954) observation of fishing behaviors among the Trobriand Islanders in

Melanesia in the early 1900s. Malinowski noticed that these islanders performed elaborate

magical rituals when traveling in unpredictable and dangerous ocean waters but not when fishing

in the safe waters of the lagoon, and concluded that they used these rituals in an effort to exercise some control over the otherwise uncertain conditions of open-sea fishing. Similarly, Mary Douglas's (1966) account of pollution/purity rituals suggests that many of our cultural and religious practices, from incessant tidying behaviors to elaborate food restrictions, result from a fundamental need to control experiences that may be "dirty" and dangerous. This suggests one reason why so many rituals center on themes of cleanliness and purity: They impose order against threatening forces of chaos and disorder.

Proposition 1: Emotional deficit increases ritualistic behavior. Clinical studies provide relatively strong support that rituals regulate negative emotions, because they demonstrate that rituals are more likely to emerge when performers experience an emotional deficit—that is, an emotional state that diverges from one's desired state. People with clinical disorders associated with anxiety, stress, or trauma often develop their own rituals, presumably as a coping mechanism to regain a sense of personal control (e.g., Rachman & Hodgson, 1980). Obsessive-compulsive disorder (OCD) in particular seems to be characterized by frequently engaging in ritual behaviors to ward off anxious and intrusive thoughts (e.g., Mataix-Cols, Rosario-Campos, & Leckman, 2005; Reuven-Magril, Dar, & Liberman, 2008). Other populations under intense stress such as abuse victims (Jacobs, 1989) and palliative care patients (Romanoff & Thompson, 2006) often adopt rituals as well.

These correlational findings extend to the religious domain as well. Interestingly, researchers have noted morphological similarities between OCD rituals and religious rituals (Dulaney & Fiske, 1994; Fiske & Haslam, 1997). Freud was one of the first to note that, "It is easy to see the resemblance between the neurotic ceremonials of obsessions and compulsions and the sacred acts of religious ritual" (1924). Similar to ritualistic compulsions, religious rituals

are known to be activated during times of anxiety and negative emotion (Ahler & Tamney, 1964; Anastasi & Newberg, 2008). Particularly compelling, a large survey sample of Israeli citizens demonstrated that those who happened to reside in areas exposed to missile attack during the Gulf War were more likely to engage in magical thinking and religious rites than those who resided in areas not exposed to attack (Keinan, 1994).

In the aforementioned studies, participants were not randomly assigned to have an emotional deficit, leading to many different possible interpretations of these data. Two sets of experiments can address this concern and provide stronger evidence for the emotional regulatory function of rituals. First, in a non-clinical population, Whitson and Galinsky (2008) found that when people's need for order is disrupted, they tend to compensate by seeking out illusory patterns of coherence and connection. Across multiple experiments, participants who were induced to lack control were more likely to develop superstitions and engage in superstitious reasoning, a style of thinking that is often coupled with rituals. Second, Lang et al. (2015) manipulated anxiety by asking participants to engage in an evaluative public speaking task and comparing them to a low-arousal group. After the task, researchers used motion-capture technology to quantify various characteristics of hand movements. They found that anxiety measured at the physiological level led to an increase in repetitiveness and rigidity, and self-reported anxiety predicted redundancy of movement, all of which are characteristic of ritual behavior.

Proposition 2: Rituals reduce emotional deficit. Although the majority of the anthropological and clinical research on this topic focuses on when rituals emerge in response to negative affective states, there are at least four studies demonstrating the reverse path: that assigning individuals in emotional distress to do rituals can alleviate their distress. First, Sosis

and Handwerker (2011) examined psalm recitation among Israeli women during the 2006 Lebanon War. They found that among those women who lived in war zones, under threating and uncontrollable conditions, more frequent psalm recitation was associated with lower anxiety levels, while that association was not found outside the war zones, where threat levels were lower. Second, Anastasi and Newberg (2008) measured Catholic college students' anxiety before and after a stressful experience and found that those randomly assigned to recite the Rosary, a Catholic set of prayers, experienced greater reduction in anxiety than those assigned to watch a religious video. Third, Brooks et al. (2016) experimentally demonstrated that rituals can reduce anxiety by randomly assigning individuals about to engage in high-anxiety performances such as public karaoke singing or high-stakes math tests to do rituals versus other non-ritual control behaviors (e.g., passively waiting or actively trying to calm down). People who did rituals showed fewer physiological signs of arousal (e.g., lower heart rate), reported less anxiety, and, as a result, performed better than people who did not. Most interesting, the effect of ritual on anxiety was significantly stronger when participants were induced to feel high anxiety than when they were induced to feel low anxiety (Study 2, Brooks et al., 2016). Finally, Norton and Gino (2014) demonstrated that individuals who performed rituals to manage their grief felt less sad, and more in control, than individuals who did not perform rituals.

  Bottom-up processing. One mechanism by which performing rituals may regulate emotion is that the act of performance may direct attention away from one's emotions. During the performance of a ritual, focusing on the series of action sequences will direct a person's attention to the specific motions and sensory experiences. Rituals then can serve as a form of distraction, blocking out possible negative thoughts from entering a person's mind. In line with this thinking, Boyer and Liénard (2007) propose that the physical action units of ritual lead to a

swamping of working memory that temporarily reduces anxiety. This attentional demand minimizes anxiety by blocking intrusive thoughts (Van Dillen & Koole, 2007).

This process is seen with athletic performances, particularly in high-stakes competitions where pressure and anxiety is high (Neil, 1982; Foster et al., 2006). During increased competition, athletes tend to focus on anxiety-related cues (Jones & Uphill, 2004; Moran, 1996), which often hurts their performance (Beilock & Carr, 2001). As a coping strategy, the pre-game rituals of athletes have been shown to limit the number of anxious thoughts they experience by directing their focus on the completion of the ritual sequence instead. Distraction techniques are also involved in the compulsive rituals of obsessive-compulsive disorder. In one recent study looking at the brain-mediated regions of elevated anxietyer, researchers found that attentional distraction techniques dampened the emotional processing of threatening stimuli (Simon, Adler, Kaufmann, & Kathmann, 2014). At the same time, however, the paradoxical consequences of obsessive-compulsive disorder – temporary relief from anxiety and the ironic rebound of returning anxiety – suggest that attentional distraction could be detrimental in the long-run. For example, other research has shown that distraction techniques can lead to decreased subjective anxiety but elevated physiological arousal (Grayson, Foa, & Stekettee, 1986; Grayson, Foa, & Steketee, 1982). It could be the case that distraction is only effective up to a certain point and is unable to dampen the automatic physiology of experienced anxious arousal.

A second bottom-up mechanism by which ritual can regulate emotion is the successful completion of a structured action sequence. The motor control required of ritual's physical actions may also regulate emotions simply through the physical completion of the ordered movements themselves. More specifically, the motoric rigidity of ritual actions satisfies a fundamental need for order, and may help to regulate emotions especially in response to anxious

events. Boyer and Liénard (2008) theorized that ritualized actions are an evolutionary vestige of a vigilance detection system, helping to provide a sense of stability in the face of uncontrollable threats. The entropy model of uncertainty makes a similar prediction, positing that anxiety motivates organisms to return to familiar low-entropy states in order to regain a sense of control (Hirsh, Mar, & Peterson, 2012; Lang et al., 2015; but also see Kratky et al., 2016).

Completing action sequences that are not only structured but also strenuous may explain ritual's influence on emotion regulation. Some studies posit that certain physical features of ritual can regulate emotion by inducing pleasurable states through the stimulation of the endocannabinoid "reward" system. For instance, the repetitive and often strenuous actions that are involved in ritual – such as whirling, chanting, dancing, or prostrating – seem to produce anxiolytic effects by stimulating the endocannabinoid system (Dunbar, Kaskatis, MacDonald, & Barra, 2012; Xygalatas, 2008). Studies of communal chanting and dancing, elements found in most collective rituals, can result in increased endorphin production (Dunbar et al., 2012; Tarr, Launay, Cohen, & Dunbar, 2015; Tarr, Launay, & Dunbar, 2017), which is known to induce pleasurable feelings, reduce distress, and facilitate coping with anxiety (Bali, Randhawa, & Jaggi, 2015).

