Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter now, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Hal Zeitlin April 15, 2015

Silent Economics: The Cooperative Effects of Hypnotic Meditation

by

Hal Zeitlin

Dr. Kelli Lanier
Adviser

Department of Economics

D. Kelli Lanier

Adviser

Dr. Sue Mialon

Committee Member

Dr. James Rilling

Committee Member

2015

Silent Economics: The Cooperative Effects of Hypnotic Meditation

By

Hal Zeitlin

Dr. Kelli Lanier

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of Economics

2015

Abstract

Silent Economics: The Cooperative Effects of Hypnotic Meditation
By Hal Zeitlin

This research aims to understand how hypnotic meditation, which consists of a progressive relaxation hypnotic induction, followed by a silent meditation, affects a person's economic cooperative behavior. One hundred fifty-seven Emory students played *the public goods game*, an economic game designed to measure economic cooperation. Cooperation is necessary for local and global markets to function properly and to prosper. Participants were placed in two treatment groups or the control. The first treatment group, the "silent meditation group" consisted of a twenty-minute silent meditation. The second treatment group, the "hypnotic meditation group" consisted of a ten-minute hypnotic meditation followed by a ten-minute "silent meditation." Average contributions between and within the control and both treatments were found to be statistically not different. Although not statistically significant, we observed the silent meditation group sustain cooperative behavior into the second round, and the hypnotic meditation group continue cooperative behavior across all three rounds. These results suggest a 'proof of concept' that the cooperative benefits of silent meditation last longer after the practice of hypnotic meditation. However, to discover if the proof of concept is legitimate, we recommend that the experiment be repeated once more with a larger sample size. The results of this experiment also suggest that it would be valuable to examine the behavioral effects of a sustained practice of hypnotic meditation.

Silent Economics: The Cooperative Effects of Hypnotic Meditation

By

Hal Zeitlin

Dr. Kelli Lanier

Adviser

A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of Economics

2015

Acknowledgements

I would like to extend appreciation to my thesis committee. In particular, I wish to express my gratitude to my primary advisor, Dr. Kelli Lanier, for sharing her time and supporting me throughout this past year. I extend my appreciation to Dr. Andrew Francis-Tan for helping me get to this point in my college career, starting with useful guidance on my first day at Emory. I also would like to thank Marie Browne and Alexa DeVetter for helping me organize and execute my eleven successful experiment sessions. The advice and guidance of Nick Bradley, Josh Weinstock, and Soren Ryland all made a noticeable difference in the production of this thesis.

On a final note, it is important to recognize Dr. Rick Levy and The Levy Center for Mind-Body Medicine and Human Potential for providing me copyright approval and the materials needed to investigate hypnotic meditation.

Table of Contents

List of Tables

List of Charts

I. Introduction

As the growing global population has developed an increasing dependence on a decreasing supply of natural resources, the world will certainly face dilemmas previously unseen by mankind. For instance, the changing climate presents a challenge that can only be solved through global human cooperation. Of 1,372 climate experts surveyed in 2010, 97% agreed that human behavior is responsible for most of the Earth's warming observed since the 1950's (Anderegg, Prall, Harold, & Schneider, 2010). In this example, the efforts of no single country can appropriately mitigate the growing climate crisis created by mankind. Non-cooperative behavior can also adversely impact the world in ways other than damaging the environment, such as through causing financial crises. For this reason, it is of the utmost importance that the people of the modern world learn to cooperate with each other.

As average climate temperatures have begun to increase in recent history, so has the prevalence of meditation practice. With written records dating meditation to 1500 BCE, and oral histories going back to 3000 BCE, the practice of meditation has been continually used as a spiritual tool to alter human awareness and bolster internal development. Beginning in the 20th century, the focus on meditation began to broaden beyond self-enhancement, toward societal cohesion, health, and wellbeing. In fact, meditation has become more commonplace in the West, finding its way into Hollywood, Wall Street, the United States Congress, and other notable institutions. National Basketball Association (NBA) coach Phil Jackson has stated that meditation practice has helped his basketball players cooperate with opposing teams and disagreeable referees. Throughout his 20-year coaching career, Phil Jackson has won eleven championship titles, the highest in NBA history. Since cooperation is vital part to the economic functioning of the modern world, we have investigated the economic cooperative effects of a

progressive relaxation hypnotic induction designed to enhance the practice of any form of silent meditation.

Using *the public goods game*, an economic game that assesses cooperation, we found that the twenty-minute hypnotic meditation treatment (T2) and the twenty-minute silent meditation treatment (T1) yield little significant effect on cooperative behavior as measured by *the public goods game*. However, self-reported Likert measurements using a Kruskal-Wallis test demonstrate a significant change in relaxation after the hypnotic meditation intervention. Qualitative responses recorded after the meditation interventions support the observation that there was a positive change in relaxation. While behavior in T1 and T2 aligned with the general hypothesis trends, there is evidence that these changes were random and cannot be directly attributed to the meditation interventions.

II. Cooperation

In order to solve the global problems of the 21st century, cooperation is a necessity. Cooperation is the ability of people to work together for a common purpose. Within today's global economy, these purposes may include small-scale priorities like a firm meeting its production goals or larger priorities like promoting international trade. If greater levels of cooperation can be promoted within a firm, more efficient and sustainable production can be achieved. Likewise, with increased levels of cooperation, accompanied by open accessibility to best industry practices, consumer welfare can be more easily increased.

In *the public goods game*, a group of three players simultaneously decide how much of their endowment they want to contribute toward the public commons. When all three players contribute a certain percentage of their endowment to the public commons, there is a possibility

that each player can earn more than their original allotment. After all three players have made their respective contributions, these players then receive the total sum of the public commons, split in half. In each round of this game, subjects choose to transfer any portion or all of their endowment to the public commons without knowing other group members' choices. For this reason, *the public goods game* is an established and accepted measure of cooperation that can be used in a lab to study ways to improve cooperation (Ledyard, 1995).

The public goods game also has various modifications that simulate practical aspects of human interaction, which can further encourage or hinder cooperative behavior. Based on a literature survey conducted by Ledyard (1995), communication, the inclusion of a threshold point, and a higher marginal per capita return (MPCR) all lead to greater levels of cooperation in *the public goods game*. In addition, Ostrom, Walker, and Gardner (1992) contend that players are also willing to incur a fee in order to punish other players for not cooperating. Since the practice of meditation has rarely, if ever, been applied to *the public goods game*, this study will utilize a traditional *public goods game* with a .5 MPCR and no communication, threshold point, or punishment option.

III. Meditation

While meditation practices have been demonstrated to impact economic behavior, little has been asked on the topic of cooperation. For instance, variations of *the dictator game* have been used to detect increases in altruism or kindness after compassion meditation training.[1] Meditation training has also been used to assess reactions to unfair behavior through the use of

[1] See Leiberg, Klimecki, & Singer, 2011; Reb, Junjie, & Narayanan, 2010; Weng et al., 2013.
In *the dictator game*, player A determines how to split an allocated endowment between themself and player B. Player B receives the remainder of the endowment that player A did not keep.

the ultimatum game. Hence, as more innovative meditation practices have begun to emerge, we ask if a twenty-minute meditation session that includes a ten-minute hypnotic meditation recording contributes more to cooperative behavior than a twenty-minute silent meditation session. Hypnotic meditation is a progressive relaxation hypnotic induction that helps an individual relax their mind and body for an effective practice of meditation. Any type of meditation may be used after listening to the hypnotic meditation recording. In this study, participants were asked to observe the breath entering and leaving the body, without controlling the breath, and to mentally repeat the mantra "*om*" on the outbreath. This scientifically valid practice, first tested under Dr. Herbert Benson of Harvard Medical School, is used in both meditation treatment groups and will be referred to as "silent meditation" within this study (Benson, 1975).

Introduction to Meditation

In recent years, Western scientists have increasingly studied the power of meditation and its effects on practitioners. Beginning in 1974, Dr. Herbert Benson investigated the effects of a meditation practice similar to the silent meditation used in this study. Dr. Benson studied the effects of meditation on the immune system, and his research catalyzed a greater level of scientific inquiry into the physical health benefits of meditation practice. While Benson's investigation focused on the contemplative meditation practices of various faiths, including Sufi, Christian, Jewish, and non-religious traditions, he identified many commonalities among these distinct forms. The research concluded that, by sitting in a comfortable position for 20 minutes each day, focusing only on breathing, and mentally repeating the mantra "one", a person can induce the physical "relaxation response," as Benson called it. The effects of the relaxation

response (the biological opposite of stress) include: decreased heart and breath rates, lower blood pressure, and lessening of tension in the muscles (Benson, 1975).

Although Benson's research introduced meditation's power to increase physical wellbeing to Western science, there are many other philosophical and applied approaches to meditation. In an effort to define meditation and better understand its benefits, a group of prominent meditation researchers grouped the most common meditation practices under two umbrella distinctions (Lutz, Slagter, Dunne, & Davidson, 2008). Under their classifications, *focused attention meditation* requires deliberate focus on a certain object, such as the breath passing through the nostrils. Their other category, *open monitoring meditation,* consists of the non-reactionary observation of moment-to-moment consciousness, such as observing emotions and thoughts as they come and go. Travis and Shear (2010) proposed a third category of meditation to amend the Lutz et al. dichotomy. This category, *automatic self-transcending meditation*, comprises meditation techniques designed to transcend their own activity. Travis and Shear propose Transcendental Meditation as an example of *automatic self-transcending meditation*.[2] Given the existence of many forms and ends of meditation encompassed within these three classifications, the general practice of meditation has not been classified under one agreed-upon definition. Furthermore, the three classifications are not mutually exclusive. To help distinguish between the different types of meditation discussed in this paper, Table 1 provides a concise overview.

Another significant development in the growth of the western study of meditation took place in 1979 with Dr. Jon Kabat-Zinn's creation of *Mindfulness-Based Stress Reduction* (MBSR), a program that includes a foundation of mindfulness meditation and *hatha yoga*

[2] Automatic self-transcending meditation is classified based on the testimony of practitioners and biological markers. There currently are no objective scientific tools to verify the subjective experiences of an individual. Transcendent experiences are described as subjective experiences that exceed ordinary, sensatory awareness.

practice. The universal practice of mindfulness, and its specific silent meditation derivatives, can be defined as the practice of present-centered, nonjudgmental awareness (Kabat-Zinn, 2003, 2013). In a meta-analysis highlighting 20 empirical studies of MBSR practice, Grossman, Niemann, Schmidt, and Walach (2004) found consistent evidence that mindfulness meditation might enhance a person's ability to cope with distress both in ordinary circumstances of everyday life and more extreme circumstances of serious disorder or stress.[3] As the popularity of MBSR continues to grow, popular media and news sources have begun to report regularly on the increasing prevalence of MBSR and other meditation practice within America. In early 2014, *Time* magazine reported that about 100 randomized clinical research papers have been published solely on MBSR in addition to 477 published scientific journal articles (Hurley, 2014). To meet the growing interest in MBSR and to better understand the science of mindfulness meditation practices, Springer Media created the journal *Mindfulness* in 2010. *Mindfulness* has published over 350 peer-reviewed articles in its first four years, solidifying itself as a formal, institutional outlet to support the growing investigation of mindfulness practices. In addition to academic efforts to investigate meditation practice, the government-funded National Health Interview Survey found that in 2007 more than 20 million U.S. adults, 9.4 percent of the US population, used some form of meditation practice for health-related reasons (Barnes, Bloom, & Nahin, 2008).

While a considerable amount of research has been dedicated to the physical and psychological effects of meditation, prior to 2007 the quality of this research was often considered relatively questionable due to a lack of rigor in experimental design. A report prepared for the U.S. Department of Health and Human Services examined 813 studies over five

[3] Furthermore, the Grossman et al. (2004) analysis highlighted several physical benefits of meditation, such as reductions in medical symptoms, though these benefits were less frequently measured within the sample of papers.

broad meditation practices in search of commonly demonstrated physiological and neuropsychological outcomes (Ospina et al., 2007). The report concluded that pre-2007 meditation research did not often fully report methodological standards. Yet, since that study and even before, prominent institutions such as Harvard, Stanford, UCLA, and The University of Wisconsin-Madison have published neuroimaging studies that recorded detectable changes in various brain regions of meditators through the use of electroencephalography (EEG), magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI).[4] Despite the subjective nature of meditation, meditative training has been demonstrated to change regions of the human brain and the human behaviors related to those regions. Recognizing these beneficial changes in brain and behavior, this paper primarily focuses on the effects of a specific meditation practice on economic behavior.

Hypnotic Meditation

After publishing the book *Hypnosis and Suggestibility* in 1933, Yale researcher Clark L. Hull began the scientific investigation of hypnosis. Despite the growing quantity of clinical hypnosis research, the popular image of hypnosis is often a thoughtless adult before an audience, entirely controlled by the wits of a stage hypnotist. Clinical hypnosis in contrast uses mental relaxation and focusing procedures that help an individual concentrate on issues related to their health and wellbeing. Clinical hypnosis is nothing like stage hypnosis.

