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Reducing Subjectivity: Meditation and Implicit Bias

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Reducing Subjectivity: Meditation and Implicit Bias

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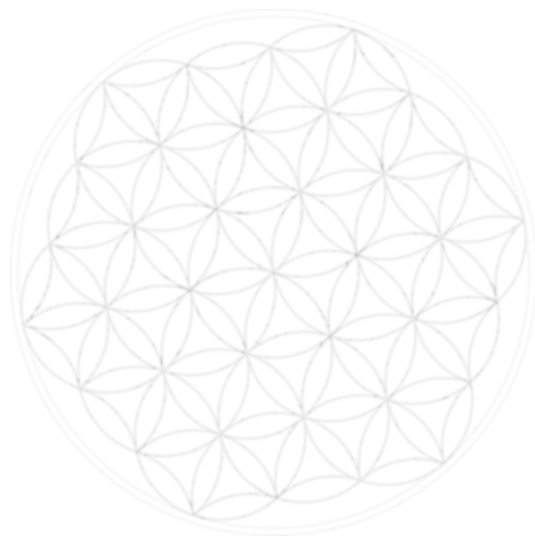Diana Maria Ciucă

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Senior Thesis in Neuroscience

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*Immense gratitude goes out to all those who have given me
a piece of advice on this ongoing
emotional, mental and spiritual journey.*

Table of Contents

I. Abstract

Implicit association of racial stereotypes is brought about by social conditioning (Greenwald & Krieger, 2006). This conditioning can be explained by attractor networks (Sharp, 2011). Reducing implicit bias through meditation can show the effectiveness of reducing the rigidity of attractor networks, thereby reducing subjectivity. Mindfulness meditation has shown to reduce bias from the use of one single guided session conducted before performing an Implicit Association Test (Lueke & Gibson, 2015). Attachment to socially conditioned racial bias should become less prevalent through practicing meditation over time. An experimental model is proposed to test this claim along with a reconceptualization of consciousness based in meditative practice.

II. Introduction

Our modern brains are trained to notice and evaluate patterns that we use as predictive models. Unfortunately, the constructs we form can often lead us with unmet expectations. In Buddhism, forming attachment to an idea or object leads to suffering. Contemporary Buddhist tradition advocates for the release from suffering towards enlightenment through the practice of meditation. In a recent review of research on Meditation, Professor of Cognitive Neuroscience at King's College London, Katya Rubia defines meditation as "essentially a physiological state of demonstrated reduced metabolic activity – different from sleep – that elicits physical and mental relaxation and is reported to enhance psychological balance and emotional stability" (2009, p. 2). However, in Buddhism, meditation tends to include religious texts and prayer-like chanting which places it in a field vastly more faith-based than scientific. Thus, extracting a unanimous definition of meditation is not preferred to choosing one specific style and maintaining consistency in that dogma. For the purpose of experimentation, a *Vipassanā-Samatha* style in the Theravada tradition is explored for this thesis. Regardless, to further remove meditation from a religious context when using it as an experimental method, we look specifically towards a simple script focused on the breath written by Sam Harris, a secularist neuroscientist. Regardless, the teachings of Buddhism will be explored to understand the traditional foundations that lead to scientific study.

Theories about consciousness underlie most neuroscientific study without explicit mention of operating paradigms. To corroborate this claim, in an overview of contemporary meditation research, Michael Murphy and Steven Donovan characterize the modern scientific approach as limited to "what is immediately physical and material constitutes all there is to reality" (1997, p. 45). Most studies tend to rely on one form or another of *identity theory*.

Arguing against identity theory, Harvard Neuroscientist Benjamin Libet summarizes this view as "The mind is 'not' *either* physical or conscious experience, it is at once physical *and* conscious experience. (2003, p. 26). He finds it difficult to believe there could be a single substrate (the brain) which exhibits an 'inner quality' (accessible only to the individual) and an 'outer quality' (observable physically to an external observer) (Ibid.). Thus, he proposes his Conscious Mental Field Theory (CMFT) that emerges from brain states but is not physical or deterministic, but instead voluntary and the entity in which subjective experience is present" (2004, p. 168). This conceptualization allows for attention modulation by an agent of control as Libet argues for free will. Although the question of free will is an important one, determining its existence lies outside the scope of the thesis. Instead, it will be acknowledged that humans tend to have at least an *illusion* of free will—that they are capable of internally influencing their own actions.

Conscious Mental Field Theory brings the topic of subjectivity to center focus, unlike most theories which try to correlate neural activations to answer *how* consciousness works. Subjectivity presents a confound in the physicalist study of consciousness because individuals cannot describe the "*redness of red*" in terms that would fully capture the nature of how it is perceived uniquely. This is referred to alternatively as *qualia*. Tufts Professor of Philosophy, Daniel Dennett provides a simple definition against this term: "'Qualia' is an unfamiliar term for something that could not be more familiar to each of us: *the way things seem to* us" (1988, p. 381). While Dennett sets aside the debate over subjectivity, the built-in constructs we have—language, time, gender, race—affect our everyday lives. We often get stuck in these constructs, which leads to *dukkha.*

Along with Libet's CMF, two other theories will be translated to fit Buddhist concepts and present a comprehensive, new paradigm to situate further speculation on the integration of meditative techniques into the neuroscience of consciousness. Professor Emeritus, Bernard Baars presents Global Workspace Theory to integrate existing concepts into a simple diagram. His theory provides a basis of critique as well as a model which is based on generally true constructs. Neurophysiologist and Professor at Bowling Green State University, Patricia Sharp provides neuroscientific speculation on how Buddhist enlightenment is attained by the deconstruction of formed neural networks. Sharp suggests that attractor networks are formed by long-term potentiation that can be "loosened" through meditative practice. Meditative techniques are backed by extensive traditional Buddhist doctrines that correlate to Sharp's claims. Furthermore, Sharp's theory into how meditation works to change the brain will be used to substantiate how implicit bias can be reduced through meditation.

The overall argument for the paper follows this outline:

1. Reducing the effect of subjectivity on perception can lead to a more accurate model of consciousness.

2. Defining consciousness requires working definitions of key terms, such as consciousness, unconsciousness, awareness and memory as well as a working model for which to situate these concepts.

   a. Benjamin Libet's **Conscious Mental Field Theory** (CMFT) allows for a mechanism that modulates perception, which is a non-physical, non-deterministic mental field (2004). Consciousness, here, is equated with

subjective experience, which is defined as Phenomenal Consciousness. He defines the field as "the entity in which subjective experience is present" (p. 168).

   b. Bernard Baars's **Global Workspace Theory** (GWT) presents a structural model as a diagram for incorporating foundational concepts such as memory, unconscious processing, and attention (2005).

3. Defining consciousness is challenged by the notion of *qualia*, or "what it is *like*" to perceive an external reality. Subjectivity of perception stands against objective investigation of consciousness.

   a. Patricia Sharp's theory on **Attractor Networks** predicts how subjective perception is affected by the conditioning of past memories

4. Meditation allows for a greater control of conscious perception by reducing subjectivity towards an objective reality. This involves a reduction in attractor networks and more overall gamma synchronicity

5. Awareness of reality is promised through Buddhist meditation and can be evinced through the weakening of built-in activation patterns. Awareness of experience and subjectivity consciousness are at odds.

