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Calming Meditation Increases Altruism, Decreases Parochialism

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Abstract

This research project attempts to answer the question of whether a socially learned calming practice increases altruistic behavior and/or decreases parochialism. In this context, altruism is defined as self-sacrifice in support of others, regardless of group affiliation or identity, and parochialism is defined as such prosocial self-sacrifice restricted to fellow members of a group. This question is examined via a formal behavioral experiment using a simple treatment and control format with a 5 minute calming breath awareness practice, with altruism and parochialism measured through anonymous play in Public Goods games performed with both in-group and out-group individuals. The in vs out group status is established through random assignment into groups, and PG games are played with and between these groups. The sum of contributions gives a measure of altruism, while the difference between the two is a measure of parochialism. The analysis of the results using Bayesian model comparison methods lend support to the hypothesis that calm both reduces parochialism and increases altruism.

Keywords: ritual, meditation, calm, prosociality, altruism, parochialism, pubic goods

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Introduction

Meditation and compassion

The major religions of the world all hold prosocial messages as sacred, at least contextually promoting altruism, compassion, generosity, honesty, trust, cooperation, forgiveness, etc.. Examples abound from Buddhism and Hinduism to teachings in the Abrahamic religions (Judaism, Christianity, Islam). Questions arise as to whether practices within these religions successfully cultivate prosociality and whether this prosociality is equanimously directed or limited to fellow group members. For the purposes of this paper, 'generalized altruism' will refer to willing ness to practice self-sacrificial behavior that benefits others, where the others may or may not be members of the same group, while 'parochialism' will refer to the willingness to practice such altruistic behavior, but only with members of some in-group. These are not mutually exclusive; an individual might be somewhat altruistic, but also be parochial, willing to be generous toward outsiders, but more so toward fellow group members.

Calming meditation practices within these religions and in secular contexts are often motivated in part by the cultivation of compassion. This research project attempts to answer the question of whether a socially learned calming practice increases altruistic behavior and/or decreases parochialism. It does so via a formal behavioral experiment using a simple treatment and control format with a short calming breath awareness practice and altruism and parochialism measured through anonymous play in public goods games performed with both in-group and out-group individuals. The sum of contributions gives a measure of altruism, while the difference between the two is a measure of parochialism. The results of the experiment lend support to both a reduction in parochialism and an increase in altruism, with stronger support for reduction in parochialism.

There is a great public interest in meditation practices as well as a growing body of scientific research on the physiological and psychological impacts of meditation practices. This has included investigation into the prosocial implications of meditation and related calming practices, like yoga, Tai chi, and prayer, suggesting that calming ritual practices promote altruism. Meditation training was found to result in increased helping behaviors toward strangers in need (Condon, Desbordes, Miller, & DeSteno, 2013). Brief loving kindness meditation (LKM) and related compassion training was found to generate significantly increased levels of prosocial sentiment (Hutcherson, Seppala, & Gross, 2008; Weng et al., 2013) as well as increased altruistic offers in economic games (Leiberg, Klimecki, & Singer, 2011; Reb, Junjie, & Narayanan, 2010). Yogic meditation was likewise found to increase trust in economic games (Bartolomeo, Papa, & Bellomo, 2012).

Of course, not all meditation practices are the same. Contemplation of prosocial values (as in LKM) is different from mindfulness cultivation is different from attention focusing, which is again different from a simple relaxation practice. It might be expected that contemplation of prosocial values might have effects on prosociality independent from other practices. In a comparison of mindfulness practices to simple relaxation practices, indistinguishable effects were found on altruism as measured by play in economic games, indicating that perhaps the effects of mindfulness on altruism are mediated largely through relaxation (Tappen, 2013). A number of metastudies of the physical and psychological benefits of meditation, found common effects amongst a variety of meditation practices mutually characterized by comfortable body position or movement, focus of attention, open attitude: they lead to calm and stress reduction, implying that many of their effects may be mediated through calm (Horowitz,

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2010)(Arias, Steinberg, Banga, & Trestman, 2006)(Greeson, 2009). Calming video games have similarly been shown to be correlated with increases in prosociality across multiple measures, while exciting video games have shown the opposite effect (Whitaker & Bushman, 2011). These studies together support the view that calm induces altruism.