In a paper assessing the synthesis of Eastern meditation and hypnosis, Otani (2003) argues that Eastern meditation techniques and modern clinical hypnosis will enrich each other. The approach tested in this paper is a progressive relaxation hypnotic induction followed by a

[4] See Davidson et al., 2003; Farb et al., 2010; Goldin & Gross, 2010; Hölzel et al., 2011; Lazar et al., 2005; Luders, Toga, Lepore, & Gaser, 2009; Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008; Pagnoni & Cekic, 2007; Slagter et al., 2007.

ten-minute period of silence in which the individual practices “silent meditation” on their own. Again, the technique of “silent meditation” discussed in this paper is comprised of observing the breath enter and leave the body, without controlling the breath, and mentally repeating the mantra “*om*” on the outbreath. Hypnotic meditation was developed to help the meditator attain the essential relaxation necessary for an effective session of meditation, and thus increase the benefits that come from meditation practice. Therefore, hypnotic meditation may encourage greater cooperative behavior than that would already result from a twenty-minute meditation session. According to the National Board for Certified Clinical Hypnotherapists, hypnotherapeutic techniques have been approved and recommended by the American Heart Association, the American Lung Association, the American Cancer Society, and many other company employee assistance programs, hospitals, non-profit organizations, and community mental health clinics throughout the United States. Before this experiment, no published study observed changes in cooperative economic behavior after the implementation of a meditation intervention. In addition, no study has yet to observe how hypnotic meditation impacts any form of economic behavior.

Continued daily meditation practice has been demonstrated to help improve baseline levels of attention, yet beginning practitioners may struggle to keep the mind focused (Valentine & Sweet, 1999). This struggle, compounded with the strong suggestion to meditate daily, can discourage novice meditators, leading them to quit before seeing any recognizable benefits. Continuous daily meditation is required to achieve many positive baseline biological changes such as a reduced heart rate and increased brain gray matter density and volume (Benson, 1975; Hölzel et al., 2011; Luders, Toga, Lepore, & Gaser, 2009). Therefore, hypnotic meditation may

help an individual begin each meditation session with a relaxed body and focused mind, supporting the cultivation of a daily practice.

One-time Interventions

Prominent neuroimaging meditation research suggests that a daily practice of meditation spanning over many weeks leads to psychological, physiological, and behavioral improvements.[5] Many studies have revealed notable biological changes within the brains and bodies of expert meditators, such as Buddhist monks with over 10,000 hours of meditation experience.[6] Research has also been conducted on the effects of less than one week of daily meditation practice.[7]

Certain meditation interventions have demonstrated that behavioral and physiological changes can be found in samples without consistent meditation training. For instance, an experiment at Stanford found a positive shift in feelings of social connection both explicitly and implicitly after a single seven-minute guided loving-kindness meditation (Hutcherson, Seppala, & Gross, 2008).[8] It should be stated that guided meditation is not the same as hypnotic meditation. Hypnotic meditation functions as an instrument to relax the body and mind prior to a silent meditation practice; guided meditation, as stated in its name, is a spoken or recorded procedure that guides an individual through the entirety of a meditation session. Guided and silent meditation practices share similarities, however open monitoring, focused attention, and automatic self-transcending meditation practices exclusively cite and are based on the use of a silent meditation practice. Silent meditation practices, rather than guided meditation practices,

[5] See footnote four.
[6] See Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007; Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008; Lutz, McFarlin, Perlman, Salomons, & Davidson, 2013.
[7] See Tang et al., 2007, 2009, 2010; Xue, Tang, & Posner, 2011; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010.
[8] Loving-kindness meditation, also known as compassion meditation, is based upon directing compassion and wishes for a positive well-being toward the self and others (Salzberg, 1995).

maintain a higher scientific credibility because they have been most frequently demonstrated to alter human physiology in long-term meditation practitioners.[9] Therefore, we have elected to observe the economic cooperative effects of a silent meditation practice within this study.

Clinical hypnosis has also shown effectiveness after a first-time induction. For example, after a single hypnosis session, wound debridement patients reported a significant reduction in pain based on the McGill Pain Questionnaire compared to a standard relaxation treatment group (Askay, Patterson, Jensen, & Sharar, 2007). Similarly, while a considerable portion of meditation research has been conducted with frequent practitioners, previous studies cited in this paper suggest that the ten-minute hypnotic meditation followed by the ten-minute silent meditation could produce a detectable effect on cooperative behavior.

Meditation's Effect on Emotional and Cognitive Behavior

Scientifically valid meditation practices have been reported to shift behavior through changes in emotion. In a Wharton study, mindfulness meditation was shown to divert a meditator's focus from previously incurred costs that should be ignored when making new financial decisions, also known as a lessening of "sunk-cost bias" (Hafenbrack, Kinias, & Barsade, 2014). In an experiment using a fifteen-minute recording based on a MBSR mindfulness meditation exercise, emotional reactions to "aversive picture slides" for the meditation group were less intense, according to Affect Scale and Short PANAS questions, than the unfocused attention and worrying groups (Arch & Craske, 2006). A similar experiment also observed a reduction in negativity bias, weighing negative information more than positive information, after mindful-breathing meditation (Kiken & Shook, 2011). Even if participants are naturally distrustful of others, silent and hypnotic meditation may diminish participants'

[9] See footnote four.

cognitive predispositions.

Table 1:
Types of Meditation and Essential Definitions:

	Direct Quote
Hypnotic meditation	- "A short series of progressive relaxation procedures that precede a scientifically-validated meditation practice. Hypnotic meditation allows the user to relax their mind and body quickly and easily so they can slide deep into meditation and enjoy its benefits right away" (Levy, 2014a).
Silent meditation	- Observing the breath enter and leave the body, without controlling the breath, and mentally repeating the mantra "*om*" on the outbreath.
Open monitoring meditation*	- "Dispassionate, non-evaluative awareness of ongoing experience" (Travis & Shear, 2010). - "Nonreactive awareness of automatic cognitive and emotional interpretations of sensory, perceptual, and endogenous stimuli" (Lutz, Slagter, et al., 2008). **Example: "Hypnotic Meditation"**
Focused attention meditation*	- "Voluntary control of attention and cognitive process" (Travis & Shear, 2010). - "Directing and sustaining attention on a selected object… detecting mind wandering and distractors" (Lutz, Slagter, et al., 2008). **Example: "Silent Meditation"****
Automatic self-transcending meditation*	- "Automatic transcending of the procedures of the meditation practice" (Travis & Shear, 2010). **Example: Transcendental Meditation**
Mindfulness (mindfulness meditation)	- "Detached observation, from one moment to the next, of a constantly changing field of objects " (Kabat-Zinn, 1982). - Present-centered, nonjudgmental awareness.
Clinical hypnosis	- "Mental relaxation and focusing procedures to help a patient concentrate on issues relating to their health and wellbeing. The patient is in control throughout the experience and remembers everything" (Levy, 2014a).
*Examples of the three umbrellas of meditation overlap and not mutually exclusive. **The silent meditation used in this study is a focused attention meditation and has some characteristics of automatic self-transcending meditation.	

IV. Hypotheses

There has been a limited investigation into meditation's effect on cooperation. Yet in an economic experiment similar to this study's, Giovanni, Stefano, & Saverio (2012) found greater levels of trust within the meditation treatment group exposed to four thirty-minute meditation

sessions when compared to the control. As this study's population was comprised of college students with little or no previous meditation experience, it presents itself as a strong precursor to this paper's hypotheses. Hardin (2002) and Gächter, Herrmann, & Thöni (2004) argue that trust is primarily important because it contributes to cooperation, which is vital to societal functioning. Due to the impact of meditation in the Giovanni et al. study, the improved trust and reciprocity observed in *the investment game* may also carry over to the *public goods game*.[10]

Giovanni et al. proposed that certain meditation practices encouraged senders to invest relatively more money to other game participants in the economic *investment game*. This study suggested that because meditation reduces cognitive rigidity, biases, and personal stress, and increases attention and emotional stability, subjects are better able to understand the implications of the economic game and are less influenced by emotional and mental biases, stresses, and fears (Greenberg, Reiner, & Meiran, 2012; Kirk, Downar, & Montague, 2011; Lazar et al., 2000; Tang et al., 2007). Furthermore, Giovanni et al. proposed that meditation's effects on human cognition, emotion, and behavior will diminish risk aversion and competitiveness, two barriers to cooperation in *the public goods game*. We hypothesize that the inclusion of hypnotic meditation and silent meditation will influence the extent of a participant's cooperative behavior.

Hypothesis I: Round One Behavior

In a sample of *public goods game* literature, Ledyard (1995) states that round one contributions are typically between 40%-60% of each player's initial endowment.

i. **Control: Participants in the control will contribute between 40 to 60 tokens.**

[10] In *the investment game*, player A can transfer any portion of their endowment to player B. This amount is then multiplied by three before being received by player B. Player B then chooses how much of their new endowment to offer to player A.

ii. **Silent meditation (T1): Participants in the silent meditation group (T1) will contribute more tokens to the public commons, relative to the control.**

iii. **Hypnotic meditation (T2): Participants in the hypnotic meditation group (T2) will contribute more tokens to the public commons, relative to the control and silent meditation group (T1).**

We hypothesize that a decreased negativity bias, as a result of the silent meditation, will lead to greater cooperative behavior in the first round of *the public goods game* (Kiken & Shook, 2011). Furthermore, like silent meditation, hypnosis has been shown to produce the relaxation response (Bellardita, Cigada, & Molinar, 2006). For students who may struggle to find calmness within a twenty-minute silent meditation session, hypnotic meditation may encourage a more-aware and focused ten-minute silent meditation.

Hypothesis II: Rounds Two and Three Behavior

Ledyard (1995) also stated in his *public goods game* survey that contributions typically approach zero over multiple rounds because, with more repetition, there are more opportunities for a player to defect. Once one player defects, other players find it difficult to cooperate in the midst of one or more players who do not contribute to the public commons. Without the ability to communicate or some other enforcement mechanism, it is unlikely for a group of players to regain the trust needed for cooperation.

i. **Control Round Two: Participants in the control will contribute fewer tokens in round two than in round one.**

ii. **Control Round Three: Participants in the control will contribute fewer tokens in round three than in round two.**

iii. **T1 Round Two: Participants in the silent meditation group (T1) will contribute more tokens to the public commons in round two, relative to the control. Participants of T1 will not contribute significantly less in round two relative to round one.**

iv. **T1 Round Three: Participants in the silent meditation group (T1) will contribute more tokens to the public commons in round three, relative to the control. Participants of T1 will not contribute significantly less in round three relative to round two.**

v. **T2 Round Two: Participants in the hypnotic meditation group (T2) will contribute more tokens to the public commons in round two, relative to the control and silent meditation group (T1). Participants of T2 will not contribute significantly less in round two relative to round one.**

vi. **T2 Round Three: Participants in the hypnotic meditation group (T2) will contribute more tokens to the public commons in round three, relative to the control and silent meditation group (T1). Participants of T2 will not contribute significantly less in round three relative to round two.**

If participants lessen their reactivity to the contributions of other participants due to meditation, then they may be more likely to contribute greater amounts of tokens to the public commons. We hypothesize this impact to be more prevalent in T2 than in T1, and more prevalent in T1 than in the control. This greater contribution will manifest as a larger increase or a lesser decrease in token offerings. One predominant biological explanation for this hypothesis is based on the observation that meditation is linked to the activation of brain areas that uncouple negative emotional reactions from behavior (Kirk et al., 2011).

A range of scientifically valid meditation practices has been associated with reductions of biases and personal stress and increases in attention and emotional stability. We hypothesize that benefits related to all valid meditation practices would increase following hypnotic meditation. In addition to facilitating greater levels of relaxation, hypnosis has been demonstrated to induce an altered sense of self through changes in self-orientation (Rainville & Price, 2003). A change in self-orientation may lead to greater prosocial behavior, which in this case manifests itself as cooperation. Negative emotional reactions should be relatively diminished within the hypnotic meditation group, leading to a higher token contribution when compared to the twenty-minute silent meditation group and control. As mentally repeated "*om* meditation" has been shown to balance mental activity, this repetition may lead to a lessened emotional reaction to low contributions or defections by other group members in both T1 and T2 (Sankhla et al., 2014).

V. Methodology

This study includes economic behavioral measures of cooperation collected through *the public goods game* in addition to numeric and short answer responses from a pre-game survey detailing background information, physiological and mental states of the subjects, and their meditation experience. A Google online survey was used to collect anonymous responses to the survey questions. The physiological and mental states of the subjects were self-reported on a Likert scale from one to seven measuring participants' level of focus, relaxation, warmth, and the dryness of their skin. Since increased levels of focus and relaxation are commonly associated with an effective practice of meditation, these two measures were recorded by participants for us to assess if the meditation intervention occurred. The measurements of skin dryness and warmth were included to lessen cognitive biases that might result from collecting self-reported

measurements. To help us understand the results of the experiment, an optional online qualitative survey was provided to all participants of the study. The behavioral measures of this study consist of the amount of tokens contributed to the public commons, which is the pot of tokens split in half and redistributed to all players directly after each of the three rounds. To prevent players from purposefully defecting in the final round, participants were not told the total number of rounds (see Table 2 for an overview of the experimental design). Charles Holt formatted the "Voluntary Public Goods game" for online use through the University of Virginia's VeconLab, which was used to simulate *the public goods game* and electronically collect the behavioral data for this study. Before playing the game, VeconLab provides an explanation of *the public goods game* and practice questions to ensure that participants understand how to play the online simulation.