6. Reducing subjective interpretation often evinced through emotional valence and associated with sensory perception can allow for better understanding of how consciousness works by reducing the confound of subjective experience.

An experiment is proposed to test the ability to subjects to reduce their conditioned responses through measuring a behavioral response of implicit bias when it comes to

perceptions of race. It is hypothesized that subjects with high implicit bias towards race will reduce their bias substantially over time through practicing focused-attention breathing meditation, a part of the *Vipassanā-Samatha* Tradition. This would show the effectiveness of meditation in reducing a fearful, subjective, unconscious response —thereby promoting a neutral, objective consciousness capable of perceiving a true external reality.

III. Philosophical Background

1. Buddhist Concepts of Meditative Practice

Meditation as part of a belief system

Types of Meditation

Buddhist Terms

2. Consciousness Explored and Redefined

Global Workspace Theory

Conscious Mental Field Theory

Attractor Networks, Buddhist Enlightenment, and

Pure Consciousness

1. Buddhist Concepts of Meditative Practice

"Science understands the outer world, Buddhism understands the inner world."
(David Lopez, *Buddhism & Science: A Guide for the Perplexed*, 2008, p. 134)

Meditation as part of a belief system

One of the initial barriers to decisive claims about the efficacy of meditation is discerning which parts of a traditional account are useful towards a neuroscientific research strategy. Meditation rooted itself in Hindu traditions ranging long before the birth of Buddha, and thereby influencing his doctrine. Thus, meditation exists as a practice inherently a part of a rich cultural tradition. To extract meditation from dogma poses potential risks of misunderstanding the role of the practice that originated in a religious context. David Lopez, author of *Buddhism and Science* has commented that in various traditions, the goal of meditation is not self help. Instead, meditation intends for "a radical reorientation toward the world—and in many articulations, a liberation from it—either for oneself or for all beings" (Lopez, 2009, p. 210). This liberation comes in many forms, from ultimate connection to an infinite source (known as reaching Nirvana) or as enlightenment through an awareness of reality brought about by heightened perception and control of attention. Allan Wallace, a leading Buddhist scholar, corroborates this point by suggesting that, "the cultivation of such inner freedom [to make wise decisions that contribute to our own and others' genuine happiness] is a central purpose of Buddhist meditation" (2011, p. 218). A common thread in most religions is the creation of a community, as seen here in Buddhist ideals of helping not only oneself, but others. Envisioning meditation in a religious context allows for the incorporation of such utopian ideas. Likewise, when researching practiced meditators, these subjects often are part of monastic traditions. Therefore, for the purpose of experimentation,

having religion be a part of the discussion incorporates obvious aspects of a meditative practice rooted in religious teachings— after all, meditation has been characteristically reserved for monks (Lopez, 2009). Instead of focusing on a deity, we can treat the religious doctrine of promoting global harmony based on sacred text as a guide for how compassion for others and community can be enhanced through meditative practice.

Thus far, we have focused on meditation in a Buddhist tradition. We will narrow that focus later to one particular type of Buddhist meditation, Vipassanā. This practice is not singular, although it is one of the most widespread (Lutz, Dunne & Davidson, 2005, p. 22). Lutz, Dunne & Davidson utilize a Tibetan tradition of Vipassanā, as does Patricia Sharp; Vipassanā as a meditative practice. The concepts later used to explain tenets of Buddhism are in the Theravada tradition An example of the range of schools of Buddhism is given below, as portrayed by James Kennedy, a teacher in Australia.
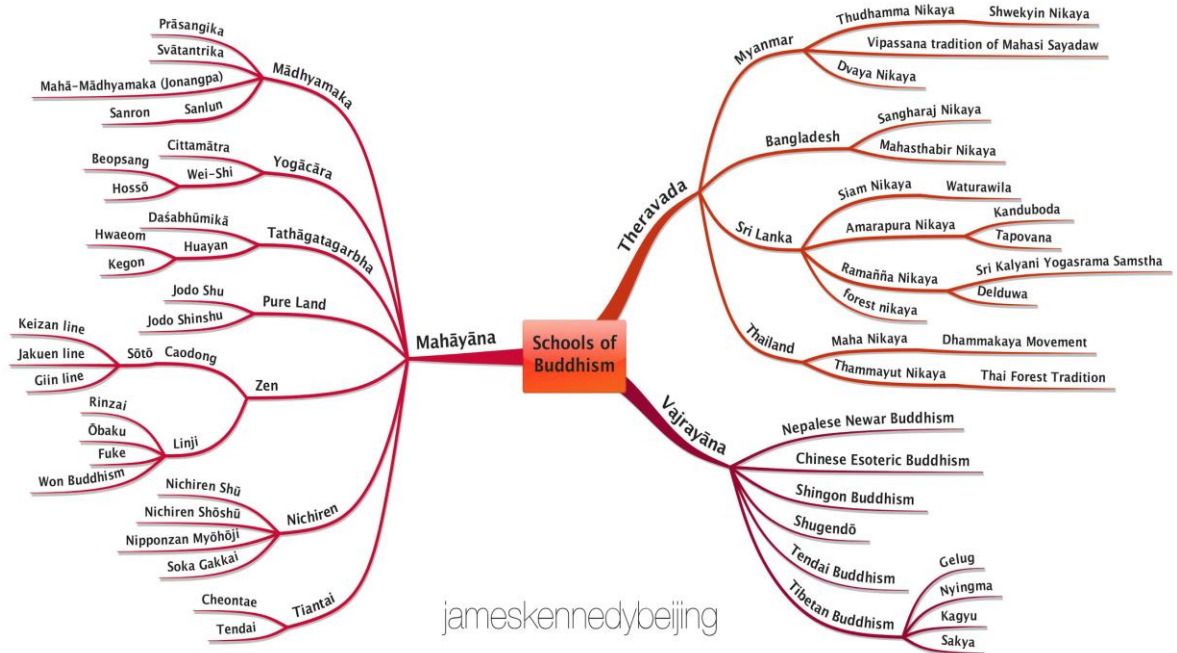

Figure 1. Schools of Buddhism (Kennedy, 2012).

David Lopez further comments on the often-espoused idea that 'Buddhist meditation works to... (alleviate stress, increase focus, etc.)' supported or denied by scientific research. He further comments, "however, in order to understand the laboratory findings, such a claim [that Buddhist meditation works] requires the one first identify what is Buddhist about this meditation, describe what the term meditation encompasses in this case, and explain what works means, especially in the context of the exalted goals that have traditionally been ascribed to Buddhist practice" (2009, p. 207). For a practice to be Buddhist, it must be associated with a Buddhist tradition. Lopez similarly comments on this relation to religion: "it is not meditation that produced [Buddha's] doctrine, but doctrine that produces meditation" (2009, p. 210). His statement supports the claim that removing meditation from a religious context could potentially weaken its role as part of a spiritual philosophy. Yet, even if we were to envision meditation in an independent context, as we will in the following chapter, we must define what meditation is. Given diverse traditions, this presents a challenge; hence, the first claim of identifying from which sort of "Buddhism" the meditation tradition stems.