Research on attachment and meditation suggest that meditation leads to secure attachment (Sahdra et al., 2011). Attachment security, whether by disposition or induced by treatment, has been shown to predict higher levels of altruism and reduced parochialism (Mikulincer & Shaver, 2005)(Mikulincer & Shaver, 2007)(Mikulincer & Shaver, 2001). As attachment security is a measure of calm in the face of relationship stress, these studies further support the idea that calm increases prosociality and reduces parochialism.

Studies which look at increases in cooperation solely with anonymous others did not however compare in vs out group cooperation levels, and so do not independently test parochialism. One study attempted to assess impacts on parochialism and found that meditation, prayer, mindfulness, and spiritual experiences were associated with higher levels of volunteering, charitable donations and helping behavior, but that they better predict helping unrelated others than helping friends (Einolf, 2011). Also, both a brief guided mindfulness meditation (Lueke & Gibson, 2015) and low intensity 6 week compassion meditation training (Kang, Gray, & Dovidio, 2014) were found to decrease negative out-group racial biases. This supports a more general hypothesis of reduction in parochialism for these different meditation practices.

Altruism is a long standing problem in evolutionary theory(Fehr & Fischbacher, 2003). While altruism provides a public good it is, by definition, at the expense of a private good. This is characterized by the social dilemmas of the Prisoner's Dilemma or Public Goods. While groups of individuals who sacrifice of themselves for the greater good would transparently do better than groups of selfish individuals, such groups are vulnerable to free-riders who take advantage of the public goods provided by others' sacrifices without themselves sacrificing. There are group level incentives to act one way, but individual level incentives to act in a contrary way. Lacking some sort of policing, such selfish individuals do better than altruists within the cooperative group and evolutionary processes undermine altruism through the success of such selfish individuals.

There are many proposed mechanisms for the maintenance of altruism in groups of unrelated others which have been shown to contextually stabilize or promote altruism. Repeated play and reciprocal altruism can do this (Axelrod & Hamilton, 1981; Trivers, 1971). Cheap punishment has been shown to bolster cooperation and altruism (Henrich & Boyd, 2001). Still, there are situations in which behavior is not under surveillance. Norms of calming ritual practices may contribute to prosociality in groups. Where there is some other factor causing preferential assortment of such altruists (such as preference for interaction with fellow ritual practitioners) such altruism may be promoted through cultural group selection, (Wilson, 2002). Perhaps this may be the case with such calming practices, if they do promote more generalized altruism.

Anthropology and study of rituals as bonding practices

Separate from the empirical study of meditation practices has been a growing scientific interest in the evolution of religion and ritual practices related to group bonding (Atran & Norenzayan, 2005). Foci of investigation include the genetic behavioral predispositions engaged by religion and ritual, cultural

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evolution of variants in religious practice, and implications of evolutionary dynamics of religion on social structure (Guthrie, 1993; Kirschner & Tomasello, 2010; Shariff, Norenzayan, & Henrich, 2010; Whitehouse, 2004). Central to theories of the cultural evolution of rituals is their ability to help groups overcome cooperation and free rider problems, where groups function better as group members are willing to sacrifice for the good of the group, setting up conflicts between group level and individual level incentives (Sosis & Alcorta, 2003; Wilson, 2002). Academics, starting with Durkheim and through Rappaport and into the current wave of quantitatively-minded scholars, explore how religion and ritual can be group level adaptations that coordinate individuals for more effective parochial collective action within groups and how culturally evolved systems of prosociality spread through cultural group selection (Atran & Henrich, 2010; Atran, 2002; Durkheim, 1912; Norenzayan & Shariff, 2008; Rappaport, 1999; Richerson & Newson, 2009; Wilson, 2002).