For the purposes of this experiment, each subject is issued ten dollars in the form of one hundred tokens worth ten cents each. Contributing a token to the public commons holds a constant marginal return of five cents, while not contributing a token to the public commons is similar to contributing said token to a private fund with a constant marginal return of ten cents. When one player contributes one token valued at ten cents to the public commons, all three players in the game receive half of a token valued at five cents in return. Therefore, pro-cooperative behavior is defined as contributing a higher quantity of tokens to the public commons. The individual dominant strategy is to contribute nothing to the public commons, whereas the socially optimal solution is for each player to contribute their entire ten-dollar endowment. To understand possible *public goods game* outcomes and the motivations for participants to cooperate, please see Table 3. The payoff function for each player, i, is the below expression. Π_i represents subject i's payoff, c_i represents subject i's contribution to the public

commons, and c_j represents the sum of all three subjects contributions to the public commons (j=1, 2, or 3).

$$\Pi_i = (10 - c_i) + 0.5 \sum_{j=1}^{3} c_j$$

Procedures

This experiment was comprised of two treatment groups and the control. Each three-player group was randomly selected and anonymity was maintained amongst all *public goods game* participants. There were eleven sessions in total with 12-18 students in each session. The control was comprised of three sessions, T1 was comprised of four sessions, and T2 was also comprised of four sessions.

Control – Students did not meditate and played the *public goods game* after completing an online survey.[11]

T1 – Students completed an online survey, were taught how to meditate, practiced silent meditation for 20 minutes, stretched, and then played *the public goods game*.

T2 – Students completed an online survey, were taught how to meditate and follow the recorded hypnotic meditation, listened to the hypnotic meditation for ten minutes, practiced silent meditation for ten minutes, stretched, and then played *the public goods* game.

The video shown to T1 and T2 described the silent meditation technique comprised of observing the breath enter and leave the body without controlling the breath, and mentally repeating the mantra "*om*" on the outbreath.[12] The video concluded by explaining the end purpose of this meditation practice, achieving a state of highly-enhanced attention where insight

[11] The survey collected demographic details of the participants and was specifically designed to not effect behavior.
[12] Mentally repeating "*om*" has been demonstrated to induce a deeper relation of body and mind, balanced mental activity, and an overall orderliness of brain functioning (Sankhla et al., 2014).

emerges. Treatment group T2 was specifically instructed to follow the recorded hypnotic meditation and continue into the silent meditation phase. After the meditation and before the rules of the *public goods game* were communicated, all subjects were asked to stand up and stretch for one minute to reawaken their attention.

Payment

Participants were informed at the beginning of the session that one group of three students will be paid the monetary equivalent of one out of the three game outcomes, randomly chosen.[13] Each token was converted into its ten-cent equivalent value, with each person eligible to receive up to twenty dollars. The subjects were also told that the non-selected participants would be compensated three dollars in return for their participation. Students turned away due to over-attendance or the number of participants not totaling to a multiple of three were also compensated three dollars.

Table 2:
Experimental Design

Experimental Parameters
1) Group Endowment per Round: 300 tokens
2) Individual Endowment per Round: 100 tokens
3) Private Marginal Return: $0.10
4) Public Marginal Return per Capita: $0.05
5) Number of Rounds: 3

[13] All public advertisements and experiment sessions disclosed that each participant had a minimum probability of 16.67% to receive five to twenty dollars and that all other participants would receive three dollars compensation.

Experiment Sequencing[14]

Treatment	'n' Including Only First Round	'n' Including All Three Rounds	Brief Description
Control	45	45	The *public goods game* was played directly after demographic information was collected.
Silent Meditation (T1)	57	51	Twenty minutes mentally repeating the sound "*om*" on outbreath.
Hypnotic Meditation (T2)	58	42	Ten minutes listening to the progressive relaxation hypnotic induction (hypnotic meditation), ten minutes practicing "silent meditation."

Table 3:
Three Examples of Possible Outcomes

Socially Optimal Outcome

	Player A	Player B	Player C
Initial Endowment (Tokens)	100 ($10)	100 ($10)	100 ($10)
Contribution	100 ($10)	100 ($10)	100 ($10)
Initial Tokens Remaining	0	0	0
Tokens Received (1/2 sum contribution of players 1, 2, and 3)	50 ($5) + 50 ($5) + 50 ($5)	50 ($5) + 50 ($5) + 50 ($5)	50 ($5) + 50 ($5) + 50 ($5)

[14] Due to technical issues and attendance issues, the sample sizes of round two and three contributions were lower than group sample sizes in T1 and T2.

Final Tokens	150 ($15)	150 ($15)	150 ($15)
Money Created	50 ($5)	50 ($5)	50 ($5)
Initial Endowment Sum: $30	**Total Money Created: $15**	**Final Endowment Sum: $45**	

Least Socially Optimal Outcome

	Player A	Player B	Player C
Initial Endowment (Tokens)	100 ($10)	100 ($10)	100 ($10)
Contribution	0 ($0)	0 ($0)	0 ($0)
Initial Tokens Remaining	100 ($10)	100 ($10)	100 ($10)
Tokens Received (1/2 sum contribution of players A, B, and C)	0 ($0) + 0 ($0) + 0 ($0)	0 ($0) + 0 ($0) + 0 ($0)	0 ($0) + 0 ($0) + 0 ($0)
Final Tokens	100 ($10)	100 ($10)	100 ($10)
Money Created	0 ($0)	0 ($0)	0 ($0)
Initial Endowment Sum: $30	**Total Money Created: $0**	**Final Endowment Sum: $30**	

Privately Optimal Outcome for Player A

	Player A	Player B	Player C
Initial Endowment (Tokens)	100 ($10)	100 ($10)	100 ($10)
Contribution	0 ($0)	100 ($10)	100 ($10)
Initial Tokens Remaining	100	0	0
Tokens Received (1/2 sum contribution of players A, B, and C)	0 ($0) + 50 ($5) + 50 ($5)	0 ($0) + 50 ($5) + 50 ($5)	0 ($0) + 50 ($5) + 50 ($5)
Final Tokens	200 ($20)	100 ($15)	100 ($15)
Money Created	0 ($0)	50 ($5)	50 ($5)
Initial Endowment Sum: $30	**Total Money Created: $10**	**Final Endowment Sum: $40**	

VI. Results

The population consists of 77 male and 80 female undergraduate students at Emory University. The age of the population ranges from 18-28 with 98.7% of subjects under the age of 23 (M=19.6, SD=1.52). The population self-identified as 37% Caucasian, 41% Asian, 9%

African American, 6% Hispanic/Latino, 1% Indian, and 6% mixed race. For a more complete description of the study participants' demographic backgrounds, see Table 5. Students were invited to participate in the study through classroom announcements, e-mails, posters, and recruitment in public locations. Forty-five participants were in the control, 57 participants were in T1, and 58 participants were in T2. Results were compiled using the data software Stata and Microsoft Excel.

Our analysis is based on observations of mean contributions, binary free rider behavior, and fluctuations of contributions between the four quadrants of possible token offerings. A proof of concept was demonstrated that hypnotic meditation extended the steadiness of pro-cooperative behavior across all three rounds, while the lone practice of silent meditation extended these cooperative effects only into the second round.[15] All two-sample t tests conducted to detect differences in levels of contribution between and within the treatments groups and the control were found to be statistically insignificant after applying a Bonferroni correction (Bonferroni threshold= 0.0003). Of the 15 t tests conducted, T1 and control contributions and T1 and T2 contributions were found to be different at the .05 level. A Bonferroni correction is important to reduce spurious results. With each additional significance test used, the probability of a type I error taking place within our analysis increases exponentially. A classical view of statistics prefers a family wise error rate at 0.05, placing merit within a p-value correction mechanism like the Bonferroni correction (Feise, 2002).[16] Kruskal-Wallis tests were used to detect changes between pre and post Likert measurements of focus and relaxation, two indicators that the meditation intervention properly occurred. A significant change in relaxation was identified

[15] A proof of concept is when an idea, concept, or principle is demonstrated to be feasible.

[16] $\frac{\alpha}{m} = \frac{.05}{21}$; 131 tests arise from nine t tests across treatments and the control, six t tests within treatments and the control, six Kruskal-Wallis tests measuring Likert values, and 110 significance tests within regression analyses (see Tables 6,7, and 9-15).

within T2. To best assess the proof of concept revealed, we recommend that this study is repeated with a larger sample size.

Two linear regression models were used to evaluate how each meditation treatment, previous levels of token contributions, and demographic details influenced the amount of tokens contributed within all rounds. See Table 6 and 7 for the regression results and Table 8 for descriptions of the independent variables used.

Result 1: Average contributions of consecutive rounds within the control were statistically not different. Contributions across treatments and the control were also not statistically different. The average control contribution began below 40 tokens in round one and increased each round toward 40 tokens. Therefore, the control population contradicted the hypothesized results, yet this phenomenon was likely a result of random variation.

In the context of a *public goods game* with multiple rounds it is expected that players will contribute 40%-60% of their endowment in the first round and that their contributions will diminish each following round. The control of this study failed to replicate all criteria of the expected results (see Chart 1 for a graphical depiction of average contributions across both treatments and the control). As Ledyard (1995) has established an expectation of a decline in contributions within rounds two and three of the control, these decreases should be statistically different according to t tests. Not only did rounds two (35.578 tokens, SD=34.509) and three (39.467 tokens, SD=38.504) incur a marginal increase in average contributions, but t tests comparing contributions of rounds one and two (t=-0.601, p=0.55), in addition to rounds two and three (t=-0.505, p=0.615), report that there is no significant difference between these values (see

Table 12). This indicates that, while contributions moved in the opposite direction than expected, this movement is currently classified as a result of random variation.

If participants within the control believed that their peers would contribute favorably to the public commons, the doctrine of conditional cooperation states that these participants' contributions would also increase in a related proportion (Chaudhuri, 2010). The round one average group contribution regression coefficient (AvgR1) is 1.11 (SE=.177, p=0.0000) and AvgR2 is 1.09 (SE=.17, p=0.0000), both satisfying the Bonferroni Threshold of 0.0003. These are the highest AvgR1 and AvgR2 regression coefficients measured across both treatment regressions and the control; likewise, no other pair of AvgR1 and AvgR2 variables both reported a p-value of 0.0000 in the within treatment regression analyses (see Table 7). The positive and relatively large magnitudinal influence of past round contributions on next round contributions, as significantly demonstrated in the control, suggests that conditional cooperation may have been present within the control.

One source of the contribution increases over the three rounds of the control was the behavior of one session comprised of an experimental economics class and three additional students (n=15). After removing these fifteen subjects from the control to evaluate this control session's impact on average contributions, the first round began with an average contribution of 30.333 tokens (SD=33.061), but only increased to 31.633 (SD=36.429) and 34.433 tokens (SD=38.01) each following round (n=30). One possible explanation for this relatively diminished increase is that the students of this session were placed within a familiar experimental setting and had already been exposed to other similar economic games that semester. With a basic background in experimental economics, these students should have known the "right way" to play the game (i.e. the most pro-social behavior), which might have facilitated higher average

contributions of tokens. If this session was removed and only a sample of 30 participants remained, one extra session of control participants might help increase statistical power. However, t tests between the 30 and 45 participant control groups were found to be statistically not different across all three rounds (t=0.43, p=0.67; t=1.161, p=0.254; t=1.239, p=0.226). Due to the small sample sizes of T1 and T2, additional sessions would be useful for both treatments and the control.

One sample of 15 students behaving according to the expected standards described in the previous literature, in this case contributing 60 tokens on average, would shift the 30 student control average contribution to above 40 tokens in round one. In this circumstance, one of our control hypotheses would be met: an average of 40-60 tokens were contributed in round one. Although, based on the contribution levels observed within both treatments and the control of this study, a 60 token average contribution remains unlikely. The inclusion of additional control data could yield more accurate results to describe *public goods game* control behavior within an undergraduate population at Emory. Although, until more data is added, the control results remain a consequence of random variation.

Result 2: Type of meditation in the T1 and T2 interventions appeared to effect cooperative behavior. Yet, t tests between and within each treatment and the control reveal that these changes were likely the result of random variation.