Top-down processing. The first way that rituals may assist in regulating emotions is through the positive feeling of having completed a practice understood to be ritual. The successful completion of a ritual acts as a signal to the self of one's control over a situation. Multiple experiments suggest that framing basic actions as ritual can help regulate negative emotion and anxiety at least in part because of a person's belief that rituals have some inherent meaning. For example, one study by Brooks et al. (2016) found that engaging in behaviors labeled as "ritual" mitigated performance anxiety, compared to doing the exact same behaviors

not labeled as ritual. Presumably, labeling the same behaviors as a ritual created a belief that they were meaningful, which played a critical role in reducing anxiety. Similarly, Norton & Gino (2014) found that engaging in ritual-labeled behaviors (compared to matched behaviors referred to as random actions) led participants to feel a greater sense of personal control after incurring a major loss. Even calling the simplest actions "ritual" may be enough to generate a meaning appraisal that mitigates negative affect.

A second explanation considers how the inherent symbolic value of ritual helps to transfer meaning to other abstract concepts. A meaning appraisal like this might help regulate emotions by alleviating incidental negative affect and heightening positive, self-transcendent emotions, like awe, contentment, and gratitude. This explanation is particularly pertinent to religious rituals. These types of appraisals during a ritual's performance provide people with a sense of comfort because doing the practice reminds them that they belong to something that is bigger than themselves (e.g., a group, a belief system, the universe).

Meaningful appraisals of rituals may at least partly derive from their historical elements, where certain practices are seen as belonging to past tradition or one's ancestry. In other words, rituals may be meaningful partly because they are seen as ancient and unchanged. Fitting with this explanation, research has shown that the concept of meaningfulness broadens the perceptual scope of time, allowing a person to think about how the present relates to the past and the future (Vallacher & Wegner, 1985). The more people devote time to thinking about the past and future, the more meaning they attribute to their life in general (Baumeister, Vohs, Aaker, & Garbinsky, 2012). From this, rituals can be thought of as vehicles of meaning. They provide comfort to a person by allowing them to escape their present self, making anxieties seem fleeting and more manageable. Religious burial rituals, for instance, might provide solace by bringing to mind

important concepts of the group's history, while also promising hope in an afterlife.

   Testable predictions. Our proposed bottom-up processing of ritual (i.e., sensorimotor features biasing attention) generates at least two novel predictions related to our regulatory framework. First, less structured rituals may not be as effective in mitigating anxiety or gaining control compared to more structured rituals. Second, although performing rituals may serve a short-term goal of reducing anxiety in the moment, such rituals may ironically become maladaptive in the long-run because people may learn to rely on them too much. Indeed, such fixated behaviors are reminiscent of different pathological conditions like obsessive-compulsive disorder (e.g., Jung & Dell, 1940). In these cases, if the emotion deficit persists after completing a ritual, future attempts to resolve the deficit will result in rituals becoming increasingly more complex and rigid over time.

   Our proposed top-down processing of ritual (i.e., symbolic features leading to meaning broad appraisals) generates the prediction that more symbolically meaningful rituals should be better-equipped to reduce anxiety. Future research could test this by varying the perception of a ritual's meaning and seeing if this enhanced perceived meaning produces a reduced emotional deficit. For example, if a person experiencing anxiety is given the choice between two identical rituals but one is perceived as culturally salient (e.g., as belonging to an ancient tradition), this ritual might be judged as more meaningful and therefore more effective at resolving the deficit and alleviating anxiety (for a related construct called the existence bias, see Eidelman, Crandall, Pattershall, 2009). Another way to isolate these top-down features would be to test for the effect of having another person complete a ritual on someone's behalf. If people experience a reduction in anxiety (or some other regulated emotion) simply by knowing a ritual was done for them, and without doing the actions themselves, then this would suggest a clear transference of meaning in

the ritual performance.

Goal regulation

Across domains, important events are often preceded or marked by the presence of rituals. In this way, rituals appear to play an important role in preparing a person for a context that is motivationally relevant, such as when athletes engage in pre-performance rituals to prepare for a game, students use study rituals to prepare for an exam, or people ceremoniously complete a morning tea ritual to prepare for the workday. Rituals energize and stimulate a person's actions, motivating them towards current and future goals by bringing attention to the regulatory context and heightening feelings of personal involvement.

Rituals can spur motivated behaviors that have personal relevance. This idea aligns with decades of research in social psychology showing that much of human behavior is governed by regulatory processes: People go to great lengths to minimize the discrepancy between ideal future states and current states, which initiates various goal-directed behaviors (e.g., Bandura, 1991; Carver & Scheier, 1982, 1998; Deci & Ryan, 2000; Friston, 2002; Inzlicht, Legault, & Teper, 2014; Gray, 1982, 1987; Kuhl, 1985, 2000). Different psychological and behavioral strategies can be employed to close the gap between current states and future goal states. We suggest that rituals may serve this fundamental psychological function by minimizing these regulatory deficits and aligning a person with focal goals. Ritual practitioners will often explicitly and deliberately bring to mind an ideal goal state (e.g., improving performance) and compare their current state to the desired outcome. This goal-regulatory process can also be achieved on a more implicit level (Koole, McCullough, Kuhl, & Roelofsma, 2010). Often the embodiment of certain ritual actions happens automatically and outside conscious awareness, suggesting that such bodily movements may be attuned to implicit self-regulation (Kuhl, 2000).

This regulatory process, both explicit and implicit, is frequently found in performance domains where rituals are enacted in order to achieve a desired level of optimal performance.

> **Proposition 1: Goal discrepancy increases ritualistic behavior.** To our knowledge, little research has directly tested whether greater discrepancy from one's goal can induce more ritualistic behavior, although some scholars theorize that goal discrepancy can direct ritualistic behavior explicitly and implicitly (Wood & Neal, 2007). Interestingly, observational studies of athletes suggest the reverse correlation: that better performers (who presumably have lower discrepancy from their goal) tend to exhibit *more* ritualistic or superstitious behavior, not less (Cohn, Rotella, & Lloyd, 1990; Cotterill, Sanders, & Collins, 2010; Foster, Weigand, & Baines, 2006; although note that these studies have low sample sizes). Hamerman and Morewedge (2015) provide one of the most direct tests of this proposition; in a series of studies they demonstrate that individuals who naturally have lower level of performance orientation or those primed to pursue performance goals exhibit more superstitious behavior, compared to those with higher performance orientation or primed to pursue learning goals. This is a clear area for future research to address.

> **Proposition 2: Rituals reduce goal discrepancy**. Three lines of research point toward ritual's ability to enhance goal pursuit, although none of this work clearly demonstrates that rituals can overcome *deficits* in pursuing goals. First, preparation rituals can improve goal-driven performance (Cohn, Rotella, & Lloyd, 1990; Foster, Weigand, & Baines, 2006; Weinberg, Gould, & Jackson, 1979); the majority of these studies examine free-throw shooting performance (Czech, Ploszay, & Burke, 2004; Gayton, Cielinski, Francis-Keniston, & Hearns, 1989; Lobmeyer & Wasserman, 1986; Predebon & Docker, 1992). Here, we can see the overlap between our first two proposed functions. During the enactment of a single ritual, like when an

athlete prepares for a stressful performance event, a person may be regulating both their emotions and performance goal states. Although most of this research is correlational, the most compelling causal evidence comes from Damisch et al. (2010), whose paper shows that athletes provided with "lucky" charms performed better, and felt greater self-efficacy, than those not given lucky charms in experimental designs. However, the authors did not test whether this effect was stronger following a particularly poor performance (that is, for larger goal discrepancy).

Second, outside performance contexts, religious concepts, which are closely linked to ritual practice and prayer, have been shown to improve self-regulation and self-control (e.g., Fishbach, Friedman, & Kruglanski, 2003; Laurin, Kay, & Fitzsimons, 2012; Mazar, Amir, & Ariely, 2008; Rounding, Lee, Jacobson, & Ji, 2012; Sharif & Norenzayan, 2007; Xygalatas, 2013; but see Good, Inzlicht, & Larson, 2015), suggesting that the rituals common to many religions are associated with the ongoing goals of impulse control and self-monitoring (Koole, et al., 2010; McCullough & Willoughby, 2009; Norenzayan, Shariff, Gervais, Willard, McNamara, Slingerland, & Henrich, 2016; Rossano, 2012). The regular practice of effortful religious rituals signals personal commitment and builds implicit self-control over time, promoting adaptive behaviors that enhance health and well-being (Whitehouse, 2002; Wood, 2016).