A theme of many anthropological studies of ritual is that rituals are bonding practices that facilitate parochialism. The costly-to-fake theory of ritual states that rituals that involve costly sacrifice help differentiate between people who buy into a given world view and those who do not and facilitate parochialism (Irons, 2001). Those who buy into the world-view perceive the ritual less negatively than non-believers, who would therefore be reluctant to participate. It suggests that rituals only benefit in-group, not out-group prosociality, and only when done as a signal with witnesses, as opposed to private rituals. This has been supported through observed correlations between longevity and costly ritual displays in utopian communes(Sosis & Bressler, 2003) and observed increases in parochial behavior in economic games in religious vs secular kibbutzes (Sosis & Ruffle, 2003). Suggesting that this effect may be independent of intention, simply sharing stressful experiences has been found to lead to group prosociality in a study of economic games amongst people living in evacuation shelters post Hurricane Katrina in Houston, Texas (Whitt & Wilson, 2013). Synchronizing and coordinating movement with others, as in unison dance or coordinated work, has been observed to promote altruistic feelings with task co-participants (Kirschner & Tomasello, 2010; McNeill, 1995; Rappaport, 1999), though this effect is most pronounced when this synchrony is intentional rather than a coincidence or coordinated externally (Reddish, Fischer, & Bulbulia, 2013). These observations support the theory that ritual helps define group boundaries and/or engender prosocial sentiments toward fellow group members, and altruism will increase toward these fellow group members, but not toward out-group individuals. There is accumulating cross-cultural evidence supporting this assertion that parochialism is correlated with participation in religious activities and rituals (though not with religiosity per se) (Atran, 2010; Ginges, Hansen, & Norenzayan, 2009; Sosis & Bressler, 2003)

One potential connection between this literature on the group bonding effects of ritual practices and the research on prosocial effects of meditation practices comes in the well-supported dual mode theory of ritual form (Whitehouse, 2002). It has been observed that ritual practice as documented in ethnography seems to often fall in one of two modes: *imagistic* mode rituals which are highly arousing and infrequently performed and *doctrinal* mode rituals which are more frequently performed and are less arousing. Swann et al (2012) theorize that such imagistic rituals create strong bonds in small groups where doctrinal mode rituals create lighter bonds in much larger groups, which matches observed correlation between size of society and ritual practice (Atkinson & Whitehouse, 2011). This suggests an increase in scope of prosocial relations as the arousal level of the ritual decreases. This is consistent with the hypothesis that calming practices will decrease parochialism and increase altruism.

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It must be noted here that the term 'ritual' is not as clear a category as we might at first think. As 'ritual' is traditionally used in anthropology as a category for behaviors whose economic or survival function is opaque (Durkheim, 1912), this category has more to do with the observing anthropologist and what they subjectively consider opaque than with functions or objective qualities of the observed behaviors. There is no a priori reason why it should be a coherent category. Instead of a unified theory of rituals, it is more plausible that we will find separate theories of the effects of synchrony, calming practices, dysphorically arousing practices, ecstatically arousing practices etc.

Where it might be that something like a synchronous dance activates a native behavioral disposition toward bonding and parochialism, it is perhaps also the case that we have instincts to be altruistic when we are in a relaxed and unstressed state. This could have evolved, for example, if an inner state of calm was consistently correlated with being in a state of lower resource stress and with being around relatives, where we would have had low cost for helping kin. Artificially inducing calm through ritual practices could hijack this evolved psychological disposition to cooperate, activating it in novel contexts. Whether or not this is an accurate depiction of the evolutionary origin of an instinctual response of altruism and reduced parochialism in humans, a growing body of research, including this study, explores this hypothesized effect.

This study fills a gap in research by assessing the effects of calming meditation simultaneously on in-group and out-group prosociality. This allows for a comparison of bonding theories and the calming theory to see which better predicts resulting changes in altruism and parochialism.

Hypotheses

Three hypotheses were explored in this study, using model comparison to see which hypothesis better predicted the observations of the experiment

> Hypothesis 1) Calming meditation leads to an increase in altruism and a decrease in extant parochialism
>
> Hypothesis 2) Meditation, as a bonding ritual, will lead to an increase in parochialism, but only when performed as a group.
>
> Hypothesis 3) Null. Calming meditation has no effect on altruism or parochialism

Method

Experimental Design. The experiment followed a randomized treatment and control group design, to test for the effects of a calming meditation on altruism and parochialism. Participants were randomly divided into one of four equal sized groups: two control and two treatment groups. After treatments all groups anonymously played two rounds of a Public Goods game (Dawes, 1980), once with members of the treatment group and once with a random mixture of members of all groups. The total offers in the both plays of the game were used as a measure of altruism. The difference between in-group and out-group offers was used as a measure of parochialism.