The T1 round one average contribution started at 32.491 tokens (SD=34.211) and increased by less than one token to 33.341 during the second round (-0.127, p=0.899), whereas the T2 average contribution began at 40.9 tokens (SD=35.091) and decreased to 37.142 tokens (SD=37.507) during the second round. The t tests performed report that these initial changes in

contributions within the T1 and T2 treatments are not different (t=0.507, p=0.613). Furthermore, a t test shows that round one contributive behavior (t=-1.301, p=0.196) and round two contributive behavior (t=-0.516, p=0.196) are not statistically different between treatments (see Tables 11, 13, and 14). Despite a fall in average contribution of almost four tokens from round one (40.9, SD=35.091) to round two (37.143, SD=37.507), the T2 average contribution then increased by more than two tokens (39.31, SD=38.16) in round three (t=-0.262, p=0.794). Yet, entering round three, the T1 average token contribution plummeted from 33.314 to 23.294 tokens (SD=30.373), exhibiting the highest recorded deviation from cooperative behavior in this study (t=1.592, p=0.115). This deviation defines the proof of concept's correlational difference between T1 and T2: both are non-reactive through round two until T1 drops and T2 remains steady in round three. Yet, at the current sample size, this proof of concept can only be explained by random variation.

After correcting the p-values using a Bonferroni correction, no across treatment or within treatment t test, including both meditation treatments and the control, remained significant at the threshold of 0.0003. At the .05 significance level, the control and T1 treatment (t=2.264, p=0.026) and the T1 and T2 treatments (t=-2.205, p=0.030) were found to be statistically different in round three. This is likely due to the over ten token average decrease in round three of T1. Due to the inclusion of 131 significance tests within this analysis, these results may be spurious type I errors.

A free rider is someone who benefits from others' contributions without individually contributing their own fair share. Free riders have previously been defined in *the public goods game* as participants who contribute under 30% of their endowment to the public commons (Gunnthorsdottir, Houser, & McCabe, 2007). Commonly, *public goods game* free riders have

been categorized based on their round one behavior, however in this study we observe free rider behavior within all three rounds. A graphical depiction of free rider behavior across and within both treatments and the control is displayed in Chart 2.

Observing free rider behavior, T1 began with 6.67% more free riders than T2. Yet, both treatments decreased at a similar rate of change, at -3.25% and -3.18% for T1 and T2 respectively. Despite the dissimilarities between the T1 and T2 average round one and two contributions, the free rider behavior aligns the predicted theme within our hypotheses: T2 will have fewer free riders in each round than T1. Unlike average round contributions, the change in free rider behavior moved in the same direction within rounds one and two. However, round three behavior diverged between T1 and T2. While fluctuations in average contributions occurred consistently within all rounds of T2, the decrease in the presence of free riders continued and increased into the third round of T2 (rate of change -4.55%). Meanwhile, the T1 free rider rate of change from round two to three was 9.76%, a reverse in direction from the previous round. Despite the slight decrease in free rider presence observed in round two, many participants in T1 decided to contribute less to the public commons once entering the third round. Similarly, a quadrant analysis reveals that T2's third round included no marginal increase of zero-token contributions, or Q1 contributions for that matter (see Chart 5).[17] Meanwhile, T1's Q1 experienced nearly three times the percentage increase as its Q3 (see Chart 4). Setting aside the control results, these free rider behaviors suggest that the cooperative effects of silent meditation wore off in round two, and the cooperative effects of hypnotic meditation persisted through all three rounds. Nevertheless, due to the insignificant t test results, we currently are unable to state that these changes are a result of the meditation interventions.

[17] Within a quadrant behavior analysis: Q1 represents 0 to 25 tokens, Q2 represents greater than 25 to 50 tokens, Q3 represents greater than 50 to 75 tokens, and Q4 represents greater than 75 to 100 tokens.

The regression results also suggest that an influence of conditional cooperation was present within T1 and T2, in addition to the control, which would help preserve statistical non-differences within and between these treatments. The statistically significant positive influence of past round behavior, observed through variables AvgR1 ($\hat{\beta}$=0.86, SE= 0.13, p=0.0000) and AvgR2 ($\hat{\beta}$=0.87, SE=0.112, p=0.0000) in the across treatment analysis, suggests that participants across all treatments may have held favorable expectations of their partners and were therefore more prone to conditionally cooperate (see Table 6). However, when viewing each distinct meditation treatments' regression results, it is revealed that T1's AvgR1 ($\hat{\beta}$=0.63, SE= 0.282, p=0.031), AvgR2 ($\hat{\beta}$=0.43, SE= 0.202, p=0.042), and T2's AvgR1 ($\hat{\beta}$=0.72, SE= 0.2, p=0.001) were not significant at the Bonferroni threshold. T2's AvgR2 ($\hat{\beta}$=0.86, SE=.112, p=0.000) was significant at the Bonferroni threshold.

While AvgR1 and AvgR2 are the only two statistically significant variables found across both treatment and control regression analyses, according to the regression models, the control is the most statistically influenced by average past round contributions. Therefore, the control may be the most susceptible to conditional cooperation. This might explain why average contributions defied expectations and increased across all rounds within the control (see Table 7). Even so, the influence of conditional cooperation may still help explain the statistically non-different behavior recorded across both treatments and the control. With more information on the attitudes and expectations of the participants, the impact of conditional cooperation in this study could be better understood.

Just as the T2 (Treat2) p-values remained statistically non-significant in both round one (p=0.734) and two (p=0.926), the T1 (Treat1) p-values also remained non-significant in rounds one and two. This suggests that if some degree of cooperative behavior was present, it was

sustained or at least did not severely change within the first two rounds of T1. Yet, in the third round, contributions decreased by 13.35 tokens (p=0.030) on average in the presence of silent meditation (see Table 6). The magnitude of this coefficient is greater than all other recorded coefficients amongst explanatory variables in the across treatment regression analysis. Excluding AvgR1 and AvgR2, which were both significant at the Bonferroni threshold, Treat1 within round three was the only significant variable at the .05 level within the across treatment regression results. Until more observations are added to the sample, this outcome remains a result of random variation.

One possible confounding factor that challenges the proposed proof of concept is the potentially skewed behavior of the 15-person experimental class session. When replacing the control results with literature expectations, correlations differentiating silent and hypnotic meditation emerge. Namely, it seems that stable cooperative behavior persists across all three rounds within T2 and stable cooperative behavior persists within the first two rounds of T1. This observation suggests that the pro-cooperative effects of the final ten-minutes of silent meditation lasted longer when it was preceded by ten minutes of hypnotic meditation, rather than an additional ten minutes of silent meditation. Yet, all t tests failed to prove any significant differences across and within both treatments and the control. Hence, we cannot conclude that the meditation interventions caused any of these changes. By adding more samples and participants to this study, significant p-values may arise and the cooperative differences between T1 and T2 may become more highly substantiated.

Result 3: There was a significant change in self-reported relaxation levels in the hypnotic meditation treatment group (T2). The qualitative reports of participants testify that both

meditation treatments encouraged relaxation. Greater relaxation did not lead to a detectable change in cooperative behavior.

It is demonstrated through Kruskal-Wallis tests that a significant change in self-reported relaxation followed the hypnotic meditation intervention (see Table 21). While a considerable change in relaxation of T1 was present, we are not assured this is not a type I error (Chi-squared=5.351, p=0.021). However, the change in relaxation of T2 did surpass the Bonferroni threshold of 0.0003 (Chi-squared=26.522, p=.0001). The difference of two chi-squared random variables is a chi-squared random variable; since 21.171 exceeds 3.85, in this case with one degree of freedom, we can also conclude that the change in T2 relaxed behavior is greater than the change in T1. As hypnotic meditation is a progressive relaxation hypnotic induction, its purpose is to induce greater relaxation for meditation practice.

Students were offered two different opportunities to qualitatively and quantitatively describe their meditation experience: directly after playing *the public goods game* and later that same day through an optional online survey. Based on the collected responses, it is demonstrated that many participants found the T1 and T2 meditation interventions to induce relaxation and focus. However, due to the open-ended nature of these responses, it is challenging to distinguish between the two meditation practices without utilizing the supplemental quantitative responses. While responses from the optional survey were self-reported later in the day, there were no conflicts in self-reporting the assigned ID numbers. The lack of self-reported typos suggest that further typos or mistakes were either minimal or not present within the survey responses. Table 4 details the questions used in the qualitative analysis.

Kruskal-Wallis tests only detect significant changes in ordinal data and do not detail the direction of these changes. Still, the qualitative and quantitative responses heavily support the notion that hypnotic meditation encouraged greater relaxation.

Qualitative Explanation: Student Responses to Meditation Interventions

It appears that enjoyment of the meditation did not always affect self-perceived behavior. Furthermore, there is an observed delineation between the actual levels of cooperation amongst players and how students perceive their own cooperative behavior. Of 57 T1 students, 12 believed the meditation had an effect on their behavior while 11 did not. Of the 12 T1 students who rated their enjoyment of meditation eight or above, five did not believe that meditation impacted their behavior. Student 42 rated the meditation a six out of ten and said, “It made me feel more relaxed and willing to trust others.” Student 58 rated the meditation a score of two and said, “I think it made me more restless and hasty in choosing investments.” Student 39 rated the meditation a score of nine and stated that he “asked more calmly and wanted to help people in my group.” Despite Student 39 taking credit for helping his group, the student contributed 20 tokens less than the group average during the first two rounds; in the third round, the two other players defected and contributed zero tokens.

In T2, 29 of 58 students responded to the optional survey. Seven out of ten students who ranked their experience as eight or above said that they do not think the meditation impacted their behavior. In T2, Student 111 did not enjoy the meditation, ranking it a four, yet said that “it put me in a different frame of mind. I was more relaxed and believe I was more generous with my tokens than I would have been.” Even so, not all participants experienced a positive shift of awareness take place. Student 123 stated “the meditation made me more drowsy and less focused

for the decision making game." Drowsiness and similar states of consciousness may be a reflection of the depth of hypnosis underwent in T2, denoting its ability to foster a deep relaxation similar to the feeling experienced after awakening from deep sleep (Rainville & Price, 2003). Again, it appears that student enjoyment of meditation did not uniformly lead to either higher or lower self-recognized pro-social behavior. As both meditation and hypnosis were expected to place participants in a distinct "frame of mind", Student 111 and other participants confirmed that changes in thought and mental process could and do occur.

Responses to the silent and hypnotic portion of the meditation were not uniformly positive or negative, yet there was a limited qualitative presence of adverse responses resulting from the T1 and T2 meditation interventions. Based on this observation, the lack of additional context on the effects of hypnotic and silent meditation may have influenced participants' reported attitudes and experiences of meditation. In T1, four out of 56 students (7.14%) reported negative qualitative responses as a result of silent meditation due to being drowsy, on edge, dizzy, and feeling restless; in T2, seven out of 57 students (12.28%) reported negative qualitative responses as a result of hypnotic and silent meditation including being bored, agitated, or feeling weird, heavy, uncomfortable, and controlled.

Although students reported changes in relaxation and focus as a result of the meditation interventions, half of the students' responses were not reported because the survey was optional. The survey responses report that the T1 and T2 meditation treatments impacted students' levels of relaxation, though the Kruskal-Wallis tests find that only the change in T2 is significant at the Bonferroni threshold. These responses do not help to clarify why added relaxation did not lead to higher levels of statistically noticeable cooperative behavior. Naturally, these students' qualitative reports provide insight into the experience of a novice meditator.

Table 4:
Qualitative Survey Questions

Open-ended question used during experiment	
1	Please describe how you felt during the meditation portion of today's session? *Please take a minute to think about the question. If able, please refer to how your experience was throughout the entire duration of the meditation session. Please note your level of focus and attention on the meditation throughout the entire meditation session.*
Selected questions used during optional post-questionnaire	
2	How did you like the experience of meditating? *(1=Not at all, 10=I loved it)*
3	Do you believe that the meditation portion of today's session effected your decision making in the proceeding game?
4	*If yes to 3* You said that the meditation portion of today's session could have effected your decision making in the game. Why do you believe this?

VII. Limitations

Perhaps the prominent limitation of this study was the small sample sizes within both treatments and the control. Nevertheless, the correlated behavior between T1 and T2 followed a common theme that aligned with our hypotheses and established a proof of concept: both meditations helped maintain cooperation, and hypnotic meditation encouraged a greater sustenance of cooperation. Still, it remains uncertain if having a larger sample size would have established more statistically significant findings. Until a larger sample is included in this study, the results will remain a consequence of random variation of student token contributions.

Participants may have also behaved differently if they were guaranteed to exit the experiment with one, two, or three full game outcomes in cash. Since participants were randomly selected to earn either three dollars or one full outcome from a randomly selected *public goods game*, students may not have behaved as if they were truly endowed with ten dollars in cash. Additionally, due to technical issues and attendance issues, the sample sizes of round two and

three contributions were lower than round one contributions within both treatment groups, especially within one T3 session (see Table 2).

Leaving the study-wide error rate at .05 may attract multiple type I errors, and for this reason we selected to use a Bonferroni correction. We lost statistical power by choosing to correct the p-values at a more stringent level. A model with greater statistical power is preferable, yet it is important to diminish the likelihood of spurious findings. The reduction of statistical power as set by the Bonferroni correction will remain a limitation in this study; however, with the Bonferroni correction the study will more likely overcome a multiple comparison problem.