Third, this notion is also reflected in classical Confucian philosophy, which places considerable emphasis on ritual through goal-directed action and the internalization of values (e.g., Ivanhoe, 2007; Sarkissian, 2010; Slingerland, 2015). For example, there is evidence suggesting that East Asians from highly ritualized Confucian cultures have improved self-regulation compared to people from Western cultures, who are less ritualized (Butler, Lee, & Gross, 2007; Sarkissian, 2014; Seeley & Gardner, 2003). Likewise, the military lifestyle is

known to espouse excellence in self-discipline and behavioral regulation. Here the ritual culture is portrayed in rigid drills that involve synchronous marching, chanting, and other regimented behaviors that ensure order and high levels of motivation (e.g., Aronson & Mills, 1959; King, 2013; McNeill, 1995, Mills & Mintz, 1972).

Finally, one set of experiments that more directly test whether rituals reduce goal discrepancy demonstrated that individuals lacking self-control who performed ritualistic gestures were able to re-exert self-control, more so than individuals who performed "random" gestures or no gestures at all (Tian et al., 2017). This effect was demonstrated across multiple self-control domains (e.g., eating healthy and being prosocial). The authors propose that one reason for rituals' effectiveness is because performers feel self-disciplined when engaging in fixed sequences of rigid and repetitive gestures.

Bottom-up processing. One way that rituals can regulate goal-directed behavior is by heightening attention to the goal context through the experience of segmented, repetitive actions. Whereas in the first function rituals buffer negative states via distraction, here the function of a ritual is to *focus* on goal-related states. Attention underlies much of our executive function and regulatory processes (e.g., James, 1890/1992; Kaplan & Berman, 2010; Todd, Cunningham, Anderson, & Thompson, 2012), guiding different motivated behaviors. Rituals may be particularly good at directing attention because they are inherently compelling and attention-grabbing. As a result, they tend to lead to increased involvement, either in subsequent acts that are temporally or conceptually linked to the ritual behavior, or to the ritual act itself (van der Hart, 1983). This suggests that the physical action-parsing that happens during rituals is effective at drawing attention either to the ritual actions themselves or to the motivated behavior that follows, resulting in feelings of heightened involvement.

For instance, one set of experiments found that performing rituals, compared to performing other acts, enhanced the eating experience by heightening the performers' perceived involvement in consumption (Vohs, Wang, Gino, & Norton, 2013). This suggests that when consuming food (a type of goal-directed process), the rigidity and repetition of a ritual in preparing to eat draws the attention to the food item, thereby increasing motivation towards the end-goal: in this case to savor the food being consumed. Moreover, the association between cardiac physiology and heightened attention (e.g., Porges & Raskin, 1969; Porges, 1992) suggests that extreme, even painful, rituals are particularly effective at honing attention to the situation revolving around the event.

A second way that ritual's physical features may contribute to goal-pursuit is through the embodiment of different regulatory states. At the heart of most rituals is outward physical movement – the expression of abstract beliefs through concrete action (Geertz, 1973). Indeed, the perceived efficacy of rituals is determined by their physical and motoric features, such as the level of repetition and sequencing of movement (e.g., Legare & Souza, 2012, 2014). We see in real life examples just how different rituals can look. Comparing the ritual traditions of weddings versus funerals, which convey either extreme joy or sorrow, it is clear that the physical movements reflect these underlying motivational dynamics. Movements in wedding rituals are quick, light, and vivacious, whereas in funerals they are typically slow, heavy, and burdensome. Our account sees these sorts of differences as a built-in regulatory function of ritual. There are different rituals for different situations, the varying actions reflecting the motivational demands required to successfully complete a goal. We suggest this feature of ritual assists in flexibly contributing to successful goal pursuit across a variety of regulatory domains. That is, the physical differences in ritual styles may be predicted by the motivational context in which the

ritual is being done.

Within a goal regulatory domain, one possible way to understand the embodiment of ritual is through the systems of approach versus avoidance motivation (e.g., Chen & Bargh, 1999; Elliot, 2006; Elliot & Thrash, 2002; Neumann & Strack, 2000; Price et al., 2012), where, for example, taking a slumped posture (i.e., avoidance-motivated stance) can lead a person to adopt a defeatist and helpless attitude, compared to when taking an upright posture (i.e., approach-motivated stance) (Riskind, 1984; Riskind & Gotay, 1982). When applied to rituals, we can see the approach/avoid distinction expressed in offensive versus defensive movements, particularly in performance domains like athletics and the military. For example, when the New Zealand national rugby team enacts the Haka war ritual before a game, they engage in a variety of approach-behaviors (e.g., leaning forward, moving quickly, stomping). These specific actions are done to evoke an approach-motivated state, which presumably helps boost performance in the ensuing game by appearing more threatening and competitive to the other team. Research on superstitious behaviors shows that when people engage in avoidant rituals, such as knocking down on wood (i.e., pushing away from oneself), they worry less about a possible jinxed outcome, compared to when they knock up on wood (i.e., pulling in towards oneself). The researchers suggest that the perceived likelihood of the negative outcome decreases because the avoidant ritual helps simulate the experience of pushing away misfortune or bad luck (Zhang, Risen, & Hosey, 2014).

Top-down processing. Ritual's appraisals and narratives regulate goal states through the successful completion of a meaningful personal practice understood to be ritual. This successful ritual experience, in turn, generates incidental feelings of personal efficacy and confidence. The processing is similar to the previous function of regulating emotion, but instead of generating

feelings of order or control, here rituals instill a sense of personal mastery by fulfilling

competence motivation (White, 1959). In other words, the successful completion of a ritual

before an important task has the function of signaling to an individual that he or she is competent

and capable of being successful on the ensuing task (for a general account of self-signaling on

action and decision- making, see Bodner & Prelec, 2003). This process can operate like a

placebo – i.e., "I believe that the ritual will help my performance on the next task, and having

that belief increases the likelihood that I am successful." Alternatively, even if an individual does

not believe it will affect an upcoming performance, the ritual could still promote self-efficacy

through a spill-over account – i.e., "I feel a sense of success from completing the ritual, and that

feeling of confidence increases the likelihood of success on an ensuing task." In either case,

success on the ritual can signal a likelihood of future goal success. Future work is needed to tease

apart the circumstances under which the positive effects of ritual are due to efficacy spill-over

rather than just a placebo effect.

The successful completion of a personally relevant ritual also imbues the goal with more

meaning. Since even the most basic ritual actions are judged as more meaningful compared to

non-ritual actions (Kapitány & Nielsen, 2015, 2016), it is reasonable that completing a ritual

transfers meaning and increases the value of the associated goal. In other words, because rituals

tend to be performed in important situations, performing a ritual may lead people to infer that the

situation is important, leading them to place more value on their current goals. The more value a

goal has, the more likely it is to be intrinsically pursued and met (Eccles & Wigfield, 2002). The

process of ritual and boosted goal-regulation is perhaps similar to what happens during goal

internalization, where a person integrates regulatory action, making goals more personally

valuable, and thus, pursued through intrinsic and self-determined drives (Grolnick, Gurland,

Jacob, & Decourcey, 2002; Deci & Ryan, 1985; Ryan & Deci, 2000a).

  Testable predictions. Drawing from a cybernetic control perspective identifies at least

one clear area for future research: testing whether greater discrepancy from one's goal will

enhance ritualistic behavior, as a means of overcoming the deficit. Relatedly, there are many

remaining questions about how one's reference point and method of goal-setting influence the

emergence and effectiveness of ritualistic behavior. For instance, do athletes with more

ambitious goals or who set goals more frequently engage more in pre-performance rituals to

achieve their goals? How might rituals interact with distance from goal to improve performance?