One treatment group (*Solo Meditation*) was facilitated in a 5 minute breath awareness meditation while facing a blank wall with their eyes closed before play. The second treatment group (*Group Meditation*) was facilitated in the same meditation, but oriented in a circle facing each other. The *Group Meditation* treatment also involved asking participants to look at each other before closing their eyes for the

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meditation. The practice was modelled after elements of common relaxation techniques shown to create calm (Hofmann, Grossman, & Hinton, 2011). The purpose of the Group Meditation treatment was to establish intentional synchrony as a group, reflecting the assumptions of the synchrony model of ritual (Hypothesis 2) which predicts that synchrony leads to parochialism amongst practice co-participants. One control group (*No Treatment*) played the economic games immediately. The other control group (*Socialize*) was invited to wait and socialize as they like for 5 minutes before the public goods games. *Socialize* was added in order to control for effects of simply spending time with each other vs being asked to engage in an intentional activity. Facilitators followed scripts and were rotated between roles in each run of the experiment, so that their individual personality differences would be less likely to influence the results. The two meditation scripts were identical except for the instructions to face each other and look at each other first vs instructions to face away from the group toward a wall (to reduce feelings of visually synchronizing with each other).

In an effort to minimize the effects of preconceptions about such concepts as “group”, “cooperation”, “trust”, or “meditation”, the scripts did not reference any of these or related terms. The instructions for the breath awareness meditation were simply for participants to close their eyes, relax, and be aware of their breath, as opposed to asking people to “meditate” or to cultivate any other social feeling, like ‘compassion’ or ‘mindfulness’. Ideas of kindness, compassion, and mindfulness are often layered into culturally situated meditation practices, like Loving Kindness Meditation. We expect that there would be synergistic effects of such embedded messages, but the purpose of the experiment was to isolate the effects of a simple calming practice from any effects of focusing the attention specifically on altruistic concepts.

The game played was a version of Public Goods. Public Goods (PG) is the multi-person version of the classic Prisoner’s Dilemma problem. Such games are characterized by the best option for the group being for everyone to cooperate, where individual level incentives motivate people to defect (not cooperate) (Ledyard, 1995). In the classic example, two criminals are arrested together. If neither snitches on the other, they both will get X years in jail. If one snitches and the other does not, the snitch gets out free, but the non-snitch gets Z years. If both snitch, they both get Y years. $0<X<Y<Z$. There is a self-centered motivation to snitch, because whether the other snitches or not, it is always better for oneself to snitch. The altruistic option is to cooperate. It is altruistic in that the group does better with cooperation, but the individual would do better with defection. Such coordination problems cause groups of selfish individuals to all defect, leading to bad outcomes for all individuals, and thus the group. Public Goods has the same payoff structure, but involves more than two people. It has the additional problem of increased potential anonymity, when one doesn’t know who played how.

In this version of Public Goods, each participant was given 10 points. They could contribute as many points of the 10 as they wanted to a pool and keep the rest. In each round, one player would win a sum of money. The amount won was proportional to the number of points put into the pool up to $20 if all points were put in. Each player’s chance of winning was proportional to the number of points they kept, plus one. Thus, a player was most likely to win if they kept all of their points, but the pot would be biggest for whomever got it if everyone put in all points. In the first round of the public goods game, participants played with members of their treatment group, while in the second round, they were asked to play with a similar sized group randomly drawn from all groups. All plays in both rounds were anonymous. The number of points contributed altogether was used as a measure of altruistic trust, one

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of the dependent variables. The difference between in-group offers and out-group offers was used as a measure of parochialism, the other dependent variable. While groups were randomly formed and there were no explicit cues given about cooperation, competition, or group identity, simply separating people randomly into groups has been shown to reliably induce functional group identification and parochialism (Dawes, 1980) (Kollock, 1998).

Winners were not announced until later in the evening, to minimize ordering effects in play in establishing parochialism. Further, if there was an ordering effect, this would not change findings, since the order was constant between treatments and the difference between groups with regards parochialism is relevant, not the base level. Subjects were asked to not discuss the experimental set up with those whom they knew were attending on subsequent evenings. See Appendix for experimental scripts.