Students of certain sessions occasionally reported that the room temperature was hot in the experiment lab. We also noticed the warm temperature during many sessions, though not in all of them. Any unpleasant warmth may have distracted students from meditating, and thus interfered with the effect sizes of the meditation interventions. In addition, students within both T1 and T2 reported falling asleep during the meditation interventions. In T2, more students reported falling asleep (20/56) than in T1 (11/57). Yet, as it can be difficult for an individual to distinguish if they are in a light sleep or in a hypnotic state, the T2 statistic may be inaccurate (Schichl, Ziberi, Olaf, & Pietrowsky, 2011). As we did not collect information on the timing and duration of the participants' sleep, we are unable to speculate if the recorded instances of sleep affected the meditation interventions that took place.

Levels of focus and relaxation may have dissipated after the meditation intervention. Therefore, the reported values may inaccurately represent the presence of focus and relaxation during the economic game. The self-reported levels of focus and relaxation were first recorded before the meditation instructions were delivered. The second measurements were collected after the students meditated, stretched, were read the rules of *the public goods game*, individually

learned the rules of the *public goods game* on their computer, and played three consecutive rounds of *the public goods game*. Student 79's testimony, "It was nice for me to finally be able to relax," suggests that the relaxing effects that arise from meditation, in this case including hypnotic meditation, could be impactful and extend beyond the specific meditation session.

Due to the nature of self-reporting, students may have also stated changes in focus and relaxation that misrepresent the changes that actually took place. For example, participants may have assumed that they should have been more relaxed after the meditation, and therefore reported high relaxation. However, the difference in the significance of relaxation between the silent meditation and the silent meditation that included a progressive relaxation hypnotic induction appears to align with our hypothesis that the latter is more effective. Focus resulting from meditation may have persisted into the economic game, but then weakened once participants stopped trying to cultivate attention within their meditation session. Still, it appears that levels of relaxation within T2 increased and persisted throughout the hypnotic meditation, the silent meditation, and the economic game.

VIII. Discussion

This study's results suggest that hypnotic meditation may improve the cooperative tendencies that arise from a practice of silent meditation, yet at its current sample size this potentiality cannot be statistically supported. Still, the selected sample of Emory students includes many fascinating features.

Over 30% of the Emory participants identified with 17 foreign countries within the experiment survey. Based on this population attribute, and counter to the conclusion of Brandts, Saijo, and Schram (2004), influences present within and outside of the United States might help

explain why T2 started with higher levels of average contributions, while T1 and the control started with lower levels. The control and T1 both included a sample with more than 35% international students, while T2 included only 22.81% international students. Examining the first round behavior across the treatments and control, both the control and T1 showed lower contribution rates than T2. Looking across treatments, international students (n=49) in all three rounds offered under 30 tokens on average, starting with 24.959 tokens (SD=28.925) in round one and increasing to 28 (SD=32.046) and 29.4 tokens (SD=34.169) each following round. American students (n=110) started at an average token contribution of 39.491 (SD=34.284) and decreased to 35.398 tokens (SD=37.144) by the third round. With a larger sample size, we wonder if this pattern would persist.

The control and T1 contained incremental increases in standard deviations across all three rounds, while T2 contained subsequent decreases across all three rounds. All standard deviations within and across treatments and the control were found to be statistically not different, according to Levene tests (see Tables 15-20). However, the correlational behavior suggests that the meditation treatments did not polarize participants toward cooperative or non-cooperative behavior.

In the context of expected average levels of contribution, it can be ascertained that Emory students may be more reserved in cooperating amongst their peers. Not only did the control's average contribution begin at a relatively low level, but also T1 began at an average of 32.491 tokens (SD=34.211) and T2 barely exceeded 40 tokens (40.9, SD=35.091) on average in its first round. Nevertheless, it remains true that these samples are currently not statistically different. While 47.8% of Emory undergraduate students receive an average of $36,304 in need-based

financial aid each year, a four-year Emory education exceeds $230,000.[18] Thus, Emory University may attract a more affluent demographic of students. If Emory students generally perceive themselves to be in an affluent environment, they may project negative attributes related to wealth on their peers, resulting in a diminished level of trust and cooperation. For this reason, lower contributions across both treatments and the control may be a result of the selected sample of Emory undergraduate students.

Changing the type of meditation training, perhaps to a compassion meditation practice, may help yield a greater presence of significant results. Compassion meditation is a tool to improve altruism, focused attention meditation is a tool to cultivate focus, and hypnotic meditation is a tool to deliver greater relaxation in meditation. Within this study, hypnotic meditation did accomplish its purpose, but it has not statistically shown itself to do more. In fact, the change in reported relaxation after hypnotic meditation was the only statistically significant finding that met the Bonferroni threshold among all 21 t tests and Kruskal-Wallis tests. Furthermore, the silent meditation treatment used in this study is primarily a focused attention meditation practice and is not commonly used to deliver changes in economic cooperative behavior.

Increasing the frequency or duration of meditation practice could deliver more significant results through increasing the effect sizes of T1 and T2. The one-time meditation intervention may not have been powerful enough alone to cause a significant change in behavior. Past research clearly states that the greatest improvements that come from meditation arise from a sustained and continued practice. Giovanni, Stefano, & Saverio's (2012) study only detected differences in economic trusting behavior after four consecutive days of meditation training. In

[18] This information was collected from the U.S. News & World Report Education website ("Emory University Cost and Financial Aid," 2015).

addition, studies that have detected significant changes in economic behavior after a one-time meditation intervention have largely focused on compassion meditation's effect on altruistic behavior.[19] Therefore, perhaps the use of a compassion meditation, or other related form of meditation, after hypnotic meditation would yield a larger effect on behavior. We suggest that future studies assess the effects of compassion meditation on economic cooperation with and without hypnotic meditation to ascertain if any significant differences are present.

IX. Conclusion

To quote a medical self-help manual written by Dr. Rick Levy, Chair Professor of Mind-body Medicine and Human Excellence at Amity University and developer of hypnotic meditation: "While the mechanism of action is not understood, 'research shows that successful meditators are able to access a state of mind that is highly focused, calm and enhanced, one where stressful day-to-day thought is set aside and a higher, more accurate level of thought, awareness and insight arise.'"[20] Already, meditation has shown impressive biological and economic behavioral changes promoting prosocial behavior. While many meditation practices have been investigated, silent meditation practices paired with clinical hypnosis have yet to undergo a similar examination, especially in an economic context. Cooperation is essential within many types of economic activities, because as demonstrated in *the public goods game*, situations exist where the optimal public outcome depends on the involved parties cooperating.

Although results were not conclusive in explaining the differences between silent and hypnotic meditations' effects on cooperation, a correlation did exist and a proof of concept

[19] See Hutcherson et al., 2008; Leiberg, Klimecki, & Singer, 2011; Reb, Junjie, & Narayanan, 2010.
[20] This quotation is from a patient self-help manual entitled *Your Heart is in Your Hands: How to Heal Your Heart Using Mind-Body Medicine*. The manual includes a recording of hypnotic meditation and is currently used in health care settings in the United States and India (Levy, 2014b).

appeared. This proof of concept was namely that the silent meditation group sustained cooperative behavior into the second round and the hypnotic meditation group continued cooperative behavior across all three rounds. We suggest that this experiment be repeated with a larger sample size, so that the proof of concept may be held to a greater level of scrutiny and a reexamination of t test significance levels can take place.

One of the only statistically significant findings within this experiment, backed by qualitative evidence, was that hypnotic meditation did increase levels of relaxation after the twenty-minute meditation session. This finding was significantly below the Bonferroni threshold of 0.0003. This affirms that hypnotic meditation achieved its purpose, which was to relax an individual so they may effectively meditate and earn all the benefits that stem from a meditation practice.

Many benefits beyond cooperation that impact the modern economy could arise from the practice of meditation. However, all are not testable through the means of economic games. Simply put, Albert Einstein said that we cannot solve problems by using the same kind of thinking we used when we created them (Confino, 2013). New techniques that help improve the way humans think about and approach problem-solving would be particularly valuable. The improvement of emotional regulation in addition to memory consolidation and reconsolidation, to cite a few examples, would be of great value to all who participate in local and global markets (Fox et al., 2014). Yet, as cited in the introduction of this paper, there is a plentiful and growing collection of scientific research on the benefits of practicing meditation. Other demonstrated benefits of mediation practices include: reductions in anxiety, cognitive rigidity, and distorted patterns of self-view and increases in present-centered focus, emotional regulation, and immune functioning.

Economics can be defined in many ways, but in its essence, it is the study of how people choose to use resources. The instrument of economics has proven itself as a vital tool to address global and local problems within their own context, such as providing health care to developing or developed nations. The field of health economics, for example, stands to gain much from including the practice of meditation within its analyses.

According to the World Health Organization, the United States spent $9,146 per capita on healthcare expenditures in 2013 (Health, 2013). Economists within the United States, for instance, have many options of how to lessen the impact of anxiety and stress within the nation in the context of current health care expenditures. Economic players may look to physical capital solutions, such as anxiety pharmaceutical operations, or focus on investing within human capital solutions, such as meditation practices proven to reduce stress. These choices must be made by policy makers and average citizens alike.

Once learning a scientifically valid technique, meditation functions as a good that reduces the adversities of stress and anxiety, only costs twenty to thirty minutes of time each day, and can be consumed at the convenience of the meditator's schedule. Nonetheless, many people want relief from stress and anxiety and need support with starting an effective meditation practice; 19% of Americans reported in 2013 that they never engage in stress management activities according to the American Psychological Association's Stress in America 2013 study (Anderson et al., 2013). To help these individuals engage in a stress or anxiety reducing mediation practice, hypnotic meditation may be useful in delivering quick relaxation without strain on the disgruntled meditator. The field of health economics is an example of an economic field that has much to gain from exploring the practice of meditation.

Of all the prosocial benefits that may arise from a meditation practice, cooperation has a unique importance in the context of the 21st century. Due to growing levels of global interconnected, the economic well-being of many countries are now linked to the decisions of other independent economic players. For example, the non-cooperative behavior that facilitated the 2008 American financial crisis resulted in economic misfortune across many parts of the world. Just as cooperation has an increasing capability to help prevent global hardships, it may also be an instrument toward promoting global security, safety, and cohesion.

To encourage large numbers of citizens to meditate daily requires creativity and encouragement. Since it may be challenging to cultivate the habit of sitting in silence for 20 to 30 minutes each day, hypnotic meditation presents itself as a tool to help anyone begin a recurring practice of meditation. In the modern world, increased access to effective approaches of meditation could lead to increased pro-market outcomes through providing market players greater access to their mind and bodies' potential. And, of course, all humans have much to gain from viewing their surroundings and experiences closer to how they really are. Based on the results of this study, hypnotic meditation appears to be a tool that could help any individual most effectively spend their already allocated time for meditation. The relaxing effects of hypnotic meditation may enhance all practices of meditation, and many practices of mediation have already been scientifically demonstrated to produce optimal changes in brain and behavior. Hence, meditation presents itself as a tool to greater develop human capital anywhere in the world for little to no cost.

The personal practice of meditation can only help improve economic situations if members of the involved parties have set aside the time to use a valid practice of meditation. Since cooperative behavior is becoming increasingly important within the 21st century, it is also

valuable to investigate strategies to improve cooperative behavior within society. Nevertheless, there are many influences that impact the modern economy, and meditation can only serve as an additional tool within the context of these forces. Accordingly, the economic impacts of meditation will only reach as far as the practice of meditation extends. Therefore, innovative approaches to meditation are necessary if meditation is to be more frequently used in the modern world. The use of any scientifically valid meditation practice, following the progressive relaxation hypnotic induction of hypnotic meditation, presents itself as a promising tool to help deliver greater individual capacity and collective economic cohesion.