Moreover, determining what "works" differs depending on which meditative practice is used and to what ends. Trained practitioners of meditation would describe specific profound experiences, such as clairvoyance, in ways that modern scientific constructs would not necessarily allow for. The usual scientifically tested effects of meditation are stress reduction and improved concentration. Very few studies look at the shifts of consciousness towards heightened awareness that tends to be one of the aims of Buddhist meditation, often characterized as enlightenment. Our understanding of meditation without viewing how practitioners experience different levels of consciousness (or different types of

consciousness—both scientifically undefined ideas) is not incorporated in traditional research. From my personal experience interviewing a monk who had been part of the monastic system for 25 years at a monastery in Thailand, he suggests that with practicing meditation one can gain insight into past lives. He envisioned his own death in an act of clairvoyance as well. This, and other types of experiential anecdotal evidence, seem to have no room in modern research, thereby limiting the sort of data that can be collected in meditation research.

Finally, as opposed to using meditation as a tool for self-improvement, it should be used rather for looking into the depth of one's experience. Allowing for a deeper understanding of experience from the perspective of the experiencer could be a starting step for the overall problem of placing experience into defining consciousness. For instance, Owen Flanagan, in *The Bodhisattva's Brain: Buddhism Naturalized*, states that, "within Buddhism, meditation is seen as a way to gain virtue or wisdom… in the form of vigilance against unwholesome attachments, of realized, enlightened Buddhist persons" (2011, p. 18). These attachments not only form to material goods, but especially to ideas, conceptualizations and habits. As these attachments cause suffering according to the Four Noble Truths of Buddhism, recognizing the cause of suffering should contribute to the release of attachments. For many positive psychologists, such as Martin Siegel, author of *The Mindful Brain*, meditation is used to produce a feeling of contentedness or ease rather than to contribute to a deeper spiritual quest (2007). Both spiritual development and happiness can undoubtedly go hand-in-hand, as greater meaning and purpose in life tend to be related and often encouraged through religious communities. Thus, focusing on solely eudemonia, or a

sense of emotional flourishing, limits the multidimensional products of meditation practice. The deeper benefits of it are releasing the suffering caused by attachment.

In the introduction of one of the earliest reviews of meditation research, Eugene Taylor writes "science – the product of Aristotelian thinking and the European rationalist enlightenment, now turns its attention to the intuitive transformation of personality through awakened consciousness (and other such Asian meanings of the term enlightenment)" (1997, p. 14). The concept of enlightenment has yet to be defined in this paper, although it tends to correspond to distinct heightened states of consciousness. Nevertheless, the way Taylor describes "awakened consciousness" can open doors for distinguishing between everyday, untrained consciousness, and the controlled, deeply aware and attentive type of consciousness produced by practicing meditation. Science has the potential of benefiting from the methodology of looking inwards which meditation aims to provoke, even if it is entrenched in a religious context. We will look at further ways in which meditation can be removed from religion, but it comes at potential loss. Navigating the line between religion and philosophy will likely generate a construct of meditation that can be used to influence research.

Types of meditation

Meditation is a practice. In the Theravada tradition, it plays a similar role that prayer has played in Christianity, Judaism and Islam. It can be paired with chants and mantras, or with requests for blessings from a higher power. In a similar way that yoga is presented as a physical exercise without a religious context, instead as being seen as part of a vague philosophy, meditation can be viewed as a mental exercise.

One of the most popular forms of meditation in Western countries, **Transcendental Meditation (TM)** "emphasizes the absence of an effort to maintain the concentration and development of a witnessing, thought-free 'transcendental awareness' or 'pure consciousness', which is characterized by the absence of any concentration" (Raffone & Srinivasan, 2010, p. 2). TM studies suggest it is effective in "reducing stress and anxiety, mood disorders, insomnia, and hypertension" (tm.org). TM does not contain as much focus on "mindfulness" as it does on inner peace and open presence more similar to the tradition of *Samatha*.

Mindfulness-Based Stress Reduction (MBSR) follows a similar agenda to TM with a hope of applying it in a healing context, but also in a form that is often packaged and sold. It was developed by John Kabat-Zinn in a Western context of "Alternative Medicine." Because of funding from the National Institute of Health, MSRB has been researched to be effective in not only stress reduction, but also as a treatment for chronic pain, anxiety and depression (Lutz, Dunne & Davidson, 2005, p. 59). One of the important concepts that MBSR utilizes is the idea of "mindfulness," which is? viewed as an accepting and attentive attitude that produces moment-to-moment awareness (Brantley, 2005, p. 132). MBSR's definition of mindfulness retains similarities with *Vipassanā* tradition by focus on awareness.

Zen and **Vipassanā** come from similar Buddhist origins. Whereas Zen mixed with Chinese Taoism influences and grew in Japan, *Vipassanā*—also known as "mindfulness" or "insight" meditation) became a part of most Mahayana and Theravada Buddhist teachings. It is often taught in conjunction with *Samatha*—translated as "tranquility" meditation (Wallace, 2008). Each tradition tends to teach different moral elements that contribute to the "right view" associated with "right mindfulness"—Thervada encourages "themes of impermanence, suffering and nonself;" Mahayana espouses "the view of emptiness, dependent origination, and Buddha-nature, and with the intention to achieve perfect enlightenment for the sake of all sentient beings;" and Vajrayana includes "stable, luminous, nonreactive attention" as well as "the cultivation of mental balance" (Wallace, 2008, p. 63. For the purpose of this paper, the Vipassanā tradition will be explained by incorporating central themes seen throughout disciplines based on Buddha's teachings, although much research in meditation from other disciplines will be brought into context.

Teachings from the Zen tradition of Japan, the Tibetan tradition, and the *Vipassanā* movement situated in Theravāda traditions present the most likely candidates of Buddhists studied for current research (Lutz, Dunne & Davidson, p. 22). *Samatha* is often combined with *Vipassanā*, with *Samatha* regarded as a state of consciousness capable of being attained after extended practice (Wallace, 1999). Wallace alternative compares these two styles of meditation: "Traditionally, *samatha* is the primary method for cultivating mindfulness, while in the practice of *Vipassanā* one applies mindfulness and wisdom (*panna)* to body, mind, feelings, and other phenomena" (2008, p. 62). The terms *Vipassanā* and *Vipassanā-Samatha*, when used in literature, tends to include aspects of both ideas intermittently (see Lutz, Dunne & Davidson), so both names will be used to refer to mindfulness practice involving a

combination of both techniques. Moreover, *Vipassanā-Samatha* is similar to MBSR and TM by incorporating the dual ideas of mindfulness and tranquility, respectively. Likewise, these traditions are often picked up by laypeople, not only Buddhists, such as Europeans and North Americans (Lutz, Dunne & Davidson, p. 22). In drawing conclusions about the use of consciousness and meditation, Lutz, Dunne & Davidson utilize *Vipassanā* because the "style of meditation taught in the *Vipassanā* traditions is especially emblematic since the basic meditative style of *Vipassanā* closely resembles some foundational practices in the Zen and Tibetan traditions" (Ibid). For the reason of shared traditions in relation to *Vipassanā*, and because of my own familiarity practicing *Vipassanā* meditation, this style along with its concepts will be used for further meditative study in proposing an experiment to test our claims. Since science tends to avoid religious contexts, the rich moral texts that often accompany *Vipassanā-Samatha* practice must be unfortunately set aside when using it as a methodological technique. If one were to study monks, understanding theory would potentially prove of more importance. Thus, *Vipassanā-Samatha*, as depicted through focus on breathing and open monitoring of moment-to-moment awareness, will be used as the experimental intervention that reduces the affect of subjectivity for the final proposed experiment.