Context and Study Population. The experiment was performed at the beginning of each night of an interactive theater work at UC Davis over 7 evenings in February 2011 (Frost, 2011). The fact that the performance was beginning with a formal behavioral experiment was included in publicity materials for the show, so audience members knew that this would be part of the experience. The participants (n=331) were a mixture of Davis and Sacramento theater goers and UC Davis students, with treatment groups ranging from 10 to 16 in size. Ages ranged from 17 to 65, and overall 149 male and 182 female. As participants entered the theater space, they were given a card at random with a letter and number on it, which was used to indicate their treatment group and to identify them for any winnings at the end. They were then asked to follow facilitators into different spaces for treatment and testing. Winners were announced at the end of the evening. After each performance audience members were invited to share and discuss their experiences of decision-making during the experiment, as well as discuss the broader social and political issues of cooperation and altruism. This post-performance feedback was used to contextualize and interpret the results and to informally assess understanding of the game structure. Part of the motivation for this study group was to expand beyond the typical study population of college students.

Data Analysis. Bayesian AICc model comparison methods were used to analyze the data, using ordered logit regression models to assess the predictive relevance of various independent variables, comparing hypotheses (Burnham & Anderson, 2002). Bayesian methods were chosen over the currently more commonly used Fisherian methods of p-value testing. This choice of data analysis was used because of the better fit of Bayesian methods to the analytic task of assessing the predictive ability of hypotheses (Gigerenzer, Krauss, & Vitouch, 2004), which is assessed in a principled way through Bayesian model comparison methods. A model weighting of X% through AIC implies a X% chance that a model would the best amongst compared models at predicting outcomes, given the priors. 95% confidence intervals are provided for estimated model parameters to have a sense of the most likely effect sizes.

For the data analysis here, first all treatment groups were analyzed together to explore if there was a reliable effect of group formation and parochialism based on division into treatment groups, by seeing if in vs out-group play was heavily weighted by AICc comparison. If this was the case, then the experimental design would have successfully triggered parochial group identification. Next, both total offers and difference between out-group and in-group offers were analyzed as dependent variables to

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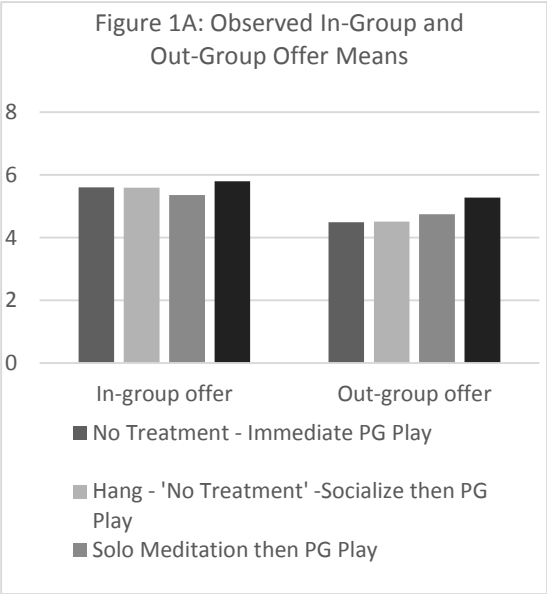
see if AICc weighted significantly the *Meditation* treatments and/or the *Socializing* control in models for either dependent variable.

Bonding theories predict only an effect for the group meditation, which would be to increase both total offers (altruism generally) and the difference between in-group and out-group offers (parochialism). These theories would predict effects for neither the solo meditation nor the socializing treatment. The calming theory predicts that prosocial benefits would result from both solo and group meditation, increasing total contributions and decreasing rather than increasing the difference between in-group and out-group offers. In terms of the AICc model comparison, heavier weighting of models with regression terms for group meditation and with positive regression parameters for both measures would support the bonding hypotheses. Heavier weighting of models with regression terms for both meditation treatments, but with negative intercept for the parochialism models and positive intercepts for the general altruism models would support the calming hypothesis. Dominant weighting for the null model would, of course, support the null.

Results

Figure 1 gives the observed mean offers for public goods game play for all 4 treatment groups: in-group, out-group, total offers (as a measure of general altruism), and the difference between in and out group (as a measure of parochialism). While the effects were small, as might be expected of a short, one-off, 5 minute treatment, the results better support the calming model than synchrony or null models, suggesting that calming practices lead to an increase in altruism generically and in fact decrease parochialism.