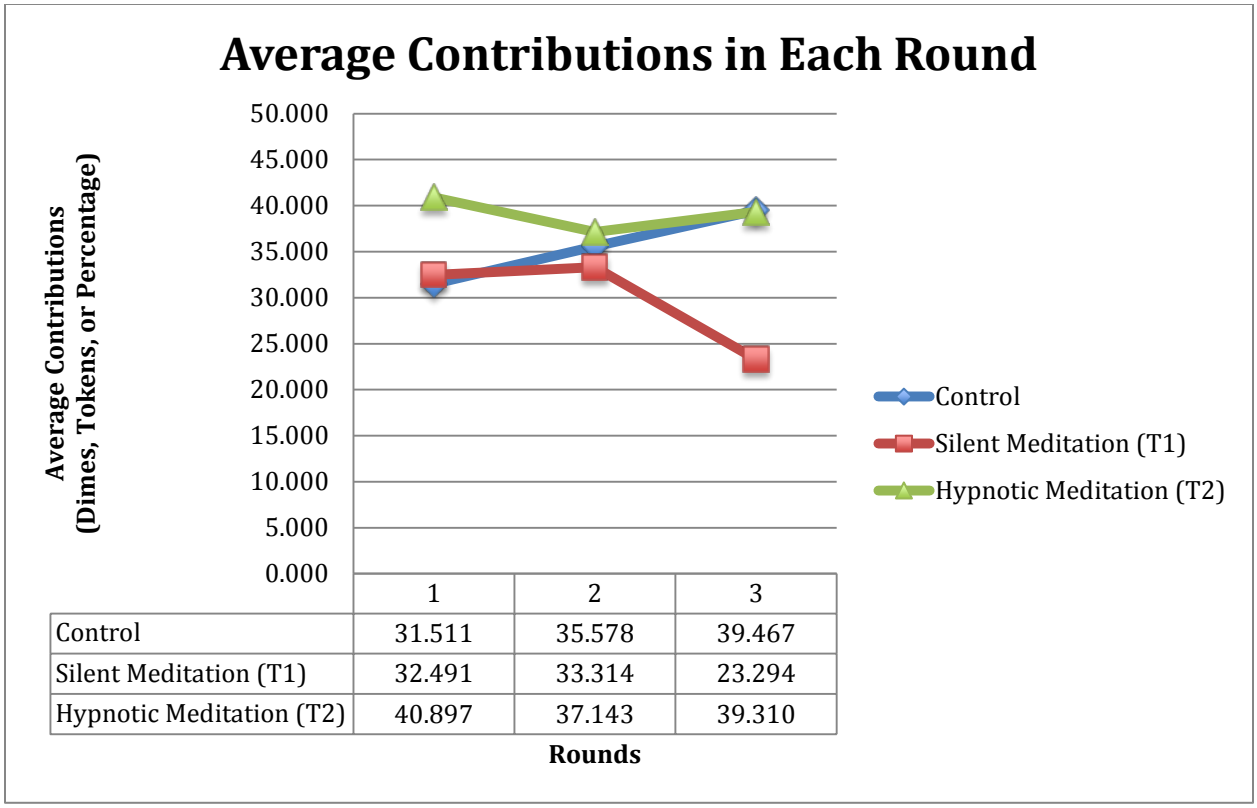
X. Charts and Tables

Table 5:
Descriptive Statistics of Population

	Sample size	**Statistics**

	Control	T1	T2	All subjects	Average	Standard Deviation
Gender	45	55	57	157	0.490446	0.501508
Male	24	25	28	77	--	--
Female	21	30	29	80	--	--
Majmin	45	57	58	160	0.55625	0.498386
Bus, Econ, Quant	28	33	28	89	--	--
Other	17	24	30	71	--	--
Race	45	57	57	159	--	--
White	19	22	24	65	--	--
Asian	16	21	21	58	--	--
Other	10	14	12	36	--	--
Country	45	57	57	159	0.691824	0.463199
American	29	37	44	110	--	--
Not American	16	20	13	49	--	--
Meditation Experience	45	57	57	159	0.415094	0.494295
Yes	19	23	24	66	--	--
No	26	34	33	93	--	--

Chart 1:
Average Contributions in Each Round



	1	2	3
Control	31.511	35.578	39.467
Silent Meditation (T1)	32.491	33.314	23.294
Hypnotic Meditation (T2)	40.897	37.143	39.310

Chart 2:
Free Riders Contributing Under 30% in Each Round

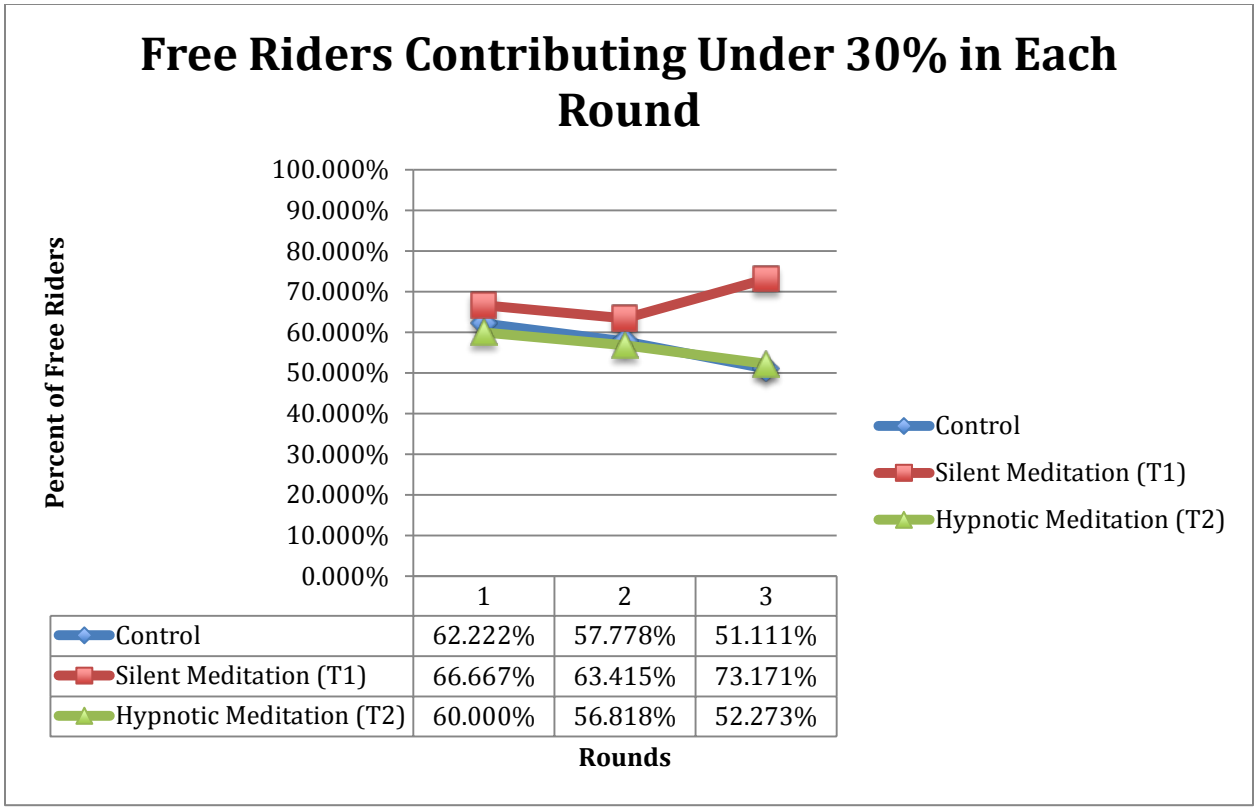
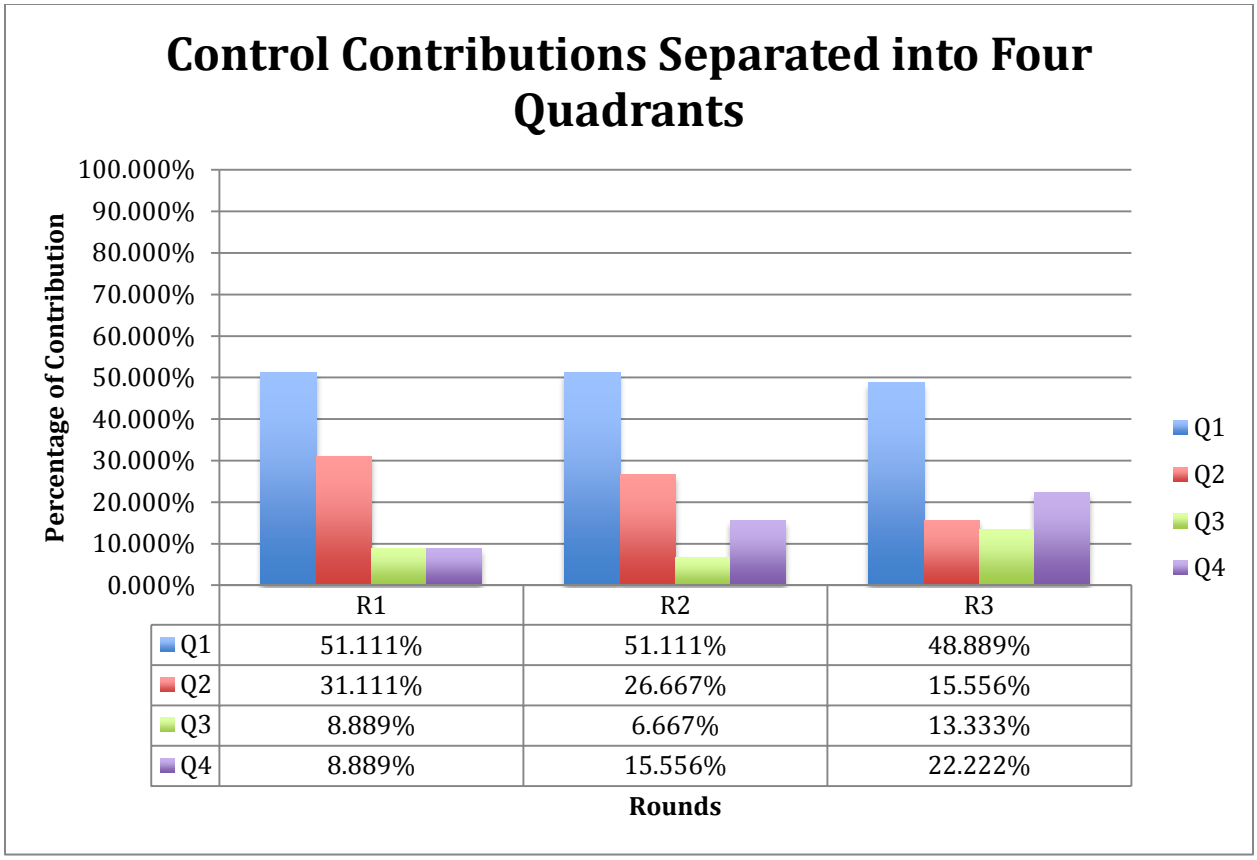
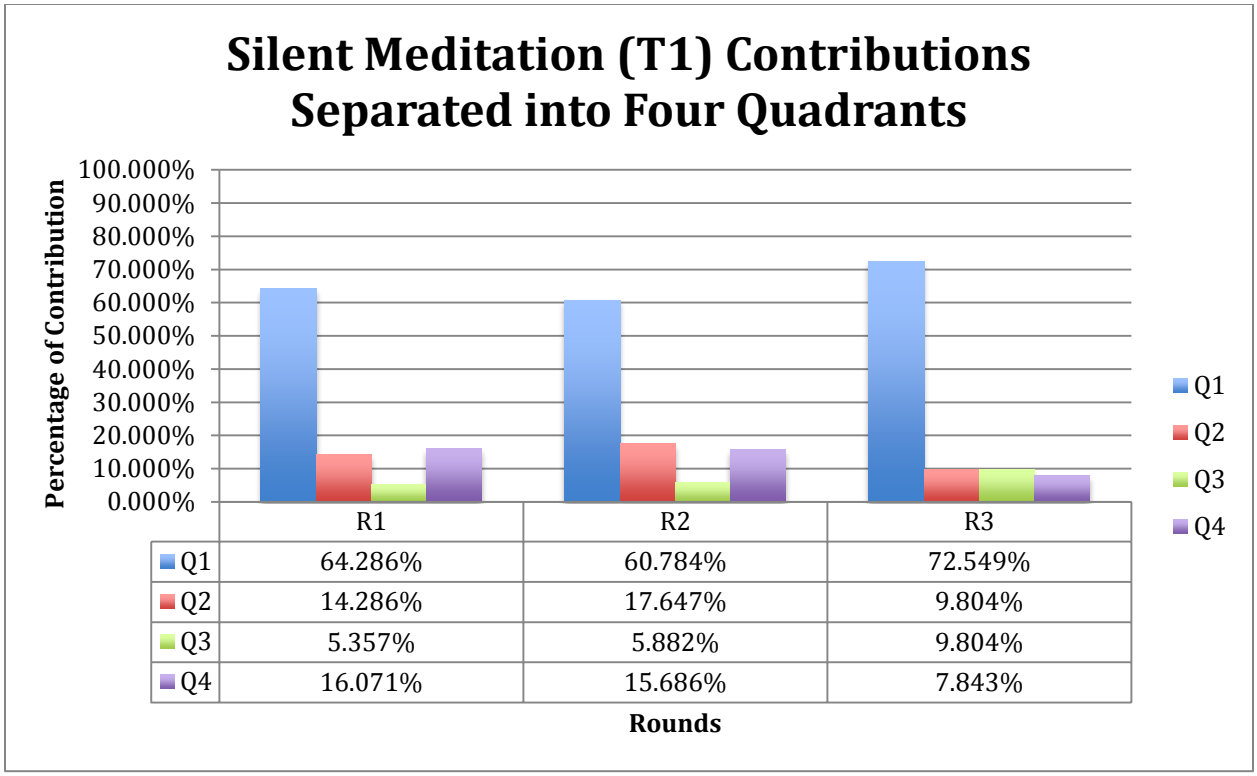