Buddhist Terms

The main vocabulary for Buddhist terms in Theravada Buddhism are in the ancient language, Pāli, although Sanskrit is also used to express similar ideas in yogic traditions. For the purpose of this paper, Pāli terms will be defined and used as terms of comparison with modern Western concepts. Some themes do not have singular words to represent them. For instance, "flux" is the arising of things from particular conditions is paired with the concept of transience. That all things are impermanent is a central idea of mindfulness. In fact, one of the four noble truths is that attachment causes suffering. Realizing the cause of suffering can lead to achieving the termination of suffering by removing attachment and noticing the impermanence of moment to moment through open presence. The constant state of change is an important theme in meditation, as focus on the breath reminds one of the fleeting nature of the present.

Before Pāli terms are discussed, it is useful to look at some English terms that researchers John Dunne, Antoine Lutz and Richard Davidson use to describe meditation in *Meditation and the Neuroscience of Consciousness*: Focused Attention, Open Presence, and Non-Referential Compassion. They draw these terms from the "Great Seal" and "Great Perfection" schools of Tibetan Buddhism (2005, p. 28). First, *Focused Attention* refers to "the ability to focus on an object for an unlimited time," which is known in Pāli as "*samatha*" (p. 29). The breath is often used as the object of focus in this practice, along with maintaining a straightened spine. Next, *Open Presence* disregards the importance of an object of focus in favor of creating a general state of being (p. 92). Instead, this advanced state of meditation involves observation of sensory or mental events without "taking the mental content as an object" to be grasped (p. 42). There is a sort of meta-awareness that

occurs, in which thoughts may arise as a sign of subjectivity without them necessarily being true. This complements the MBSR definition of meditation by focusing on the feeling of awareness of the object rather than the object itself. Finally, *Non-referential Compassion* produces the cultivation of empathy. While increased empathy is frequently attributed to meditation practice, it does not necessarily connect to consciousness unless one is to argue for a connected consciousness of all beings - slightly beyond the scope of this paper, although worth investigating. Nevertheless, the manifestation of Open Presence can provide a key to consciousness in uncovering a consciousness without subjectivity. Since each individual's unique feeling of experience tends to be the main confound in unifying a theory of consciousness, reducing or even eliminating this subjective nature of experience (e.g., the redness of red), could bring about what a unified theory consciousness should look like. The stages that build up to Open Presence are exemplified below in Figure 2.

Stage	Object	Subject	Reflexive Awareness
1	+	-	-
2	-	+	+
3	-	-	+
4	Ø	ø	++

"-" = de-emphasis; "+" = emphasis; "ø" = absent.

Figure 2. Achieving Open Presence through piecewise meditation

Johnathan Shear and Ron Jevning explore the concept of "Pure Consciousness"—an idea similar to Open Presence because both eliminate the role of subjectivity (1999). In describing this experience, Shear and Jevning argue that the experience of pure consciousness "is not *like* anything…inasmuch as it contains no phenomenal content at all" (1999, p. 195). The mind in this state is settled, fully awake and "experiences pure, unmanifest, absolute objectless consciousness" leading them to claim this experience is essentially "awareness itself" (Ibid.). Thus, this level of pure consciousness corresponds with the most advanced level of Open Presence in which reflexive awareness (of awareness) is the sole experience of consciousness. It almost seems recursive then, such that experience and consciousness would spiral into each other at such a frequency that they are inseparable like one mirror facing another. The empty, or objectless meditation, may even be compared "experiencing nothingness itself, or even being nothingness itself. To simplify, I define it as the experience of awareness. Focusing on awareness leads to open monitoring of incoming stimuli without associated judgment as encouraged in *Vipassanā-Samatha*.

A duality of conscious experience will be exemplified instead of affirming a singular definition of consciousness. For the development of a new model of consciousness, I will define two terms, *Phenomenal Consciousness* and *Pure Consciousness*, through meditative and scientific to draw parallels between the two traditions. While modern neuroscientific studies attempt to understand Phenomenal Consciousness, I argue that the attainment of Pure Consciousness can occur through meditative practice and its associated forms (TM, MBSR, Zen, etc.). Although not all traditions lead to Pure Consciousness, they tend to advocate for some transformation of *awareness*, which is the main actor towards the attainment of Pure Consciousness.

Phenomenal Consciousness is the experience of sensory input as affected by stored information based on memory—an "unconscious resource" in Baars's GWT. Phenomenal Consciousness is essentially the subjective experience in CMFT. Phenomenal Consciousness has correlates to bottom-up processing of information based on learned conditioning that affects perception. It also has correlates to executive processes, such as decision-making, that tend to be viewed as top-down. These processes are created by the brain through experiential training, influencing how inputs are subjectively perceived. Phenomenal Consciousness combines both the *feeling of* (or *awareness of*) experience as well as the way in which this experience is physically influenced by prior conditioning.

Pure Consciousness is the reflexive awareness of perception, or "awareness itself" (Shear & Jevning, 1999). It is not *like* anything as it contains no phenomenal content at all. Practicing *Vipassanā-Samatha* meditation is purported to help achieve this state, defined alternatively as *Open Presence* (Lutz & Davidson, 2007). Pure Consciousness would incorporate the Buddhist idea of *sati* and transform it into nonjudgmental, open awareness. This sort of consciousness is marked by an increase in the "experience of awareness" rather than the "awareness of experience."

The discussion of these terms will be used in conjunction with Patricia Sharp's theory of attractor networks and Buddhist enlightenment in the end of this section. Polarizing consciousness into a duality is illustrated as a model in Figure 4. The ideas have been introduced here to apply these definitions onward, particularly towards Buddhist concepts.

