

ulations. While we concur that ritual behavior can serve as an antianxiety agent in certain situations, we are concerned that the current data do not afford a straightforward interpretation. Whereas the main finding of stress reduction after the Holi and Navratri rituals is compelling, we lack sufficient data to understand what mediated this decrease. In this commentary, we identify four models that can potentially explain the observed stress decrease and suggest supplementary measurements that can distinguish between these competing explanations.

In the introduction to the target article, Snodgrass et al. describe two sets of allegedly competing models on the potential effects of ritual practice: rituals may decrease or increase anxiety. However, it is not likely that the models cited are mutually exclusive but rather they address different types of rituals in different socioecological conditions. Ritual behavior is a multifaceted phenomenon that is crucially dependent on situatedness in a specific context. Whereas some rituals may alleviate anxiety, others can instill anxiety in order to communicate group membership through costly signals (Bulbulia and Sosis 2011; Sosis and Ruffle 2003) or create group unity through shared dysphoric experiences (Whitehouse and Lanman 2014; Xygalatas et al. 2013). Nonetheless, the authors theoretically ameliorate this dichotomy by suggesting that rituals evoke anxiety only to soothe it afterward, thereby providing comfort and the feeling of *communitas* (Durkheim 1912; Turner 1969). They illustrate this proposition with their ethnographic accounts of trance, possessions, and fighting, on one hand, and communal feasting, joy, and helping, on the other hand. Thus, Snodgrass et al.'s model suggests that ritual performers have high stress levels preritual, which are increased even more during the initial ritual stages, and subsequently alleviated and further reduced by the conclusion of the ceremony so that stress levels are lower than they were prior to the ritual performance (see fig.9A).

However, another model proposes that ritual participation, independent of practitioners' preritual level of anxiety, will increase anxiety and subsequently return it to baseline levels during "the soothing part" of ritual performance (Atran and Norenzayan 2004; see fig.9B). In other words, the first model claims that artificially inducing and then alleviating anxiety leads to an overall positive effect on stress levels, while the second model suggests that rituals alleviate only the anxiety that they created. Distinguishing between these two models is crucial because only the first one would show that rituals are "good medicine" for chronic stress. Unfortunately, the authors do not offer sufficient preritual cortisol data that would afford a direct comparison. Although Snodgrass et al. describe chronic stress levels of the relocated populations, none of these observations can be directly inserted into the self-reported and cortisol data analyses. Perhaps the baseline survey offers a longitudinal perspective, but its interpretation is hindered by the fact that the survey was distributed during the Holi and Navratri rituals. We do not know whether participants interpreted their stress retrospectively in light of

Martin Lang and Richard Sosis

LEVYNA Laboratory for the Experimental Research of Religion, Department for the Study of Religions, Masaryk University, Arna Novaka 1, Brno 602 00, Czech Republic/Department of Anthropology, University of Connecticut, U-2176, Storrs, Connecticut 06269-2176, USA (richard.sosis@gmail.com). 11 IX 16

Uncertain Malinowski: The Importance of Preritual Stress Data

Snodgrass, Most, and Upadhyay present exciting and intriguing research on the complex relationship between religious ritual and anxiety. They suggest, based on their results, that rituals may be "good medicine" for chronically stressed pop-

the upcoming celebrations or whether these data refer to actual stress experienced “over the past several weeks.” We would need survey and cortisol data measured before the Holi and Navratri rituals. Furthermore, the data do not support the idea that rituals first increase anxiety in order to assuage it afterward. Irrespective of the preritual stress data, we should expect a negative quadratic relationship between day 1 and day 9 (stress goes up and then down). However, the key dependent variables seem to exhibit either linear trends (negative for stress and positive for Positive and Negative Affect Schedule) or positive exponential trends (morning-evening cortisol difference).

The lack of support for these two models (fig. 9A, 9B) may stem from the fact that the proposed anxiogenic parts of the Holi and Navratri rituals were not stressful enough. While occasional fights or spirit possessions can be stressful for some, they do not constitute stressors for the whole community. Thus, simpler models of ritual dynamics may be more appropriate. For instance, rituals might alleviate long-term anxiety without necessarily increasing it (see fig. 9C), as proposed by Malinowski (1948). Indeed, the finding that highly insecure people experienced greater increase in morning-evening cor-

tisol difference seems to support this model. However, the lack of preritual cortisol data again hinders the longitudinal perspective, which could show that the highly insecure people were already stressed before the ritual. Furthermore, there might be other valid models. For example, maybe the preparation of ritual celebrations invokes stress that is subsequently alleviated with a successful ending of celebrations (fig. 9D), and this effect could be pronounced for high-income people as documented by their significantly higher stress at the intercept. Perhaps the ritual effect on those people is just an indication of their relief that nothing bad has happened to them during the ritual.