The first AICc model comparison selected the model that included a term for in vs outgroup play, with a strength of over 99.9%. The experimental set up clearly triggered identification of the treatment group as a group relevant to altruistic decisions and parochialism.

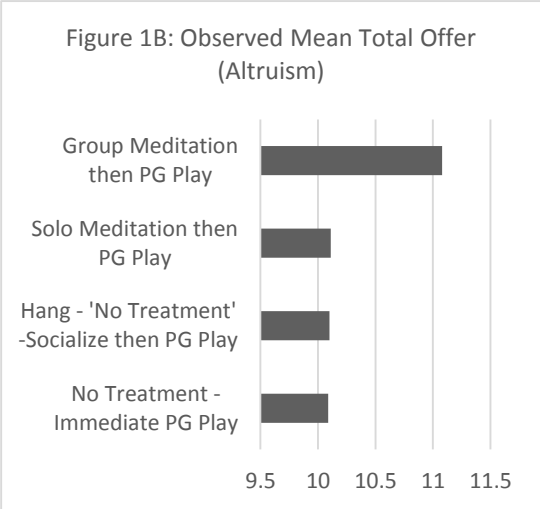


Table 1 shows the results of AICc model comparison for both general altruism and parochialism. As can be seen from the table, The null is clearly less weighted than the models tracking meditation treatments. Models with meditation treatments as an independent variable are weighted collectively at 69% for predicting total offers and 75% for predicting parochialism. Table 2 shows the model intercepts for the model tracking both solo and group meditation for the ordered logit regressions and also translates them into odds ratios for increased contributions or increased difference in contributions between the two games. The results are illustrated with

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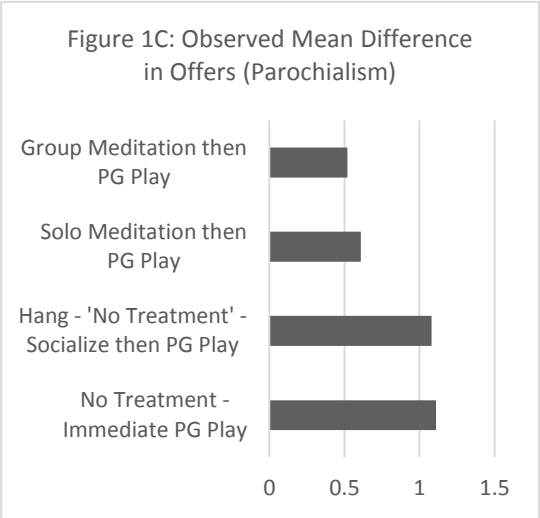
95% confidence intervals in Figure 2. These parameters indicate that the effects of the group meditation on the public goods game play were better characterized by the calming hypothesis than by the synchrony or null hypotheses. While 0 is still just inside the range of the 95% confidence interval for the intercept, it is only barely so, and most of the confidence interval is characterized by positive effects on total offers and negative effects on parochialism. Specifically, looking at the parameters for group meditation, 0 is excluded by the 92% confidence interval for the model of parochialism and the 86% confidence interval for the model of general altruism.



The solo meditation results are harder to interpret. The intercept for total offers is nearly zero, but the intercept for parochialism is, as with group meditation, negative. While the lack of a net effect on total offers would seem to support the null hypothesis, the negative intercept for parochialism supports the calming hypothesis. Post-performance interviews with participants shed some light on the unpredicted behavior of the solo meditation. While the idea of facing a wall immediately on entering the space was meant to evoke privacy and to emulate the practice in some forms of Zen meditation, Zen meditation was not a strong, easily accessed reference point for many participants. Instead, the specific set up evoked in some a threatening situation with something unknown happening behind them. A few people also mentioned references to childhood punishment, as exemplified by "time out," a widely used parenting practice in the last decades, adding to the stressful associations in this specific treatment for a minority of participants. Thus while post performance conversations revealed that attention focusing occurred during the solo meditation treatment, the effect was not as calming for some participants.