Dukkha - Suffering

The Four Noble Truths is a central facet of Buddha's teachings. In it, Buddha introduces the idea of *dukkha*, colloquially translated as suffering. Suffering comes about from an attachment to things, ranging from an attachment to the body to worldly items. It is through recognizing the impermanence of things that suffering is eased. This translation may be limited as Ven. Bhikku Anāluyo proposes that all feelings are suffering: "Applied practically, then, mindfulness of *dukkha*, its arising, its cessation and the path leading to its cessation can be undertaken by becoming aware of any type of attachment or craving occurring in everyday life" (Ven. Analayo, p. 241). Attachment parallels constructs of thought that often arises from associated feelings that enforce such constructs. Potentially, the act of attachment mimics the idea that 'neurons that fire together, wire together;' a common summary of Hebbian synaptic theory. For instance, attachment reflects learned habits and patterns that can be the underlying conditions that shape subjective experience. This tendency towards attachment is our downfall that leads to suffering. Undoing typical patterns of thinking to which people often cling is the goal of Buddhist meditation, such as the attainment of Open Presence.

Dukkha encapsulates the important concept of a mind that has already developed and seems rigid in its thoughts. This limited mobility can suggest a lack of free will. For instance, Alan Wallace comments, "Buddhist tradition clearly emphasizes that ordinary sentient beings are not entirely free, for we are constrained by mental afflictions such as craving, hostility, and delusion, which in turn stem from our ignorance of the true nature of reality; and, in so far as we lead our lives under the domination of these afflictions, we remain in bondage to their resultant suffering" (2004, p. 224). The "true nature of reality" differs from our

consciousness, with phenomenal consciousness reflecting how it is perceived. It is through meditation that phenomenal consciousness reflects a neutral attitude and the clarity of a shared reality shines through.

Sati - Mindfulness or *Awareness*

A linguistic issue with the word "mindfulness" arises in the sense that it implies a mind that is full. Quite the opposite, mindfulness seeks a mind that is empty. Some types of meditation encourage an observant attitude towards thoughts that arise, allowing them to come and go. Vipassanā reduces the focus to a single, transient item: the breath, through which withdrawing the mind from transient thoughts lead to heightened concentration abilities and mental clarity. The Pāli word, *sati,* is often translated as mindfulness or awareness. It is closely related to another Buddhist term, *sarati,* meaning "to remember" (Ven Anālayo, 229). The connection between memory and awareness reflect the modern way we look at consciousness. For instance, Baars's Global Workspace situates consciousness in a stage of working memory with a spotlight navigating what is important to pay attention to. Working memory and *sati* are similar enough ideas to be interchangeable to combine Buddhism with GWT.

Padmasiri de Silva, in *An Introduction to Buddhist Psychology*, quotes Caroline Rhys Davids, a Buddhist historian to define *sati*: "*Sati*, an important term in Buddhist ethical training, is not wholly covered by memory, and is on the whole, best rendered by mindfulness, inasmuch as it denotes rather the requisite condition for efficient remembrance, or thought of any kind, namely, lucidity and alertness of consciousness" (p. 27). The concepts that transcend working memory and go into long-term memory are likely chosen

due to *sati*. *Bhikkhu* Anālayo corroborates this definition, adding that memory and mindfulness are not synonymous, but mindfulness allows for memory to function (p. 230 in Buddhist Thought and Applied Psychological Research). Mindfulness further requires a broad and boundless sense of mind as opposed to a singular focus of attention as it? tends to be viewed as a spotlight (230). Theories of consciousness that include a global workspace may be limiting their definitions with regard to a more expansive view of attentional processes. Lutz, Denne & Davidson construe awareness as "subjectivity in relation to objects" (p. 43). Their definition fits in with the distinction between Focused-Attention Meditation and Open Presence such that the latter includes no specific object of focus in favor of open, nonjudgmental monitoring of incoming stimuli. *Samādhi*, defined as concentration, is characterized as directed tranquility achieved through extensive meditation. It is a higher state of consciousness reflected through practice and is largely the goal of meditation (*Buddhist Thought and Applied Psychological Research*, p. 245). Looking at trained practitioners can allow for insight into *samādhi*

Consciousness

      Dainin Katagiri, a master of the Zen tradition, comments "Consciousness forms concepts that divide and define the world in an effort to make things clear... The question is, how can we unify the things that are analyzed by our consciousness, things that were never separated in the first place?" (1998, p. 21). Phenomenal consciousness is characterized as subjective quality, resulting in a categorization of reality into parts. As subjective experience presents a confound in clarity of consciousness, Katagiri's statement aligns itself with such neuroscientific debate by questioning how subjectivity and consciousness are related.

Simultaneously, if we work to reduce subjectivity, perhaps a clearer and more unified definition of consciousness will come about.

To fit consciousness into general Buddhist beliefs, "the *Middle Length Sayings* present the emergence of a perception in this manner: when the eye that is internal is intact and external visible forms come within its range, and when there is an appropriate act of attention on the part of the mind, there is the emergence of perceptual consciousness" (de Silva, 2000, p. 22). Here, perception is described through neural processing done by physical parts (retina, cones, synapses, intact visual system) and their functional connectedness. The "external visible forms" relate to the idea of an observable physical world beyond our internalized perception. Finally, "attention" acts to control the mind's ability to focus on incoming information and filter out unnecessary stimuli. Thus, as agreed upon in most neuroscience research, visual cognition depends on functional anatomy, an external world and modulation of attention. Perceptual consciousness seems to differ from "true" consciousness. The unconditioned consciousness would be closer to a "pure" consciousness than the perceptual one. It would seem that our experiences result in perceptual consciousness, which contributes to learning and to forming a sense of identity. On the other hand, letting go of these attachments can lead to *samādhi,* or a pure sense of consciousness marked by clarity of our shared reality.

2. Consciousness Explored and Redefined

"Whatever its relation to the physical world, consciousness is the context in which the objects of experience appear."

(Sam Harris, *Waking Up*, p. 88)

Sam Harris's definition of consciousness provides us with a general definition of consciousness, malleable enough to use for my own model of consciousness. "Context" will be defined by Global Workspace Theory. "Experience" is discussed through Mental Field Theory. The "object" of experience is a vague idea, potentially referring to sensory information particularly in the context of Phenomenal Consciousness. In *Vipassanā-Samatha* meditative practice the object is initially the breath and advances towards a reflexively reflective experience of awareness itself, referred to as Pure Consciousness.

Philosopher and cognitive scientist, David Chalmers outlines the hard problem of consciousness in a well-known essay "Facing Up to the Problem of Consciousness," in which he rejects various failed attempts at answering the question of "Why consciousness is bound to rise from the structural confines of the mind?" (1995). This gap exists between the 'easy' question of defining the functions of consciousness - a topic that has been heavily researched - and the 'hard' question of "How does experience arise from the functions of consciousness" (Ibid.). Whereas "reductive methods are successful in most domains because what needs explaining in those domains are structures and functions," Chalmers contends that the domain of consciousness is not physical and cannot be reduced to physical processes (1995, p. 450). Chalmers claims that a non-reductive explanation is necessary to contrast physicalist and functionalist methods of explaining consciousness. Benjamin Libet presents the most convincing explanation of consciousness by describing it similarly to Chalmers as an

"emergent property" - a uniquely fundamental property - of a physical brain (2004, p. 163). His Conscious Mental Field Theory (CMFT) will be used to exemplify the affect of subjectivity on awareness and propose how awareness could affect this CMF. Libet provides an account of consciousness that places the subjective experience in the forefront of the discussion. In conjunction with? CMFT, Bernard Baars's Global Workspace Theory (GWT) can provide a useful metaphor for the way perception is affected by existing physical mental processes. Finally, Patricia Sharp proposes definitions that correspond to Buddhist philosophy to place these theories in discussion with meditative practice. I argue alongside Sharp's claims that Everyday Consciousness (akin to *Phenomenal Consciousness*) can be transformed into Buddha-Awakening (akin to *Pure Consciousness*). More importantly, the change induced by meditation towards an objective reality will be further reflected by reduced measures of implicit bias, exemplifying a loosening of built attractor networks.