  Drawing from our proposed mechanisms elicits a different set of research questions. The

bottom-up processing of ritual leads to questions about which exact features affect goal-

regulation, and how. For example, if there is a connection between the motoric features of rituals

(how they appear physically) and the motivational context, then manipulating the amount of

(mis)match between these two variables should give insight into this link. Experiments could test

whether certain physical features of a ritual would better prepare a person for a given situation. If

the goal, for instance, is to reach a state of calmness and relaxation (e.g., before a nerve-

wracking presentation), an ideal ritual would look more meditative and unhurried. But if the goal

is to reach a state of high energy (e.g. before an athletic competition), an ideal ritual would

appear more energized and outward-directed. What follows from this prediction is that any

discordance between goal context and ritual actions – like doing the energized ritual to reach a

state of calmness – would lead to poorer goal-regulation and worse performance.

  The top-down processing of ritual leads to questions about how ritual completion

influences identity and later performance. Mechanisms implicated in top-down processing

suggest that if a person does a ritual before a test, for example, then they would attach greater

value to the grade outcome, and perhaps to their identity as a student compared to someone who does not do a ritual beforehand. Relatedly, a person who is interrupted partway through their ritual would likely consider this a failed attempt. As much as a successful ritual signals confidence in upcoming tasks, so too might a failed ritual cast doubt on one's ability during an anticipated performance. Inversely, when people fail at a performance, are they more likely to attribute their lack of success to the incorrect completion of the ritual rather than to some internal source? Future work should examine this question to see whether rituals could in fact act as a hindrance to achieving ongoing performance goals rather than as an aid.

We note the apparent contradiction in the role that bottom-up attention plays for regulating goals versus emotions. For regulating emotions, the processing of ritual's segmented actions helps orient one's attention *away* from potential sources of negative affect, whereas for regulating performance goal states, the processing of the same actions helps orient one's attention *towards* goals. This can be resolved by looking at the combination of bottom-up and top-down processing and the context in which the ritual is done. Recall that for mitigating anxiety, a ritual that has a combination of more bottom-up and less top-down processing will be effective until the point when it becomes over-learned. In a similar manner, we can draw the comparison to predict when a ritual is more likely to minimize anxiety (i.e., regulate negative emotion) or mobilize goal-directed behavior (i.e., regulate goals). For instance, a ritual that has fewer symbolic connections (less top-down) but more complex, segmented actions (more bottom-up) will likely be better suited for quelling anxiety than mobilizing goal-directed behavior. And opposite to this, a ritual that has fewer complex, segmented actions (less bottom-up) but more symbolic connections (more top-down) will likely be better for mobilizing goal-directed behavior than quelling anxiety. This prediction could be tested using novel rituals and

manipulating (i) their features (altering the amount of bottom-up versus top-down processing) and (ii) the context in which they are being done (altering the need to either reduce anxiety or increase goal involvement).

Social regulation

Rituals shared within religious groups, sports teams, work organizations, and families, are often experienced as social events. Indeed, many scholars have suggested that rituals are ubiquitous because they are central to the functioning of large-scale cooperative groups, forming the basis of contemporary society (Atran & Henrich, 2010; Durkeim, 1912; Irons, 1996; Norenzayan & Shariff, 2008; Rossano, 2012; Watson-Jones & Legare, 2016). The idea of ritual regulating a person's ability to connect with others has longstanding tradition in anthropology. Ritual is often regarded as a powerful mediating social mechanism that, when done properly, strikes a balance between opposing social and interpersonal forces. This line of theorizing sees ritual as a practice that integrates an individual's subjective state with the communal social order, bringing together one's private and public life (e.g., Durkheim, 1915; Munn, 1973). In a similar vein, ritual is also thought to regulate social antistructure (the *communitas,* or leveling of people experiencing togetherness) and formalized social order (the existence of rigid social hierarchies; Turner, 1979). In such cases, the function of a shared group ritual is to allow an individual to participate fully in the social world by affiliating with fellow group members, reaffirming one's position in the group, and sharing in important social conventions and cultural knowledge.

We take the position that ritual's social functions operate in two ways, incorporating Watson-Jones and Legare's (2016) examination of the functions served by collective ritual. First, performing a group ritual enhances affiliation with fellow group members and advertises signals of group loyalty and trust. In such a way, shared performance can create a stronger feeling of

connection to others. Second, observing a group ritual helps a person learn and share cultural knowledge related to the social norms most important to the group. This can cause the effective transmission of social convention, a "tightness" of shared intentions that serves to further strengthen an individual's connection to a group. In other words, a person affiliates with fellow group members while *performing* a group ritual, and learns cultural knowledge while *observing* it. Indeed, this distinction is played out in real-life rituals such as rites of passage, in which a young person is first required to observe the ceremony for a number of years before formally becoming a performer, usually as an initiate at a certain age of maturity (Turner, 1987; Van Gennep, 2011). For each component, we elaborate on the attendant psychological processes that are thought to be involved.[iv]

Affiliating with group members: Performing collective rituals. Durkheim (1915) theorized that collective rituals allow participants to affiliate with group members by creating a sense of collective unity. Since then, a host of empirical studies have provided evidence linking group rituals to positive social outcomes, such as cooperation, social cohesion, and perceived social support (Fischer et al., 2013; Hopkins, Reicher, Khan, Tewari, Srinivasan, & Stevenson, 2015; Páez, Basabe, Ubillos, Gonzalez-Castro, 2007; Páez, Rimé, Basabe, Wlodarczyk, & Zumeta, 2015; Ruffle & Sosis, 2007; Sosis & Ruffle, 2003).

Proposition 1: Lacking affiliation increases ritualistic behavior. To our knowledge, very little extant psychological research tests our first proposition deriving from cybernetic control theory—that having a need for social connection or belonging should induce more social ritualistic behavior. In one study offering supportive evidence, Watson-Jones, Whitehouse, and Legare (2015) found that children who are ostracized, compared to those who are socially included, are more likely to imitate the ritual-like actions of other ingroup members. This is a

clear question for future research.

 Proposition 2: Ritual reduces affiliative deficits. Two sets of experiments, in particular,

demonstrate that enacting a group ritual can reduce a deficit in affiliation. In the first, individuals

who watched a film clip designed to induce negative mood alone felt less group cohesion than

those watching a neutral film clip, but this effect was reversed when the group watched the clips

together (Rennung & Göritz, 2015). In the second, individuals who learned novel rituals reported

less bias against outgroup members with the same ritual, but only when the ritual was

sufficiently elaborate (Hobson et al., 2017). Each of these papers provide causal evidence that

group rituals can alleviate negative mood in groups and group bias, respectively, indicating that

rituals serve an affiliative function.

 A much longer literature investigates the association between rituals and affiliative

outcomes. For example, students who participated together in secular ritual protests following a

series of bomb attacks reported more perceived social support than those who did not

demonstrate (Páez et al., 2007), and kibbutz members who more frequently engaged in

communal religious rituals were more cooperative in a public goods game with other kibbutz

members (Ruffle & Sosis, 2007; Sosis & Ruffle, 2003). But these correlational results cannot

show whether engaging in group rituals causally promotes group cohesion and cooperation or

whether people with a strong group identity are especially likely to engage in group rituals (see,

for example, Swann, Gomex, Seyle, Moralies, & Huici, 2009). Longitudinal and experimental

designs, however, provide more convincing support for the notion that engaging in collective

rituals helps a person affiliate with fellow group members. For example, people who walked

together in the *Tamborrada* ritual in Spain reported more group belonging and social integration

after the event than before (Páez et al., 2015). In addition, people donated more money to their

temple after participating in a high-ordeal Hindu ritual compared to a low-ordeal ritual, and the level of pain correlated with the amount of donation (Xygalatas et al., 2013). Indeed, even novel rituals introduced by an experimenter have been shown to promote affiliation. Children in an afterschool program who were led to engage in a necklace beading ritual reported more ingroup affiliation than those who engaged in the same group activity without the ritual (Wen, Herrmann, & Legare, 2016).