Table 1: AICc model comparison table

Model	Parameters	Total offers	Parochialism
0	*(none)*	0.23	0.17
1	Socialize	0.09	0.09
2	Solo	0.08	0.06
3	Group	0.24	0.16
4	Socialize and Solo	0.03	0.03
5	Solo and Group	0.08	0.09
6	Socialize and Group	0.08	0.06
7	Socialize, Solo, Group	0.02	0.03
8	Meditation	0.12	0.24
9	Meditation and Socialize	0.04	0.08
All Models with Meditation: Total		**0.69**	**0.75**

This table lists the AICc model weights for 10 different models which have all combinations of treatment groups as independent variables. "Socialize" refers to the treatment group that was invited to 'hang out' for 5 minutes before playing economic games. "Solo" refers to the treatment group asked to perform the breath awareness exercise facing away from each other. "Group" refers to the treatment group that performed the breath awareness practice facing each other. "Meditation" refers to membership in either

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Table 2: Intercepts and Odds Ratios

	Intercept Estimate	standard error	95% confidence		**Odds Ratio**	95% confidence	
			2.50%	97.50 %		2.5%	97.5%
Difference between In and Out Offers (Parochialism)							
solo	-0.26	0.24	-0.74	0.22	0.77	0.47	1.24
group	-0.43	0.25	-0.91	0.06	0.65	0.40	1.06
meditation	-0.35	0.2	-0.74	0.05	0.70	0.48	1.05
Total Offers (Altruism)							
solo	0.02	0.23	-0.44	0.48	1.02	0.64	1.62
group	0.35	0.24	-0.11	0.81	1.42	0.90	2.25
meditation	0.18	0.19	-0.19	0.56	1.20	0.83	1.75

This table lists the intercepts for the ordered logit regression for the meditation treatment terms for models 7 (group and solo tracked separately) and 9 (all meditation treatments combined).

The 'Odds Ratio' is the odds of an offer (or offer difference level) or higher, given the treatment divided by the odds of an offer level or (offer difference level) or higher in absence of treatment.

Discussion and Conclusions

The analysis presented here supports the thesis that calming practices will have the effect of reducing parochialism and increasing altruism. Group meditation was found to predict higher levels of cooperation generally and to have an even larger effect of reducing parochialism. While the solo meditation treatment was not found to increase altruism, it was found to decrease parochialism. It is unclear from the experiment whether the difference in effect from the solo vs group variants had to do with the effects of doing the practice in private or if it had to do with inadvertently different effects on calm produced by idiosyncrasies of the experimental set up. The unsolicited reports from some participants about stressful associations with facing a wall indicate the usefulness of repeating the experiment with either a more uniformly comfortable way of creating privacy for the participants or an independent measure of calm after treatment.

As the winning in the game involved a random draw and the player's choice affected the probability of winning, a potential challenge might be that an alternative interpretation of the impacts on altruism is that the effects might be mediated by a decrease in risk aversion, rather than other-regard. It is still, however, a relative evaluation of the risk of oneself winning vs probability of others winning and so game play should still be interpreted as a measure of altruism. Also, this critique would not extend to findings with regards parochialism, given that this is measured via differences between in and out-group play.

While there is a great deal of experimental and quasi experimental support for theories of ritual that predict that group ritual practices lead to group bonding and parochial altruism (Norenzayan & Shariff, 2008), this and other studies of meditation indicate that this is not true of all ritual practices. It would be naïve to assume that the heterogeneous physical practices that have been traditionally lumped together into the category of 'ritual' should have identical effects, so this should not be a surprise. We should not

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be aiming for a single theory of rituals, but instead should use this loose category of activities that have been called ritual as a grab bag in which to find specific phenomena to study: synchronizing activities, activities which involve sacrifice, activities which involve calming, activities which involve contemplation of morally concerned high gods, etc. (Frost, 2013).

Durkheim's definition of 'ritual' refers to their causal opacity (Durkheim, 1912). It is the category of social phenomena anthropologists use for activities whose material function is non-obvious to the anthropologist, an outsider. As Rappaport noted however, the Papua New Guinea tribesman who initiates a dance before a raid has a clear idea of the function of the ritual to generate group commitment (Rappaport, 1999). Similarly, centuries of Buddhists have sat in meditation in part because they observe that it cultivates compassion . As Rappaport writes, many of these disparate things which we have chosen to call 'ritual' are not causally opaque to their practitioners, and their beliefs about their functioning often correlate with their actual functioning in social groups that practice them.