47

Contexts

- Self
- Intentions
- Expectations
- Perceptual contexts

The conscious spotlight in Working Memory

Sensory stimuli Images, Ideas (Input)

Working Memory

Conscious experience

Speech & Action (Output)

Unconscious Resources:

Interpreters

Memories
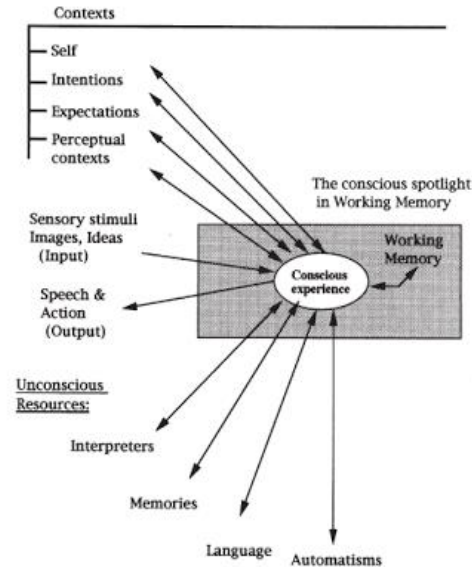
Language   Automatisms

Fig. 1. A schematic diagram of GW theory, viewed metaphorically as a theater of mind. Conscious contents correspond to the bright spot on the stage of working memory. Once conscious, they activate many unconscious regions of the brain, including interpreters, memories, language capacities, and automatisms. In brain terms, those would be involved in certain cortical regions, hippocampus, and basal ganglia, which are believed not to directly support conscious experiences. However, conscious cognitions themselves are always shaped by unconscious contexts. Executive functions (self) may be considered as one set of such contexts (Adapted from Baars, 1997).

Figure 4. Baars's Global Workspace (2005, p. 46)

First, Baars defines consciousness as a spotlight:

> Consciousness in this metaphor resembles a bright spot on the stage of immediate memory, directed there by a spotlight of attention under executive guidance. Only the bright spot is conscious, while the rest of the theater is dark and unconscious. This approach leads to specific neural hypotheses. For sensory consciousness the bright spot on stage is likely to require the corresponding sensory projection areas of the cortex. (2005, p. 46)

When it comes to delineating what sort of selective attention system is responsible for the spotlight, Baars differentiates between automatic (subcortical) processing and voluntary (frontal-lobe, higher executive) processing (2005, p. 49). Context presents itself as the stage, possibly including qualia without explicit mention to its role in how the stage itself is depicted. Because of the activation of the frontal lobe in consciousness in the waking state particularly in response to cognitively challenging tasks, Baars suggests this area plays a role

in the modulation of the context, or theater. Different parts of the brain controls attention monitoring (frontal lobe) than corresponds to the function of working memory (limbic system and basal ganglia). Buddhist psychology would view the combination of working memory and attention as *sati* – generally equated to *awareness* or *mindfulness*. The attentional spotlight alone could not reflect the depth of conscious experience; but, the combination of working memory along with the spotlight reflects how conscious experience arises. Finally, the function of consciousness would be "to provide widespread access, which in turn may serve coordination and control" (Baars, 2005, p. 52).

Baars's Global Workspace theory is useful because it features a palpable metaphor for consciousness that relies on attention as a source of modulation of incoming information. It also bases itself on a global network on integration not limited to one specific brain region. Although some regions have distinct functions, the brain as a whole must work in conjunction to produce consciousness. It is also useful that Baars mentions what the unconscious state looks like - "deep sleep, coma/vegetative states, epileptic loss of consciousness and general anesthesia under various agents" (2005, p. 51). These states seem to lack the integration of working memory into long-term memory. The physical features that define these states are marked by slow EEG waveforms, low frontoparietal activation, "blocked connectivity" and limited response to normal conscious stimuli (Ibid.). Baars conceptualizes consciousness as an integrated network defined by its ability to stay connected; hence, why a lack of these critical functions result in unconsciousness. The neural correlates of conscious would be more complex than a simple chain, and would rather depict a "global workspace" as plainly stated in the title.

David Chalmers offers criticism of Baars's model, as it only exemplifies *cognitive accessibility* rather than explaining why consciousness should arise from global accessibility (1995). Chalmers's incessant desire for an explanation of experience will go unanswered by this thesis, and will take subjectivity as a base fact. Nevertheless, Chalmers states that GWT "shows promise as a theory of awareness, a functional correlate of conscious experience" (Ibid.). Redefining Baars model in favor of Chalmers' argument, the term "conscious experience" should be replaced with "awareness," and unconscious experience with "unaware resources" or simply "factors constituent of experience which influence awareness." Situating the attentional spotlight on a realm of working memory relates to the earlier topic of *sati*, often defined as mindfulness or awareness. Moreover, implicit bias, considered a mental formulation based on memory, would now be a conscious construct, albeit at a level not entirely accessible to awareness. These working definitions will be used to situate the following discussion of implicit bias by using the popular GWT as a theoretical construct to elucidate complicated interactions between multiple brain resources and awareness.

Conscious Mental Field Theory

Essentially, the Conscious Mental Field (CMF) represents a unifying aura that provides the "entity in which subjective experience is present" (2004, p. 168). Libet characterizes consciousness as an *emergent property*. Libet further explains that the Mental Field is influenced but not reliably predicted by neural patterns. However, in Libet's words, "we may view conscious subjective experience as if it were a field, produced by appropriate though multifarious neuronal activities of the brain" (p. 168). Libet identifies several aspects of it and in order for CMF theory to be applied, these must be preserved.

The CMF:
- causally alters neuronal functions
- is not physically observable or reducible
- is only accessible to the individual subject

Experimenting with cortical and skin stimulation, Libet found that there was an "awareness gap" of ranging from 200 to 500 milliseconds (2004). Stimulating a part of the somatosensory cortex, Libet found that it required approximately 500 msec of prolonged stimulation to elicit a subjective response of feeling. When stimulating the medial lemniscus, part of the sensory tract, simultaneously with skin stimulation, the patients reported both sensations occurred at the same time (2004, p. 76). However, Libet asserts that cortical stimulation could not have produced immediate awareness because of the temporally observed gap of about 500 msec for cortical stimulation to produce a sensation. Thus, there must be a *subjective referral* of sensory perception that corresponds to the primary evoked potential of the cortical stimulus (2004, p. 79). In the temporal space between stimulation and awareness, Libet's results show that awareness of experience (sensation) is much more

subjective than objective. Based on these and other findings, he proposes that there must be a third modality interfering with perception – the Conscious Mental Field.