Bottom-up processing. One mechanism by which engaging in group rituals may regulate an individual's connection to the group is through shared attention. Durkheim (1915) thought that collective rituals create group cohesion because of the shared attentional and emotional experiences, leading to a joint perceptual state termed "collective effervescence" (see also Haidt, Seder, Kesebir, 2008). Indeed, there is evidence to suggest that collective rituals bring about an alignment of the practitioners' emotional and attentional experiences (Fischer et al., 2014; Hopkins, et al., 2015; Konvalinka et al., 2011; Páez et al., 2015; Xygalatas, 2014), and that these experiences lead to increased affiliation (Fischer et al., 2014; Páez et al., 2007; Rime, 2007; 2009; Rimé, Paez, Basabe, Martinez, 2010; Swann, Jetten, Gomez, Whitehouse, & Bastian, 2012).

The sense of shared attention generates perceptions of emotional synchrony in each individual (Páez et al., 2015), which fosters a feeling of oneness and bonding with the others members of the group (Spoor & Kelly, 2004). In other words, the perceived knowledge of shared attentional states causes elaborative processing of a jointly attended sensorimotor stimulus. With this heightened processing, a person's emotional state becomes intensified and then translated as a joint experience shared among those belonging to the same group and participating in the same ritual (Shteynberg, Hirsh, Galinsky, & Knight, 2014; see Shteynberg, 2015). For example,

research found that people expressed stronger feelings of fusion with their group after participating in a group walking ritual, and this was mediated by the extent to which they perceived emotional synchrony with other walkers (Páez et al., 2015). Similar research found that people enjoy the holiday seasons more when engaging in holiday rituals with others (versus alone) because the ritualistic experiences heighten people's attention and shared involvement in the moment (Sezer, Norton, Gino, & Vohs, 2016).

Recent field experiments looking at extreme, attention-grabbing rituals found similar results. Even rituals that involve pain, stress, or self-mutilation have been shown to lead to the alignment of physiological and emotional states among participants (Fischer et al., 2014; Konvalinka et al., 2011; but see Bulbulia et al., 2013 for differential affective outcomes depending on the type of participation). The pain experienced during extreme rituals may focus people's attention towards the painful stimulus or to the sensation of pain itself. These types of group rituals are particularly effective at coordinating shared attention/affect simply because the pain experienced by one person is also being experienced, and therefore shared, by others in the group. Thus, participating in collective rituals, especially those that are attention-grabbing and involve increased effort or pain, can create shared intense emotional experiences among participants, and as a result, can make a person feel closer to other group members.

Collective rituals may not only shape bottom-up processing by capturing joint-attention, but also through shared physical action. Thus, a second process by which performing group rituals may enhance social functioning is through the coordination of movement, in particular engaging in behaviors that are similar in form and matched in time with others. Behavioral synchrony occurs automatically (Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007; Schmidt, Carello, & Turvey, 1990) and is related to perceptions of connectedness and unity

(Bernieri, 1988; Miles, Nind, & Macrae, 2009). Experimental manipulations of synchrony –
from finger-tapping to full-body marching and stomping – have been shown to increase
affiliation (Hove & Risen, 2009), compassion (Valdesolo & DeSteno, 2011), cooperation
(Wiltermuth & Heath, 2009), and team performance (Davis, Taylor, & Cohen, 2015), especially
when synchrony is part of the goal (Reddish, Fischer, & Bulbulia, 2013). Group rituals that
involve more synchronous body movements are associated with more trust, cooperation, and
feelings of oneness than are other group rituals (Fischer et al., 2013).[v]

   Top-down processing. The top-down processing of social ritual relies on the fact that one
has engaged in a behavior known to be ceremonial (and not some other mundane social
behavior). First, completing a ritual in the presence of others signals important information: that
the person choosing to participate in the event shares in its collective meaning for the group. This
in turn regulates social states, as the information can be used to draw inferences about
participants and their relationship to the group, such as whether they are trustworthy and loyal
members. Such knowledge acts as a reliable and credible cue that can foster group cohesion
through identity and status formation (Henrich, 2009). By engaging in a group ritual, an
individual can show that they are part of the group. And to the extent that the ritual is difficult or
costly, participation signals not only membership but also commitment to the group (Bulbulia &
Sosis, 2011; Irons, 1996, 2001; Sosis, Kress, & Boster, 2007). Throughout history, there are
examples of religious or secular rituals that involve considerable pain and effort (Glucklich,
2001; Smith, 2003), and historical evidence shows that religious groups that have costly rituals
are more successful (Sosis & Bressler, 2003).

   Second, ritual may enhance group cohesion through top-down processing when the
meaning or value that is inherent to the ritual is extended to other people who are part of the

ritual performance. There is ample evidence in the psychological literature for feelings toward

one stimulus being transferred, extended, or misattributed to other related ones (see, for example,

Schwarz & Clore, 1983). In the case of ritual, just as an activity or goal can become more

meaningful because it is incorporated into a ritual (Kapitány & Nielsen, 2015), we suggest that

other people who are part of the ritual may also become more meaningful. Engaging in a ritual at

the start of a basketball game, for example, may make the game as well as the team of players

seem more important. Supporting this, research has shown that rituals that are judged to be more

sacred or meaningful are associated with more cooperation and feelings of oneness than are other

group rituals (Fischer et al., 2013).

     Testable predictions. One prediction that comes from the cybernetic control model is that

more dysfunctional groups may be more likely to develop rituals as a method of compensating

for their dysfunction (i.e., our Proposition 1), but only when the group is motivated to affiliate

with each other. For instance, sports teams that must perform together or close social groups

(e.g., a sorority) may be particularly likely to develop group rituals when faced with affiliative

challenges such as competing against a highly-ranked team or hosting a rush event, respectively.

Drawing on the sociometer hypothesis (Leary, Tambor, Terdal, & Downs, 1995), another

prediction is that a person experiencing a deficit in self-esteem will be more willing to engage in

a group's ritual in order to prevent the possibility of being socially excluded (i.e., our Proposition

2).

     Our proposed mechanisms further elicit a set of testable predictions. If the bottom-up

processing of sequenced, synchronized actions during ritual leads to joint attention and enhanced

self-other overlap, then it follows that rituals with greater levels of attentional sharing will

predict heightened group affiliation. For example, people who pay attention to a single stimulus

feature of ritual (compared to different features) will feel heightened emotional synchrony and, in turn, show greater degrees of group affiliation. Similarly, future experiments could manipulate the degree of synchronization in novel rituals to determine the extent to which it plays a causal role in creating group cohesion. Would rituals that require more synchrony promote more cohesion? And, what would happen if people failed to synchronize during a group ritual? It might be the case that attempting to complete a ritual in sync with each other – and failing – would be worse for group cohesion than not trying at all. Related to this point, there may be situations, for example in recently formed groups, where certain ritual sequences are too complex for successful synchrony. By this account, this would also predict that synchronous ritual performances become more complex as the group itself becomes more established and better coordinated.

The top-down processing of group ritual generates at least two predictions regarding how people feel about others with whom a symbolic experience is shared (or not shared). First, a person who completes a group ritual may feel closer to ingroup members when there is an obvious outgroup that is not participating (or doing a different ritual). In other words, the presence of outside groups who possess different rituals may further bolster the meaning of one's own group since the ingroup's rituals appear unique, and therefore, in some way more special. From a cybernetic perspective, the threatening presence of an outgroup would lead to an affiliative need, which should then motivate ingroup members to further galvanize group ties by engaging in more frequent or intense ritual practices. This prediction points to a possible dark side of ritual, whereby the ties to the ingroup are strengthened but to the detriment of the outgroup. For example, in one set of experiments using novel rituals performed over the course of a week, researchers found that the shared ritual experience elicited intergroup bias, evidenced

by increased economic trust towards ingroup members as well as neural evidence that witnessing punishment of outgroup members is rewarding (Hobson, Gino, Norton, & Inzlicht, 2017). Levels of intergroup bias were also moderated by the effort involved in the ritual, with greater effort leading to more bias. Thus, although ritual promotes ingroup cohesion and trust, it may do so at the expense of the outgroup.