Without stress data measured in the weeks preceding rituals, the applicability of Malinowski’s (1948) model is questionable because we do not know whether the Holi and Navratri rituals actually decreased anxiety below preritual levels (fig. 9A, 9C). Furthermore, the rituals that Malinowski and others have ethnographically described focus on controlling future ecological threats rather than ritually evoked stressors (e.g., Boyer and Liénard 2006; Sosis and Handwerker 2011). While the Holi and Navratri ceremonies might, of course, comprise specific rituals focused on controlling future events,

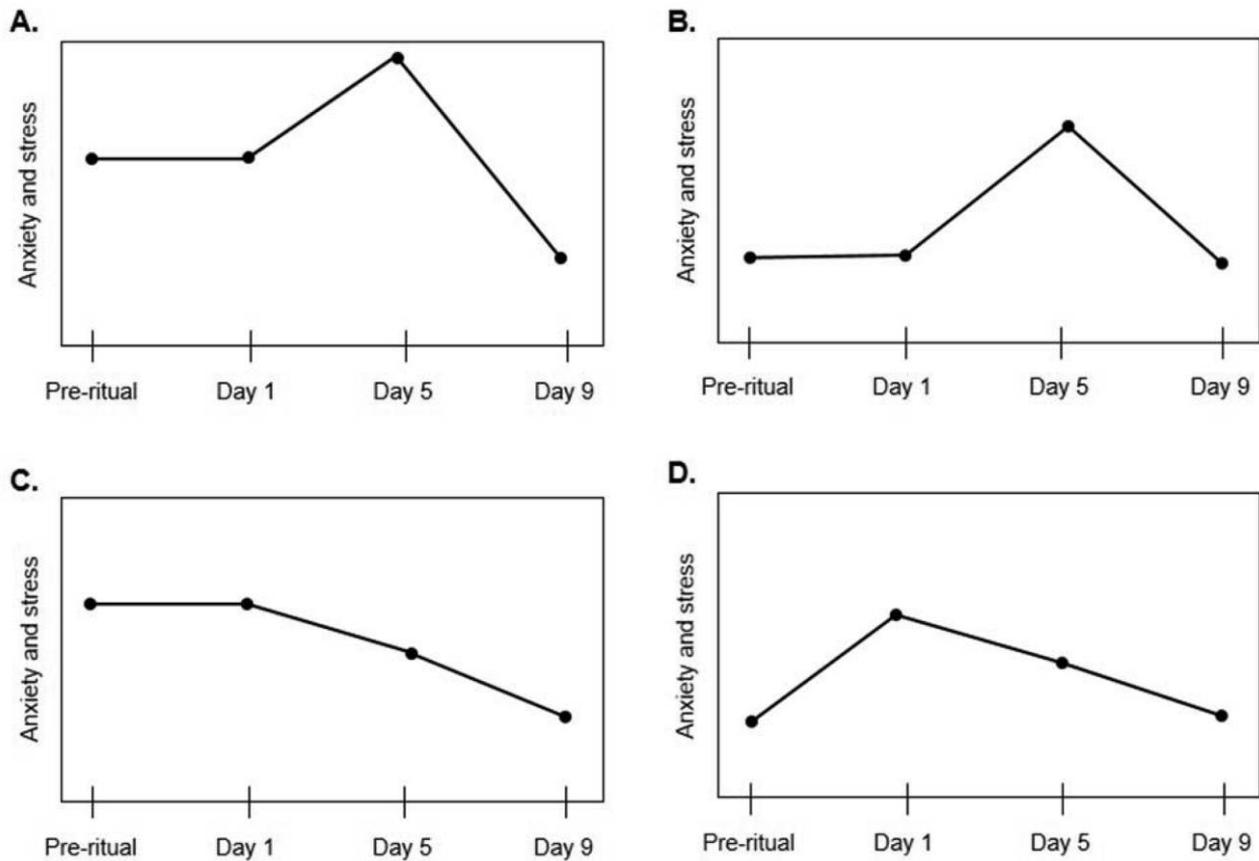


Figure 9. Four models of ritual and anxiety reduction. A, The increase and subsequent decrease of anxiety lead to an overall anxiety reduction. B, Ritual increases anxiety only to bring it back to baseline levels. C, Preritual anxiety is decreased throughout the ritual. D, Ritual preparation increases anxiety that is alleviated throughout ritual celebration.

we would need to analyze immediate anxiety responses to the specific rituals within the ritual complex (Lang et al. 2015) rather than nonspecific responses during the whole 9-day period. Without the analysis of immediate anxiety responses, we can conclude only that the collective joy and celebrations decrease stress, but that is a different mechanism than Malinowski suggested. As a consequence, it is not clear whether religion and ritual are relevant or whether communal celebrations themselves account for the observed effects (Haidt, Seder, and Kesebir 2008).

In conclusion, Snodgrass et al.'s ethnographic and quantitative data offer a significant advance in the study of the relationship between ritual and anxiety. We recommend that their future work, which we eagerly await, includes stress data measured preritual.