Prior to releasing his book, *Mind Time*, Libet summarizes his claims about the "unique nature of the mind-brain relationship" by addressing the confound that conscious subjective experience cannot be observed by any external physical means (2003, p. 26). It can be measured, but the internal feeling of perceiving is not immediately available for third-person access. The CMF allows for an intervening effort to exert a will over a deterministic fate. I argue that this subjective CMF is deterministically influence by previous memories and experiences. However, since consciousness surpasses the expected pathways through personal voluntary action, Libet's model of consciousness allows for intervention into otherwise rigid patterns of behavior.

Attractor Networks and Buddhist Enlightenment

Consciousness escapes a mutually agreed upon, universal definition that allows it to be used by a number of researchers. Harris's definition exemplifies the difficulty in pinning down a succinct phrase to define consciousness. It is often confounded with the idea of attention. Attention is merely a facet of conscious experience that aligns itself better with the idea of awareness, particularly if working memory is brought into the definition. Finding definitions are only the beginning of the problem, thus defining terms may lead to clearer concepts. In the same sense paradigms are necessary for situating scientific thought, there is a philosophy behind most theories of consciousness. The structures of two theories of consciousness have been outlined and will be used with Buddhist terms to elucidate how subjectivity of experience can be reduced.

We can draw upon Libet's characterization of a Mental Field to suggest how meditation can affect perception. If this mental field acts to integrate experience and perception, then strengthening this field by working on one's own awareness can lead to measurable physical brain changes. These changes can be represented by Baars's GWT and the changes in speech and actions (output) as well as through adjusting unconscious automatisms. These two theories will be addressed with respect to Patricia Sharp's Theory on Attractor Networks to show how there is a difference between Everyday Consciousness and Pure Consciousness. Meditation is the tool that can allow for experience of Pure Consciousness, leading to greater objectivity of reality.

Many theories attempt to draw a schema for how consciousness arises, thereby attempting to solve the problem of a physical description of consciousness, leaving unanswered the question of *what it feels like* to perceive. Phenomenal Consciousness is explored in Libet's CMFT to understand how consciousness interacts with the physical brain without denoting a clear agent working to modulate attention or awareness. Without meditative practice, phenomenal consciousness is the main, if not only, type of consciousness one is familiar with. The confound of qualia or subjective experience that differentiates how each person experiences reality will stand against a unifying theory of consciousness if we all have varied internal perceptions of an external world. If qualia is reduced, then we can study the formulation of Pure Consciousness to fit consciousness into an objective scientific model, opposing the confound of phenomenal consciousness. This is not to say that we do not have different experiences as individuals. Instead, it is that our consciousness can release attachment from our subjective experiences in order to perceive a more true reality.
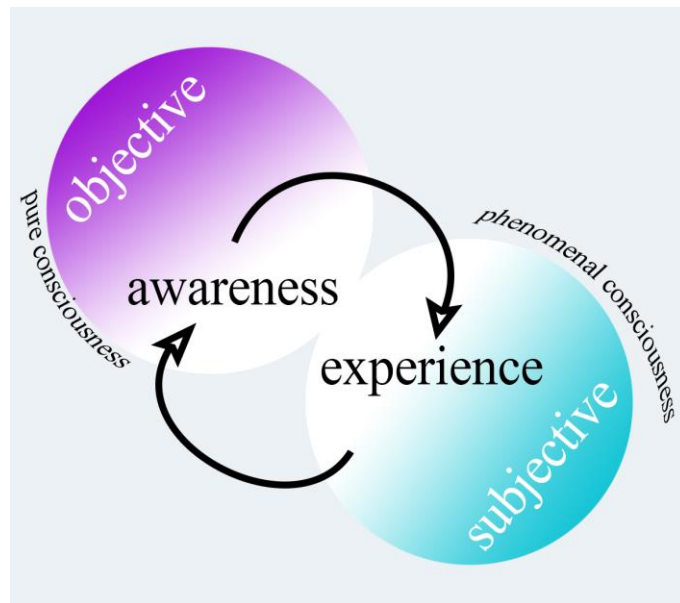

Figure 5. The Plastic Magnetic Model

Defining terms will allow us to move forward in generating a new theory of consciousness I propose, the Plastic Magnetic Model (PMM) that can be tested using the construct of implicit bias conditioning and subsequent deconditioning. Plastic involves that it can be shifted to reflect a different orientation towards perception. Magnetic indicates that the vague term, consciousness, can be pulled towards either a subjective or objective realm. The term subjective corresponds to the CMF that predicts how future behavior works based on past experiences. GWT incorporates such learned activity as "unconscious resources." However, unconsciousness will be defined only as a state without willful modulation of brain activity (Monti et al, 2010). Awareness can be seen as both an intervention to the cycle of being stuck in subjectivity as well as an avenue towards objectivity. Baars's conceptualization of unconscious resources (interpreters, memories, language, and automatisms) that reflexively influence the global workspace should be thought of as conscious processes that are below the level of awareness, not necessarily as "unconscious resources."

In "Buddhist Enlightenment and the Destruction of Attractor Networks," Patricia Sharp presents an account of consciousness based on Buddhist psychology as a paradigm for her theory on attractor networks (2011). She differentiates between Everyday Consciousness and Buddha Awakening. Everyday Consciousness is divided into a consciousness devoted to each of the five senses as well as the mind's judgment, the autobiographical self (Klesha-Mind) and memory (All-Base or Store Consciousness). Stored information in the cortex plus activity in the nucleus acumbens is the Klesha-Mind, containing "connected emotional and motivational mechanisms" responsible for forming cravings and aversions viewed as ever-present (2011, p. 156). The basis for all other types of consciousnesses is the All-Base

Consciousness, or Store Consciousness (Thich Nhat Hanh, 2006 cited in Sharp, 2011, p. 156). Sharp believes that Store Consciousness corresponds to memory, particularly by providing "connections between different parts of the mind" and possessing the ability to "seize and store experience and then, later, replay that experience when the conditions are right" (p. 157). A summary of Sharp's definitions are provided in Table 1. Ultimately, the conditioning of memory leads to lasting changes in synaptic strength termed "attractor networks."