Second, would any conceptual appraisal that generates more meaning also lead to heightened perceptions of group affiliation? For instance, ritual settings are often imbued with feelings of self-transcendence. A person may feel more connected to the land, the music, the night sky, or other aspects of the environment when they engage in a ritual than when they engage in another group activity. In turn, this would impact how one feels about others with whom the experience is shared. Meaningful environments – like the monumental architecture of religious centers of worship – may enhance the specialness of the ritual, further increasing a sense of group connectedness (e.g., Joye & Verpooten, 2013). In other words, doing a ritual in a mosque or temple would elicit greater cohesion compared to doing the exact same ritual in a more mundane, less awe-inspiring setting (Xygalatas et al., 2016).

Learning cultural norms: Observing collective rituals. A person who frequently engages in a group's ritual (in many cases, over a lifetime) will naturally come to learn about the cultural norms represented by that ritual (i.e., how and why it is done a certain way, when and where exactly it is done, who engages in it, what it represents, etc.). Beginning from infancy, rituals impart a collective wisdom of the most important elements of social living, including the underlying cultural norms that help define the group. Rituals represent a culture's most cherished norms and values (e.g., Bell, 1997; Smith, 1980) and can assist in the formation of "idiocultures" in any group, no matter how small (Fine, 1979, 2006). Indeed, some suggest that the *essential*

role of collective rituals is to transmit and reinforce social norms, both from parent to offspring, in the case of ritualized infant-caregiver behaviors, and between adults, as seen in more formalized communal rituals (Rossano, 2012).

Here we provide evidence suggesting that a second way collective rituals regulate social connections is by having practitioners observe and imitate rituals through interactions, helping them learn about enduring cultural norms and practices. Much of this work deals with the vertical transmission of cultural norms, namely in the formative ritual interactions between child and adult, usually a caregiver (Brinich, 1982; Collins, 2004). Ritual begins early in life, suggesting there is a developmental sensitivity for observing behaviors that are ritual-like and socially conventional (e.g., Bateson & Meade, 1942). In particular, we point to research on "over-imitation" (Lyons, Young, & Keil, 2007), which occurs when observers mimic a performer so faithfully that they reproduce actions that are irrelevant to achieving the task at hand, engaging in a type of ritualistic behavior that enforce the group's norms and culture.

Proposition 1: Lacking affiliation increases ritualistic behavior. There is strong evidence that ritualistic behavior, in this case the over-imitation of non-instrumental actions demonstrated by others, is more likely to emerge when the observer's need for social connection is higher. For instance, children who are ostracized by their ingroup (compared to those who are not ostracized, or are ostracized by the outgroup) are more likely to engage in ritualistic imitation strategies (Watson-Jones et al., 2015). Similarly, children imitate a model more faithfully after being primed with social exclusion (i.e., after having been shown videos in which one shape is excluded from a group of other shapes; Over & Carpenter, 2009) or when the individual who demonstrated them is present at the time of test (Nielsen & Blank, 2011), thus suggesting that their imitation was produced for the model. Both children and adults engage in more ritualistic

imitation when the model is an adult, perhaps because social pressure is higher (McGuigan, Makinson, & Whiten, 2011). In contrast, time pressure, direct warnings, and even financial incentives often do not decrease non-instrumental imitation (Flynn & Smith, 2012; Lyons et al., 2007). Finally, children with autism, who may lack a strong social motivation to be like others, tend not to copy the specific style with which a model performs an action (Hobson & Hobson, 2008). This perspective is further supported by findings that children with autism are capable of imitating, but tend not to do so spontaneously (Carpenter, 2006).

This imitative function in children offers a possible explanation of how ritual artifacts find their way into meaningful cultural practices, starting early in life (Legare & Nielsen, 2015; Lyons, Damrosch, Lin, Macris, & Keil, 2011). Across development, this process then becomes elaborated in adults, where rituals, particularly credible practices that are hard to fake (Henrich, 2009; Harris, 2012), signal the establishment of a culture's most cherished values (Sosis, 2004). In adulthood, inferring social intention during ritual leads to more complex cognitive appraisals that lead to the maintenance and transmission of norms. Aligning with these predictions, there is now experimental evidence that adults continue to over-imitate superfluous behaviors (i.e., ritual-like actions) (Flynn & Smith, 2012; McGuigan et al., 2011). Taken together, this evidence suggests that ritualistic imitation of non-instrumental behavior reliably emerges to fulfill social needs, whether to enforce social norms or increase felt belonging.

Proposition 2: Ritual reduces affiliative deficits. The second primary prediction that derives from the cybernetic control model is that engaging in ritualistic behavior should regulate deficits in cultural learning or affiliation. Although the aforementioned research demonstrates that children engage in ritualistic imitation when socially ostracized (e.g., Watson-Jones et al., 2015), it does not test whether this strategy will increase the likelihood that the group will

socially re-engage with the ostracized individual. Many scholars have theorized that ritualistic imitation (i.e., of non-instrumental actions) serves a social function (Chartrand & Bargh, 1999; Nielsen, 2009; Over & Carpenter, 2012; Uzˇgiris, 1981), and adults subconsciously mimic the mannerisms of social partners to enhance affiliation (Chartrand & Bargh, 1999). At least two studies provide weak evidence for this proposition, suggesting that more ritualistic behavior can improve cultural learning, though they do not measure cultural learning per se. In one study, children imitated actions most faithfully if the actions were performed synchronously and framed as a matter of convention as opposed to outcome-based, indicating greater learning for more ritualistic actions (i.e., synchronous and symbolic acts; Herrmann, Legare, Harris, & Whitehouse, 2013). Further evidence of this has been shown in one-year-olds, who are more likely to imitate superfluous, non- instrumental (i.e., ritual-like) actions compared to goal-relevant ones (Brugger, Lariviere, Mumme, & Bushnell, 2007; Lyons, Young, & Keil, 2007). By studying young children, scholars can assume that there is cultural naïveté (e.g., a deficit). Nevertheless, future research can directly test whether rituals are particularly effective for improving cultural knowledge and a sense of belonging when people are culturally naïve. For instance, this might be observed in the behaviors of new immigrants and the rate at which they adopt the ritual practices of the new host culture.

Bottom-up processing. First, a possible explanation of how ritual helps a person engage in cultural learning is related to the fact that adherence to ritual actions limits attention to particular stimuli in the environment. As explained in the previous sections, the motoric features that distinguish rituals from other behaviors, namely non-instrumental and rigid sequencing, help orient attention to the ritual and/or surrounding context. One consequence of this is that focused attention swamps a person's executive systems, leaving little room for personal improvisation or

alteration. Thus, the script that is encoded in memory tends to have little variation. As long as a shared ritual remains a fixed set of sequences, done in the exact same way as in previous instances (Rappaport, 1999), then the properties of the ritual experience that are encoded (and later retrieved) will remain relatively unchanged. A recent socio-cognitive account (Schjoedt et al., 2013) suggests that narrowing the focus of attention towards emotion states and segmented action units leads to increased cognitive load, in turn making a person more susceptible to the suggested narratives of the group (e.g., Balgrove, 1996; Otgaar, Alberts, & Cuppens, 2012). This then helps reinforce the ritual and the associated norms.

A second bottom-up explanation accounting for ritual's role in cultural learning is how engaging with certain physical actions prepares learners to encode and imitate the action sequences. Simply put, because of their rigid patterning and segmentation, rituals are more easily remembered and copied compared to non-ritual behaviors. This developmental preparedness to imitate the ritualistic (i.e., socially conventional) behaviors of others may provide the basis from which more complex normative rituals arise later in life (Nielsen, Kapitány, & Elkins, 2015).