Chart 3:
Control Contributions Separated into Four Quadrants



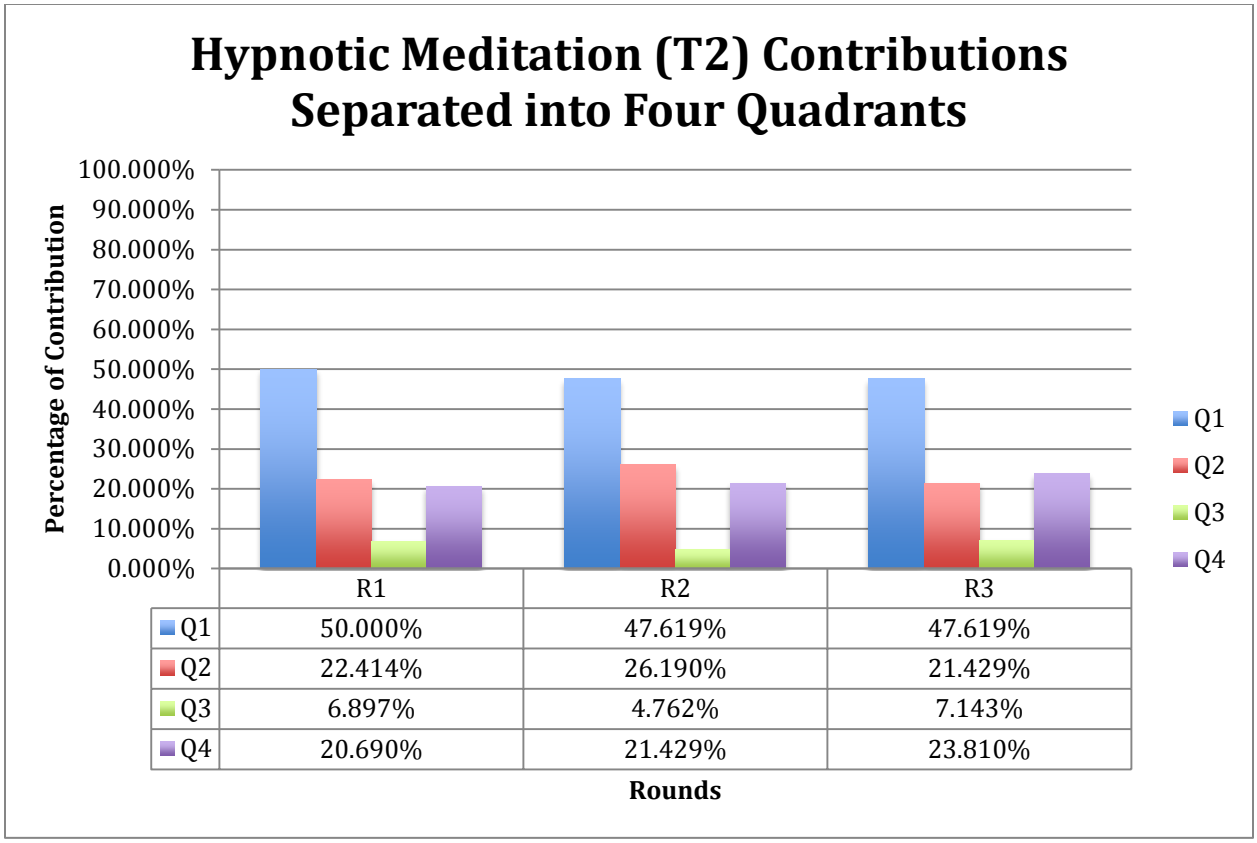
	R1	R2	R3
Q1	51.111%	51.111%	48.889%
Q2	31.111%	26.667%	15.556%
Q3	8.889%	6.667%	13.333%
Q4	8.889%	15.556%	22.222%

Chart 4:
Silent Meditation (T1) Contributions Separated into Four Quadrants



	R1	R2	R3
Q1	64.286%	60.784%	72.549%
Q2	14.286%	17.647%	9.804%
Q3	5.357%	5.882%	9.804%
Q4	16.071%	15.686%	7.843%

Chart 5:
Hypnotic Meditation (T2) Contributions Separated into Four Quadrants



	R1	R2	R3
Q1	50.000%	47.619%	47.619%
Q2	22.414%	26.190%	21.429%
Q3	6.897%	4.762%	7.143%
Q4	20.690%	21.429%	23.810%

Table 6:
Linear Regression Results of Contributions, Including Treatment as Independent Variable

VARIABLES	(1) r1	(2) r2	(3) r3
Treat1	2.26	-0.57	-13.35**
	(6.615)	(6.138)	(6.078)
Treat2	9.55	0.37	1.29
	(6.765)	(6.815)	(6.720)
Gender	9.04*	8.37	0.19
	(5.335)	(5.254)	(5.204)
Year	2.57	1.97	2.59
	(2.399)	(2.543)	(2.517)
MajMin	-2.79	-6.65	2.47
	(5.8)	(5.655)	(5.628)
Country	5.07	-3.65	-3.18
	(7.22)	(7.032)	(6.948)
Exp	1.56	1.45	8.05
	(5.46)	(5.328)	(5.274)
AvgR1	--	0.86***	--
		(.13)	
AvgR2	--	--	0.87***
			(.112)
Race1	-4.83	1.84	-5.26
	(7.73)	(7.574)	(7.458)
Race2	6.44	7.11	-3.76
	(7.381)	(7.211)	(7.127)
Constant	17.86*	1.75	2.65
	(10.321)	(10.206)	(10.07)
Obs	157	138	138
R-squared	0.101	0.320	0.386

Std error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

$$Round_i\ Contribution = \beta_0 + \beta_1 Treat1 + \beta_2 Treat2 + \beta_3 Gender + \beta_4 Year + \beta_5\, MajMin + \beta_6\, Country + \beta_7\, Experience + \beta_8\, AvgR1 + \beta_9\, AvgrR + \beta_{10} Race1 + \beta_{11} Race2 + u$$

Table 7:
Linear Regression Results of Contributions, Including Treatments and the Control

	CONTROL			**T1**			**T2**		
	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	r1	r2	r3	r1	r2	r3	r1	r2	r3
Gender	1.65	4.79	1.79	5.00	14.88	-4.14	19.03*	17.36*	9.68
	(8.552)	(7.4)	(8.432)	(9.431)	(8.944)	(8.62)	(9.67)	(9.75)	(9.130)
Year	8.80**	7.09**	3.23	1.93	-0.61	.13	-1.76	-8.79	0.90
	(3.752)	(3.25)	(3.714)	(4.772)	(4.806)	(4.51)	(4.19)	(5.33)	(4.922)
MajMin	-4.80	-1.89	-2.72	1.16	-4.05	1.99	-14.67	-34.17***	-1.75
	(10.1)	(8.69)	(9.81)	(10.16)	(9.72)	(9.5)	(10.842)	(10.57)	(9.851)
Country	-1.48	-16.02	-14.00	19.43	20.60*	20.011*	-18.72	-34.13**	-36.24***
	(13.106)	(11.43)	(12.96)	(12.28)	(11.473)	(10.814)	(13.624)	(13.23)	(12.56)
Exp	-2.11	-10.71	-10.57	-3.60	4.65	8.1	5.52	14.23	37.41***
	(8.922)	(7.680)	(8.67)	(9.681)	(9.45)	(8.92)	(10.524)	(10.020)	(9.261)
Race1	-27.91*	-21.54*	-14.46	-0.65	13.45	-5.87	-4.41	2.98	-13.18
	(14.406)	(12.404)	(14)	(13.38)	(12.222)	(11.69)	(14.351)	(13.762)	(12.7)
Race2	-8.07	-11.73	-4.12	11.23	-2.26	-9.88	7.91	31.09**	-10.78
	(12)	(10.33)	(11.75)	(12.99)	(12.412)	(11.762)	(13.63)	(12.89)	(11.887)
AvgR1	--	1.11***	--	--	0.63**	--	--	0.72***	--
		(0.177)			(.282)			(.2)	
AvgR2	--	--	1.09***	--	--	0.43**	--	--	0.97***
			(.17)			(0.202)			(0.210)
Constant	28.23	9.67	14.48	10.44	-8.54	-.6	52.58***	46.59**	20.57
	(16.75)	(14.79)	(16.472)	(14.594)	(14.682)	()	(18.052)	(18.273)	(18.42)
Obs	45	45	45	55	51	51	57	42	42
R-squared	0.245	0.602	0.592	0.178	0.296	0.485	0.130	0.530	0.707

Std error in parentheses

*** p<0.01, ** p<0.05,* p<0.1

$$Round_i\ Contribution = \beta_0 + \beta_1 Gender + \beta_2 Year + \beta_3\, MajMin + \beta_4\, Country +$$

$$\beta_5\, Experience + \beta_6\, AvgR1 + \beta_7\, AvgR2 + \beta_8 Race1 + \beta_9 Race2 + \mathrm{u}$$

Table 8:
Description of Regression Independent Variables

Independent Variable	Description
Treat*i* (Dummy)	1 if a student is in treatment *i*. *Types of meditation may differently influence human behavior.*
Gender (Dummy)	1 if a student identifies as a male. All students identified as male or female. *Gender effects may differ levels of contribution.*
Year (Continuous)	The subject's year of study. *Duration of college study may impact maturity and cooperative behavior.*
Majmin (Dummy)	1 if a student identifies as an Economics, Quantitative Science, or Business major or minor. *These students may cognitively operate in a distinct fashion in economics games.*
Country (Dummy)	1 if a student identifies as an American. *Cultural influences may impact cooperation.*
Exp (Dummy)	1 if a student reports any previous experience with meditation practice. *Past meditation experience may impact the effect of the meditation intervention.*
AvgR*i* (Continuous)	The average group contribution from the previous round's three participants. AvgR1 and AvgR2 are used in regressing rounds two and three respectively. *Past contributions may affect future contributions. The inclusion of all three players weights the average to account for possible expectations of all three players.*
Race*i* (Dummy)	1 if a student identifies as race *i*. Race1 is White; Race2 is Asian; Race3 is all other participants *Race effects may differ levels of contributions.*

Table 9:
T Test Results for Token Contribution between Control and T1

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1	-0.155	99.162	0.877	-0.980	6.318
R2	0.327	91.443	0.745	2.264	6.927
R3	2.264	83.443	0.026	16.173	7.144

Table 10:
T Test Results for Token Contribution between Control and T2

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1	-1.473	100.292	0.144	-9.385	6.373
R2	-0.202	83.064	0.840	-1.565	7.743
R3	0.019	84.686	0.985	0.157	8.223

Table 11:
T Test Results for Token Contribution between T1 and T2

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1	-1.301	112.993	0.196	-8.405	6.463
R2	-0.516	82.635	0.607	-3.829	7.417
R3	-2.205	77.616	0.030	-16.015	7.264

Table 12:
T Test Results for Token Contribution within Control

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1 & R2	-0.601	85.951	0.550	-4.067	6.771
R2 & R3	-0.505	86.965	0.615	-3.889	7.708

Table 13:
T Test Results for Token Contribution within T1

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1 & R2	-0.127	105.323	0.899	-0.822	6.485
R2 & R3	1.592	99.255	0.115	10.020	6.293

Table 14:
T Test Results for Token Contribution within T2

	T Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
R1 & R2	0.507	84.910	0.613	3.754	7.398
R2 & R3	-0.262	81.976	0.794	-2.167	8.256

Table 15:
Levene Test Results for Token Contribution between Control and T1

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1	0.7453	44, 56	0.3138
R2	1.0851	44, 50	0.7761
R3	1.6071	44, 50	0.105

Table 16:
Levene Test Results for Token Contribution between Control and T2

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1	0.7084	44, 57	0.2361
R2	0.8465	44, 41	0.5868
R3	1.0181	44, 41	0.9566

Table 17:
Levene Test Results for Token Contribution between T1 and T2

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1	0.9505	56, 57	0.8499
R2	0.7801	50, 41	0.4003
R3	0.6335	50, 41	0.1239

Table 18:
Levene Test Results for Token Contribution within Control

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1 & R2	0.7325	44, 44	0.3056
R2 & R3	0.8033	44, 44	0.4704

Table 19:
Levene Test Results for Token Contribution within T1

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1 & R2	1.0665	56, 50	0.8201
R2 & R3	1.1897	50, 50	0.5415

Table 20:
Levene Test Results for Token Contribution within T2

	Levene test of Equal Variances		
	f	df	Sig. (2-tailed)
R1 & R2	0.8753	57, 41	0.6349
R2 & R3	0.9661	41, 41	0.9125

Table 21:
Kruskal-Wallis Results for Changes in Relaxation and Focus

Kruskal-Wallis One-Way Analysis of Variance				
Treatment	Test	Chi-squared	d.f.	p
Control	Focused	2.283	1	0.131
	Relaxed	0.0001	1	0.971
T1	Focused	0.171	1	0.68
	Relaxed	5.351	1	0.021
T2	Focused	0.595	1	0.441
	Relaxed	26.522	1	0.0001

Works Cited

Anderegg, W. R. L., Prall, J. W., Harold, J., & Schneider, S. H. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(27), 12107–9. http://doi.org/10.1073/pnas.1003187107

Anderson, N., Belar, C., Breckler, S., Nordal, K., Ballard, D., Bukfa, L., … Wiggins, K. (2013). *Stress in America*. Washington D.C.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, *44*(12), 1849–58. http://doi.org/10.1016/j.brat.2005.12.007

Askay, S. W., Patterson, D. R., Jensen, M. P., & Sharar, S. R. (2007). A Randomized Controlled Trial of Hypnosis for Burn Wound Care. *Rehabilitation Psychology*, *52*(3), 247–253.