Of course, a behavioral tendency toward altruism with non-group members presents an evolutionary conundrum. If altruists freely associate with others, they will be subject to problems with free-riders: people who take advantage of the altruist and fail to reciprocate. This suggests that such a behavioral tendency should be associated with some other compensating mechanisms. These could include the following…

- Independent physical or mental health benefits, leading to greater reproductive success
- Positive assortment with fellow altruists
- Compensating horizontal cultural transmission (learning from unrelated others), such as through increased effectiveness in proselytizing and conversion

In different cases all three of these mechanisms have been shown to be at play for meditation. The empirical support for mental and physical health benefits of meditation, yoga, and related practices is now copious (Grossman, Niemann, Schmidt, & Walach, 2004) (Sloan, Bagiella, & Powell, 1999)(Koenig & Larson, 2001). While many religions profess universal altruism and adherents may 'practice what they preach,' in many of these cases, the groups practice high degrees of positive assortment. They may have an inclination to cooperate altruistically in all interactions, but they interact preferentially with co-religionists, who 'coincidentally' practice the same altruism-cultivating rituals (Wilson, 2002). For example, Christians during the Roman empire who actively practiced universal compassion tended to associate preferentially with each other for spiritual reasons and had special rules for the treatment of "brethren in poor standing" (non-cooperators), which escalated to exclusion. Wilson also reviews documentation of significant early Christian charity toward less fortunate non-Christians. This altruism was often associated, however, with conversion activity, whether it be active proselytizing or others joining the fold motivated by the greater material success and health of those in the fold. A Buddhist parallel would be association into sangha. While these circles of spiritual fellowship may be motivated by intellectual and spiritual exchange, it is plausible that they will also have material repercussions in terms of increased opportunities for economic coordination and mutual altruism.

In terms of the effects on social structure and therefore on dynamics of cultural group selection, there are, as mentioned earlier, parallels to be drawn to Harvey Whitehouse's multiple modes theory of ritual (Whitehouse, 2002). If meditation and similar calming activities do indeed facilitate a more generalized altruism, they would also facilitate cooperation in larger groups. It could be that these doctrinal mode

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practices combine calming activities with other actions facilitating bonding with abstract social identifiers to bind large polities into cooperative units.

There are obvious limits to this kind of experiment by itself. The treatments were short and the nature of controlled experiment is that gains in precision are often at the expense of ecological validity: the ability to extrapolate those results to daily life. However, in synthesis with other experimental and survey based work on meditation and related calming practices, there is growing support developing for the theory that calming practices benefit prosociality, increasing altruism and reducing existing parochialism. A few directions of further research are suggested. First, it would be useful to see if similar effects of reducing parochialism could be seen in standing identity groups rather than in the less stable temporary groups of an experimental set up with random group assignments. While this study demonstrates a reduction in parochialism due to calming practices, a reduction in parochial preference across standing identity lines of ethnicity, religion, or nationality would be evidence of a stronger, more ecologically valid, effect. Second, to address the evolutionary dilemma of altruism, it would be useful to examine the ethnographic record for correlations between calming ritual practices and positive assortment or increased conversion rates which maintain these rituals in the population in the face of potential free riders. There is already evidence of health benefits which may be sufficient to compensate for such potential losses, but there may be multiple factors contributing to the stability of such practices in the population in the face of free rider problems. Third, it would be useful to compare different ritual forms, including ones iconic of costly signaling or synchrony theories, in the same experimental arrangement as calming practices to test different theories of ritual social function. Fourth, it would be useful to tease apart the effects of different elements of meditation practice. Does attention focusing have effects on altruism and parochialism similar to calming? This could explain the difference between the effects of solo vs group meditations in this experiment, given that they both successfully focused attention but varied in their calming effects, as evidenced in post-experiment feedback. Further, does meditation on concepts like compassion, emptiness, or reduction of suffering have independent effects from physical calming and/or interaction effects and are the prosocial effects of calming practices direct or mediated by increased accuracy in social cognition, increase in compassion, or increased self regulation of emotional responses. Answering these questions will help us develop a more sophisticated science of ritual practice.

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