Top-down processing. The first explanation for why observing rituals facilitates engagement in cultural learning is that it is a marker or signal of important social behaviors. While observing the performance of a ritual, one will make inferences related to the intentions of the actor(s). Given the symbolism and lack of causality inherent in rituals, these behaviors signal that something important and meaningful is being done. When a person observes an actor interacting with physical objects, those objects are evaluated as more special and desirable when they are subjected to non-instrumental ritual-like actions, compared to instrumental control actions (Kapitány & Nielsen, 2015). Unlike instrumental actions, which are knowable in their causal relevance, the non-instrumental actions of ritual are *causally opaque* (Legare &

Herrmann, 2013; Legare & Souza, 2012, 2013; Nielbo & Sørensen, 2011). In other words, the

link between action (e.g. reciting a holy prayer over beads) and outcome (e.g. absolution of sins)

is in principle unknowable. And compared to causally relevant behaviors, which involve

knowable sequences of action-outcome goals that can be tweaked to be more effective (Claidière

& Sperber, 2010), non-instrumental ritual behaviors are done each time in the exact way as

intended for ostensibly important, social-based reasons (Legare & Herrmann, 2013; Herrmann,

Legare, Harris, & Whitehouse, 2013). This is critical because attending to the intentions of others

(inferring through their behavior) offers valuable social information about the world (e.g.,

Dennett, 1971; Gergely, Nádasdy, Csibra, & Biro, 1995; Rossano, 2012) from which a person

derives meaning and guidance. Cues of social intention in such cases are even more important to

an observer (usually a child or new initiate) when the behavior being observed is ambiguous in

its purpose (Legare, Wen, Herrmann, & Whitehouse, 2015). Such ambiguity may occur in rituals

that are on the surface indistinguishable from instrumentally guided behaviors. For example,

when a young Muslim child observes her parents clean their hands and face, this could be

interpreted as an instrumental act (exhibiting proper hygiene) or a ritualistic act (performing

Wudu, the ceremonious cleaning before the Salat prayer). In this type of situation where a ritual

is actually being enacted, the contextual and social cues given by the actors, or parents, act as a

signal to the child that this behavior is a matter of convention, and thus, is to be engaged in

ritualistically (i.e., with greater meaning).

Second, we suggest that cultural learning is maintained through ritual because meaning is

transferred back onto the norms through frequent performance. Each time a ritual is performed or

observed, a mental narrative is re-created, which acts as a reminder of what a group values most

(and the meaning behind the purpose of the ritual). Researchers have argued that this happens

most often with low-arousal (i.e., more frequent and monotonous) group rituals because their regular practice conjures norm-related meaning narratives on a consistent, often daily, basis (Whitehouse, 2000, 2004). Citing a prayer in a religious ritual, for example, will prime a person in a manner consistent with the norms of that religious group, placing meaning onto both the norms and the group. With greater sense of collective purpose, a person will be motivated to continue to share and transmit the group's ritual practices. Consistent with these explanations, religious primes will cause people to become more punitive of others' behaviors if they violate norms (McKay, Efferson, Whitehouse, & Fehr, 2011), a reaction that can be amplified in religious settings that prioritize orthopraxy rather than orthodoxy, in which ritual and prayer are highly valued (Laurin & Plaks, 2014).

Testable predictions. One prediction that comes from the cybernetic control model is that a person who is new to a group, and experiencing a stronger need to belong, will be more motivated to learn the group's rituals by paying closer attention and adhering to certain normative scripts. A new initiate, for instance, should be more willing to faithfully copy and learn a ritual than someone who is already established in the group. Similarly, we should also see that there are different expectations for low ranking versus high ranking individuals in groups, as is often the case in team sports and military units.

Considering our proposed mechanisms, if, as we suggest, the sensory experience of non-instrumental (i.e., ritualized) actions increases focal attention, then rituals composed of more causally opaque steps should be better at amplifying attention, which should also lead to better memory recall and heightened imitation later on. Using experimental methods like transmission chains (e.g., Mesoudi & Whiten, 2008), researchers could test which non- instrumental features lead to the highest degree of imitation. Relatedly, varied levels of complexity in the action

sequences should predict the likelihood of a ritual being copied and shared. Manipulating the perception of a ritual so that it is viewed as more puzzling, and thus demanding greater attention, might lead to better imitation and more shared interpretations. This paradoxical effect of more – not less – puzzling rituals enhancing imitation aligns with research on religious concepts. Religious narratives demonstrate superior memetic transmission and imitation (Dawkins, 1993; Dennett, 1991), arguably because they are minimally counterintuitive and attention-grabbing (e.g., Barrett, 2000; Boyer, 1992; Norenzayan, Atran, Faulkner, & Schaller, 2006; also see Porubanova et al., 2014). Ritual imitation may function in a similar fashion.

With respect to the top-down conceptual processing, we know one way to apply the learning and imitation of ritual is through vertical transmission from parent to child. When a child observes her parents performing a ritual regularly (for example, the Catholic rosary), they infer over time that the ritual "works" (provides peace, builds social bonds, etc.). Because the behavior is judged as efficacious, the ritual maintains its conventionality and has its original structure copied. Critical to this process is the lack of motivation to test any alternative ritual steps, those which might work equally well or perhaps better (different prayers on a different day provides peace). In fact, to do so might be seen as costly (missing out on feeling a sense of peace; Rutherford, 2006). And to be willing to test the limits of an ancient ritual – like those of many religious/cultural practices – would be an even costlier decision. If our framework's explanations hold, we should see that people are less willing to "test" a group's oldest rituals, but more willing to do so with newer ones valued less by the group. Moreover, we suspect that the older a ritual gets, the more likely it will remain unchanged and, in a sense, be self-protected by its own existence.

As mentioned in the introduction, rituals may change over time. And, the combination of

bottom-up and top-down processes will vary as a person becomes more familiar with the actions through repeated exposure/practice. Our framework accounts for these changing dynamics. For instance, to a novice, a group's rituals will be less familiar and more complicated, demanding more of their attention in order to properly complete the actions. But over time, with regular practice, the novice becomes an expert: the automatization and overlearning of the sequences eventually leads to a state where less attention is required to successfully complete these actions. The prediction that follows is that newcomers would require more attention in attempting to complete a ritual and, therefore, would be more susceptible to the normative interpretations of the group. We should see that as the familiarity of ritual increases over time, a person's attention will be less limited, leaving room for more idiosyncratic interpretations of the experience. This also says that when an expert engages in ritual, the mode of processing could shift from being more bottom-up to top-down.[vi] For these people, the symbolic purpose of the group's ritual becomes more important than the strict adherence to its rules, a process that may help explain why leaders and experts tend to have greater normative influence than others in the group (Hogg & Reid, 2006). The shift from bottom-up to top-down could also help explain how group rituals can change over time despite their prescriptive nature. The prediction here is that group novices are the ones who are more likely to uphold the rules of the ritual script, focusing more on the physical features involved and how they ought to be unchanged. Experts, however, will eventually shift their focus to maintaining the meaning behind the ritual, and be less concerned with sticking to the script. Thus, we should see that experts are more willing to introduce novel ritual actions but only if the overall symbolic interpretation remains intact.

Discussion

Scientific interest in ritual is not new. However, our focus on rituals' regulatory functions

and underlying psychological and cognitive processing is. Rituals are now being investigated experimentally both in the laboratory and the field, through the use of techniques common to social psychology, cognitive psychology, neuroscience, behavioral economics, and experimental anthropology. This has garnered renewed interest in the topic and spurred a variety of novel questions and testable hypotheses that have heretofore gone unexplored.

Our aim for this review was two-fold: first, to take stock of the empirical data and summarize recent findings using the lens of a cybernetic control model; and second, to provide a process-based framework for the consequences of ritual performance. Here we propose that by studying ritual through an empirical lens, we allow its myriad forms to come together under a single conceptual roof. According to our framework, all forms of ritual derive from an assorted combination of bottom- up (sensorimotor) and top-down (conceptual) mental processing related to its physical and psychological features, respectively. The combination offers a psychological explanation of rituals, giving insight into how they are performed, their various behavioral and affective outcomes, and why they appear the way they do. Moreover, we have examined the evidence underlying two propositions derived from the cybernetic control model suggesting that rituals regulate (a) emotions, (b) performance goal states, (c) and social connections to others because 1) deficits in each of these states tend to increase ritualistic behavior, and 2) enacting rituals can reduce these deficits. Our regulatory account improves understanding of the underlying cognitive processing responsible for driving the different psychosocial consequences of ritual.

Addressing complexity in our framework

Our framework complements past theoretical approaches, which also seek to unify the phenomenon of ritual by examining its fundamental cognitive processes (e.g., Boyer, 2001;

Boyer & Liénard, 2006; Dulaney & Fiske, 1994; Marshall, 2002; McCauley & Lawson, 2002; Whitehouse, 2004) and shared psychosocial functions (e.g., Islam & Zyphur, 2009; Smith & Stewart, 2011; Watson-Jones & Legare, 2016). We extend these previous accounts by placing psychological processing front and center. The novelty of our framework lies in the emphasis placed on experimentation, on the use of empirical methods, and most important, on the psychological processing underlying all forms of ritual. Together, our hope is that this offers a common language for researchers interested in the study of ritual.