Barnes, P. M., Bloom, B., & Nahin, R. L. (2008). Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Reports*, (12), 1–23. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19361005

Bellardita, L., Cigada, M., & Molinar, E. (2006). *Relaxation Techniques and Hypnosis in the Treatment of CHD Patients*. (E. Molinari, A. Compare, & G. Parti, Eds.)*Clinical Psychology and Heart Disease*. Venice: Springer. http://doi.org/10.1007/978-88-470-0378-1

Benson, H. (1975). *The Relaxation Response* (1st ed.). New York: Morrow.

Brandts, J., Saijo, T., & Schram, A. (2004). How Universal is Behavior? A Four Country Comparison of Spite and Cooperation in Voluntary Contribution Mechanisms. *Public Choice*, *119*(3/4), 381–424. http://doi.org/10.1023/B:PUCH.0000033329.53595.1b

Brefczynski-Lewis, J. A., Lutz, A., Schaefer, H. S., Levinson, D. B., & Davidson, R. J. (2007). Neural correlates of attentional expertise in long-term meditation practitioners. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(27), 11483–8. http://doi.org/10.1073/pnas.0606552104

Chaudhuri, A. (2010). Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. *Experimental Economics*, *14*(1), 47–83. http://doi.org/10.1007/s10683-010-9257-1

Confino, J. (2013). Changing mindsets is key to preventing social and environmental disaster.

Davidson, R. J. P., Kabat-Zinn, J. P., Schumacher, J. M., Rosenkranz, M. B., Muller, Daniel MD, P., Santorelli, S. F. E., … Sheridan, J. F. P. (2003). Alterations in Brain and Immune Function Produced by Mindfulness Meditation. *Psychosomatic Medicine*, *65*(4), 564–570.

Emory University Cost and Financial Aid. (2015).

Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one's emotions: mindfulness training alters the neural expression of sadness. *Emotion (Washington, D.C.), 10*(1), 25–33. http://doi.org/10.1037/a0017151

Feise, R. (2002). Do multiple outcome measures require p-value adjustment? *BMC Medical Research Methodology, 2*(1), 8. http://doi.org/10.1186/1471-2288-2-8

Fox, K. C. R., Nijeboer, S., Dixon, M. L., Floman, J. L., Ellamil, M., Rumak, S. P., … Christoff, K. (2014). Is meditation associated with altered brain structure? A systematic review and meta-analysis of morphometric neuroimaging in meditation practitioners. *Neuroscience and Biobehavioral Reviews, 43*, 48–73. http://doi.org/10.1016/j.neubiorev.2014.03.016

Gächter, S., Herrmann, B., & Thöni, C. (2004). Trust, voluntary cooperation, and socio-economic background: survey and experimental evidence. *Journal of Economic Behavior & Organization, 55*(4), 505–531. http://doi.org/10.1016/j.jebo.2003.11.006

Giovanni, D. B., Stefano, P., & Saverio, B. (2012). Yoga beyond wellness: Meditation, trust and cooperation. Retrieved from http://ideas.repec.org/p/ter/wpaper/0095.html

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion (Washington, D.C.), 10*(1), 83–91. http://doi.org/10.1037/a0018441

Greenberg, J., Reiner, K., & Meiran, N. (2012). "Mind the trap": mindfulness practice reduces cognitive rigidity. *PloS One, 7*(5), e36206. http://doi.org/10.1371/journal.pone.0036206

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. A meta-analysis. *Journal of Psychosomatic Research, 57*(1), 35–43. http://doi.org/10.1016/S0022-3999(03)00573-7

Hafenbrack, A. C., Kinias, Z., & Barsade, S. G. (2014). Debiasing the mind through meditation: mindfulness and the sunk-cost bias. *Psychological Science, 25*(2), 369–76. http://doi.org/10.1177/0956797613503853

Hardin, R. Trust and Trustworthiness. New York: Russell Sage Foundation, 2002. (n.d.). Retrieved December 8, 2014, from https://www.russellsage.org/publications/trust-and-trustworthiness

Health System Financing Country Profile: United States of America. (2013).

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research, 191*(1), 36–43. http://doi.org/10.1016/j.pscychresns.2010.08.006

Hurley, D. (2014). Breathing In vs. Spacing Out. Retrieved March 1, 2015, from http://www.nytimes.com/2014/01/19/magazine/breathing-in-vs-spacing-out.html?_r=2

Hutcherson, C. A., Seppala, E. M., & Gross, J. J. (2008). Loving-kindness meditation increases social connectedness. *Emotion (Washington, D.C.)*, *8*(5), 720–4. http://doi.org/10.1037/a0013237

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. *General Hospital Psychiatry*, *4*(1), 33–47. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7042457

Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical Psychology: Science and Practice*, *10*(2), 144–156. http://doi.org/10.1093/clipsy.bpg016

Kabat-Zinn, J. (2013). *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. New York: Bantam.

Kiken, L. G., & Shook, N. J. (2011). Looking Up: Mindfulness Increases Positive Judgments and Reduces Negativity Bias. *Social Psychological and Personality Science*, *2*(4), 425–431. http://doi.org/10.1177/1948550610396585

Kirk, U., Downar, J., & Montague, P. R. (2011). Interoception drives increased rational decision-making in meditators playing the ultimatum game. *Frontiers in Neuroscience*, *5*, 49. http://doi.org/10.3389/fnins.2011.00049

Lazar, S. W., Bush, G., Gollub, R. L., Fricchione, G. L., Khalsa, G., & Benson, H. (2000). Functional brain mapping of the relaxation response and meditation. *Neuroreport*, *11*(7), 1581–5. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10841380

Lazar, S. W., Kerr, C. E., Wasserman, R. H., Gray, J. R., Greve, D. N., Treadway, M. T., … Fischl, B. (2005). Meditation experience is associated with increased cortical thickness. *Neuroreport*, *16*(17), 1893–7. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1361002&tool=pmcentrez&rendertype=abstract

Ledyard, J. O. (1995). Public Goods: A Survey of Experimental Research. *Ledyard, J., "Public Goods: A Survey of Experimental Research." in Handbook of Experimental Economics, Eds. J. Kagel and A. Roth, 112-94. Princeton, New Jersey: Princeton University Press, 1995.* Retrieved from http://ideas.repec.org/p/wpa/wuwppe/9405003.html

Leiberg, S., Klimecki, O., & Singer, T. (2011). Short-term compassion training increases prosocial behavior in a newly developed prosocial game. *PloS One*, *6*(3), e17798. http://doi.org/10.1371/journal.pone.0017798

Levy, R. (2014a). Distress, Depression, Anxiety and Cardiovascular Disease: A Call to Action. *J Clin Prev Cardiol*, *3*(4), 107–134. Retrieved from http://www.jcpconline.org/full/distress-depression-anxiety-and-cardiovascular-disease--150.php

Levy, R. (2014b). *Your Heart is in Your Hands: How to Heal Your Heart Using Mind-Body Medicine*. *Your Heart is in Your Hands: How to Heal Your Heart Using Mind-Body Medicine*. Gaithersburg: The Levy Centers for Mind- Body Medicine.

Luders, E., Toga, A. W., Lepore, N., & Gaser, C. (2009). The underlying anatomical correlates of long-term meditation: larger hippocampal and frontal volumes of gray matter. *NeuroImage*, *45*(3), 672–8. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3184843&tool=pmcentrez&rendertype=abstract

Lutz, A., Brefczynski-Lewis, J., Johnstone, T., & Davidson, R. J. (2008). Regulation of the neural circuitry of emotion by compassion meditation: effects of meditative expertise. *PloS One*, *3*(3), e1897. http://doi.org/10.1371/journal.pone.0001897

Lutz, A., McFarlin, D. R., Perlman, D. M., Salomons, T. V, & Davidson, R. J. (2013). Altered anterior insula activation during anticipation and experience of painful stimuli in expert meditators. *NeuroImage*, *64*, 538–46. http://doi.org/10.1016/j.neuroimage.2012.09.030

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*, *12*(4), 163–9. http://doi.org/10.1016/j.tics.2008.01.005

Ospina, M. B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., … Klassen, T. P. (2007). Meditation practices for health: state of the research. *Evidence Report/technology Assessment*, (155), 1–263. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17764203

Ostrom, E., Walker, J., & Gardner, R. (1992). Covenants With and Without a Sword: Self-Governance is Possible. *The American Political Science Review*, *86*(2), 404. http://doi.org/10.2307/1964229

Otani, A. (2003). Eastern meditative techniques and hypnosis: a new synthesis. *The American Journal of Clinical Hypnosis*, *46*(2), 97–108. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14609296

Pagnoni, G., & Cekic, M. (2007). Age effects on gray matter volume and attentional performance in Zen meditation. *Neurobiology of Aging*, *28*(10), 1623–7. http://doi.org/10.1016/j.neurobiolaging.2007.06.008

Rainville, P., & Price, D. D. (2003). Hypnosis Phenomenology and the Neurobiology of Consciousness. *International Journal of Clinical and Experimental Hypnosis*, *51*(2). Retrieved from

http://www.tandfonline.com.proxy.library.emory.edu/doi/abs/10.1076/iceh.51.2.105.14613#.VRhU7fnF-So

Reb, J., Junjie, S., & Narayanan, J. (2010). Compassionate Dictators? The Effects of Loving-Kindness Meditation on Offers in a Dictator Game. *SSRN Electronic Journal*. http://doi.org/10.2139/ssrn.1612888

Sankhla, H., Sham Ganpat, T., Pailoor, S., Zala, K., Some, P., Ranjan, M., & Agarwal, M. (2014). Yoga for academic performance: A brain wave coherence analysis. *European Journal of Psychology and Educational Studies*, *1*(1), 10. Retrieved from http://www.ejpes.org/article.asp?issn=WKMP-0042;year=2014;volume=1;issue=1;spage=10;epage=15;aulast=Sankhla

Schichl, M., Ziberi, M., Olaf, L., & Pietrowsky, R. (2011). The Influence of Midday Naps and Relaxation-Hypnosis on Declarative and Procedural Memory Performance. *Sleep and Hypnosis*, *13*(1), 7–14.

Slagter, H. A., Lutz, A., Greischar, L. L., Francis, A. D., Nieuwenhuis, S., Davis, J. M., & Davidson, R. J. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology*, *5*(6), e138. http://doi.org/10.1371/journal.pbio.0050138

Tang, Y.-Y., Lu, Q., Geng, X., Stein, E. A., Yang, Y., & Posner, M. I. (2010). Short-term meditation induces white matter changes in the anterior cingulate. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(35), 15649–52. http://doi.org/10.1073/pnas.1011043107

Tang, Y.-Y., Ma, Y., Fan, Y., Feng, H., Wang, J., Feng, S., … Fan, M. (2009). Central and autonomic nervous system interaction is altered by short-term meditation. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(22), 8865–70. http://doi.org/10.1073/pnas.0904031106

Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., … Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(43), 17152–6. http://doi.org/10.1073/pnas.0707678104

Travis, F., & Shear, J. (2010). Focused attention, open monitoring and automatic self-transcending: Categories to organize meditations from Vedic, Buddhist and Chinese traditions. *Consciousness and Cognition*, *19*(4), 1110–8. http://doi.org/10.1016/j.concog.2010.01.007

Valentine, E., & Sweet, P. L. G. (1999). Meditation and attention: a comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion & Culture*, *2*(1), 59–70.

Weng, H. Y., Fox, A. S., Shackman, A. J., Stodola, D. E., Caldwell, J. Z. K., Olson, M. C., … Davidson, R. J. (2013). Compassion training alters altruism and neural responses to suffering. *Psychological Science*, *24*(7), 1171–80. http://doi.org/10.1177/0956797612469537

Xue, S., Tang, Y.-Y., & Posner, M. I. (2011). Short-term meditation increases network efficiency of the anterior cingulate cortex. *Neuroreport*, *22*(12), 570–4. http://doi.org/10.1097/WNR.0b013e328348c750

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: evidence of brief mental training. *Consciousness and Cognition*, *19*(2), 597–605. http://doi.org/10.1016/j.concog.2010.03.014

Non-Printed Works Cited

Levy, R. (2015). How to Meditate. (Available from The Levy Center for Mind-Body Medicine and Human Potential, 101 East 2nd Street, Frederick, MD 21701)

Levy, R. (2014). Hypnotic Meditation. On Your Heart is in Your Hands: How to Heal Your Heart Using Mind-Body Medicine. Gaithersburg, Maryland: The Levy Centers for Mind-Body Medicine.