Despite our strong belief that our framework will be generative, inciting new and valuable research on the psychology of rituals, we note that this framework is not without its limitations. A primary area of complexity is that both the functions of ritual that we address, and its psychological mechanisms, involve overlapping categories. First, our framework is open to overlap occurring across the three regulatory functions. For example, consider the overlap between social and goal regulation. The mechanism explaining how heightened attention during ritual contributes to effective goal-pursuit can also be understood in a social context with collective rituals. Just as shared attention can promote group affiliation (social regulation), so too can shared attention promote effective goal-pursuit (goal regulation). Confirming this, past work has shown that when a person has knowledge that their goal state is shared with another, particularly with someone who is similar, they tend to experience an intensification of goal-pursuit (Shteynberg & Galinski, 2011). This could help explain, for example, how collective rituals in team contexts are particularly well-suited to both galvanize group unity and heighten motivated performance on an ensuing task. As another example, emotional states are not merely psychosocial states to be regulated; they also serve as cues signaling when other psychosocial states require regulation. As work on "sociometer theory" shows, for instance, deficits in social

connection arouse negative affect, which then serves as a signal that motivates individuals to engage in behavior that may reduce that deficit in social connection (and, as a consequence, also reduce that negative affective state; Leary, 1999).

Second, bottom-up and top-down processing do not necessarily present a clear division for explaining ritual's effects. A ritual is rarely, if ever, exclusively the result of one level of processing. Instead, ritual can be considered a combination of both bottom-up and top-down processing. For instance, we proposed that a bottom-up mechanism for why rituals facilitate emotion regulation is that their successful completion satisfies a fundamental need for order. But it is important to note that the processing involved during the successful completion of a ritual is likely to involve top-down psychological inputs as well. The interpretation of what constitutes "correct" completion and its importance may be critical for regulating emotion. Indeed, unlike instrumental or functional behaviors, often the goal of ritual is merely the correct execution of the actions themselves (Rossano, 2012). As Bell explains, ritual is "the simple imperative to *do* something in such a way that the doing itself gives the [act] a special or privileged status." (1997, p. 166). This conceptualization implies that rituals must be done properly, which is why completing them feels particularly good compared to other types of behavior that do not have to be done with such specificity.

Third, by offering a common psychological basis to unite *all* types of ritual, we do not mean to suggest that individual rituals or categories of ritual are not themselves worthy of study. Individual rituals are important in their own right and they connect to other central psychological topics worthy of study. For example, imitation that occurs when observing ritual is a form of social influence. Rituals for managing anxiety connect to clinical research as well as to superstitious beliefs and magical thinking. And, rituals that people use to improve performance

often operate similarly to habits and routines. Although we think it is useful to provide a "tent" that is large enough to include all different types of ritual, we do not want this to limit how scholars explore broader conceptual connections to specific types of rituals, but rather, we hope it encourages researchers to study all the ways that rituals intersect with human experience.

Conclusion

The current paper sheds new light on the study of ritual. First, we provide an operating definition of ritual: predefined sequences characterized by rigidity, formality, and repetition that are embedded in a larger system of symbolism and meaning, which partially lack direct instrumental purpose. Second, we comprehensively summarize the most recent scientific findings on ritual, and situate them in a theoretical framework that organizes its regulatory psychosocial functions into three categories—regulating social connections, emotions, and performance goal states. We argue that the same core psychological mechanisms, bottom-up and top-down cognitive processes, underlie all three functions. Our proposed framework seeks not to replace the rich theoretical advances of traditional sociocultural accounts, but instead to extend them, and to allow for novel insights into the study of ritual. The perspective we advance will help unpack the mysteries of ritual, generating new questions and hypotheses. Though the field of psychology has remained quiet on the topic of ritual for decades, the current framework recognizes the value that psychological research can add to our understanding of this remarkable and universal aspect of human behavior.

Table 1. *Organizing Framework: Regulatory Functions and the Underlying (Bottom-Up and Top-Down) Processing,*

Psychosocial Functions of Ritual

Processes	Regulating Emotions	Regulating Performance	Regulating Social Connections	
Bottom-Up Processes				
			(Performing Rituals with Others)	*(Observing Others Perform Rituals)*
Biased Attention & Encoding	Constrains thinking and blocks out anxious intrusive thoughts by acting as an attentional distraction	Hones attention, leading to heightened involvement and immersion in the goal context	Leads to joint attention, perceptions of emotional synchrony and self-other overlap	Loads executive control, making collective scripts more easily encoded, remembered, and learned
Physical Movement	Satisfies a fundamental need for order, buffering against negative uncertainty and reestablishing feelings of lost control	Embodies the motivational features of the goal context through variations in the style of physical movement	Coordinates behavioral synchrony, generating perceptions of unity and cohesiveness	Facilitates automatic imitation of scripted sequences, making normative behaviors easily copied and shared
Social- and Self-Signaling	Evokes feelings of agentic control and restores a sense of personal order in the face of anxious uncertainty	Boosts confidence, initiating the belief that success on the subsequent performance/task is also likely	Provides credible, difficult-to-fake cues of a person's level of group loyalty, helping promote trustworthiness and affiliation	Signals important social intentions, making a ritual socially meaningful and worthy of being learned, imitated, and shared with others
Meaning Creation and Transference	Creates feelings of self-transcendence, allowing a person to escape ego-based thoughts and anxieties	Attaches great value to the desired motivational state, increasing the likelihood of successfully completing the related goal	Transfers meaning to others through self-transcendence, leading to feelings of shared unity	Reinforces the value of cultural knowledge, reminding and motivating people to behave in a way that is consistent with norms

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Notes

[i] The example used here is a religious one. However, our framework can be applied to all forms of ritual, religious *and* secular. Within the parameters of our framework, religious rituals are not considered a special class of ritual, and at the level of the individual psychology, are in fact no different than other non-religious types.

[ii] We note that the bottom-up and top-down processing of ritual are inevitably overlapping, and will typically simultaneosly occur. For each of the regulatory sections that follow, we discuss these two levels of processing separately for the sake of clarity, in order to show how they are involved differently during ritual, and also to show how manipulating the different process variable generates testable predictions. That said, in each of the section we still address instances in which ritual's combined psychological processing can be helpful in resolving apparent contradictions.

[iii] A series of other propositions could also follow from this logic; for instance, when alternative means exist to reduce these deficits, people may be less likely to engage in rituals (and their rituals may also be less effective). To our knowledge very little research has tested the predictions that derive from cybernetic control theory beyond Propositions 1 and 2.

[iv] There is, of course, considerable overlap between the two. A person who faithfully enacts their group's rituals over a lifetime will gain a rich understanding of the cultural conventional norms built into those rituals, inevitably leading to stronger affiliative ties, especially with whom the ritual experience is shared.

[v] An alternative mechanism that exists outside our framework, and which could help explain these group-based effects, is related to the role of endorphins. Recent studies show that the production of endogenous opioids is greatly amplified when ritual is performed in the context of a group (Weinstein, Launay, Pearce, Dunbar, & Stewart, 2016), and especially so when performed in synchrony (Cohen et al., 2010; Sullivan & Rickers, 2012). Importantly, endorphin levels correlate with feelings of in-group bonding (Tarr et al., 2015, Weinstein et al., 2016), and may be instrumental in fostering group cohesion. A recent study that examined both those mechanisms together (Lang et al., forthcoming) found that synchrony increased interpersonal bonding and trust, and that these effects were mediated both by endorphin release and perceived synchrony.

[vi] Nevertheless, a certain amount of bottom-up attention may still be required even for those who have mastered the actions, especially when the ritual involves high levels of interpersonal synchrony. Though an expert can easily do the actions themselves, they still need to attend to the movements of others in order to ensure proper coordination and timing. This is particularly true in group contexts where coordination or synchronization is crucial for the successful completion of the ritual, such as during religious prayer gatherings.