Table 1. Speculative mapping between Buddhist categories of consciousness and brain regions/activities (Sharp, 2011)

MIND	BRAIN
Everyday Consciousness	Strong Attractor Networks
Eye Consciousness	Electrochemical Events in Retina (and possible additional regions?)
Ear Consciousness	Electrochemical Events in Cochlear Hair Cells (and possible additional regions?)
Nose Consciousness	Electrochemical Events in Olfactory Receptor Cells (and possible additional regions?)
Tongue Consciousness	Electrochemical Events in Taste Receptor Cells (and possible additional regions?)
Body Consciousness	Electrochemical Events in Somatosensory Receptor Cell (and possible additional regions?)
Mind Consciousness	Electrochemical Events in Central Nervous System
Klesha-Mind (Manas)	Stored Information in Cortex Plus Activity in Nucleus Accumbens
All-Base (Store) Consciousness	The Entire Set of Synaptic Connections and Their Relative Weights (Strengths) Worn in by Experience and Heredity
Buddha-Awakening	Loosened Attractor Networks
The Five Primordial Awarenesses (See Table 1)	All Sensory and Central Brain Regions Interconnected Through Transformed Synaptic Weights

Buddha-Awakening corresponds to liberation "into a state in which each situation appears to us as novel and clear, unencumbered by our conditioned tendencies to code all

events in terms of our ego, needs, fears, aversions, and desires," freeing ourselves from the "struggle and delusion of Everyday Consciousness" (2011, p. 158). Sharp's account corresponds to Lutz et al.'s description of *Open Presence* and the Buddhist notion of *samādhi.* Ron Jevning and Jonathan Shear's use of the term *Pure Consciousness* will be used to integrate these similar definitions into a simplified working model demonstrating the duality of consciousness discussed by Sharp. Thus, *Pure Consciousness* will be defined as the reflexive awareness of perception, or "awareness itself" (Shear & Jevning, 1999). It is not *like* anything as it contains no phenomenal content at all. Practicing *Vipassanā-Samatha* meditation is purported to help achieve this state (Lutz & Davidson, 2007).

On the other hand, *Phenomenal Consciousness* is the experience of stored information based on memory - seen as an "unconscious resource" in Baars's GWT. Phenomenal Consciousness is the subjective experience in CMFT. It has correlates to bottom-up processing of information based on learned conditioning that affects perception. I argue that this learning is strongly tied to limbic processing and is strongest in relation to fear. Sharp would most likely relate Phenomenal Consciousness to the formation of attractor networks because these formed patterns exemplify how subjectivity is paired with stimuli through ongoing learning. This conditioning leads to subjective impressions.

Attractor networks are characterized as a pattern of activation that is reinforced through learning (Fig. 6) (Sharp, 2011). These connections are probably responsible for learned perceptual abilities, such as subjectivity. Long-term potentiation caused by experience form habitual perceptions and emotional reactions characterized as Hebbian cell assemblies (Sharp, 2011, p. 139). Hebbian long-term plasticity is thought to underlie the response properties of neurons in primary visual cortex, reflecting an implicit form of

conditioning towards Phenomenal Consciousness that does not reach the level of awareness of Pure Consciousness. The neurological basis for formation of built-in attractor networks is gamma synchronicity. The plasticity of these networks can also be evinced through gamma synchronicity which is more global and attentionally modulated, rather than localized and unaware. Findings to support these claims will be discussed in the experimental section of the thesis.

Patricia Sharp argues that the synaptic weights that characterize attractor networks are loosened through meditation. Synchronicity in connections is marked by simultaneous firing of gamma signals (Sharp, p. 15). First, the there is "*local* gamma oscillations and firing synchrony" followed by synchronous firing across two areas (Sharp, p. 150). Synchrony "gives rise to the conscious perception of a single entity" while "asynchronous activity between two different areas apparently gives rise to the perception of two different elements" (Sharp, p. 151). To elucidate the problem of qualia, attractor networks should be envisioned as the neural correlates of subjectivity, as each individual's network reflects a different perceptual experience. Regardless, even qualia-denier Daniel Dennett affirms this plasticity by suggesting that the "functional variability of subjective experience is itself plastic over time" (1980, p. 408). He claims that *basic actions* (correlated here to attractor networks) "have been discovered to be variable, and subject under training to decomposition (one can learn with the help of 'biofeedback' to will the firing of a particular motor neuron 'directly'), so what counts for an individual as the simple or atomic properties of experienced items is subject to variation with training" (Ibid). Thus, training in the form of meditation can change the experience of perception, evinced by inducing specific biofeedback changes. In the final section, arguments for the loosening of attractor network brought about by meditation will

show how the experience of subjectivity is affected. Sharp uses existing studies on global

activation patterns gamma patterns and increased secondary-messengers to explain how a re-

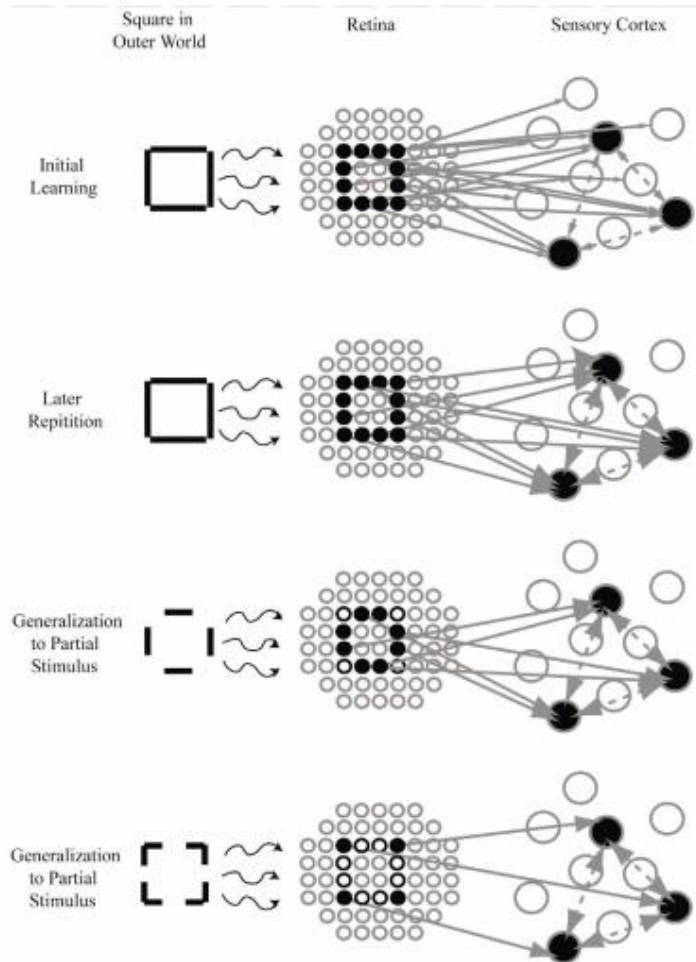wiring of the brain brought about by meditation.

Figure 6. Excerpt from Sharp's Conceptualization of Attractor Networks (2011)

Increased gamma EEG waves are often associated with increased practice of Tibetan

Buddhism (Cahn & Polich, 2006). Crick and Koch saw these oscillations (around 40 Hz) to

reflect binding, thereby supporting the theory of synchronicity as a facet of conscious perception. Global Workspace Theory similarly proposes that enhanced connectivity creates a conscious context. Conscious Mental Field theory attempts to interject the particular location of consciousness outside of the physical realm. Thus, if consciousness is an emergent property, these oscillations would be reflections of consciousness at work through the binding of information. Consciousness in terms of Buddhist meditation is marked by an increased global connectivity through gamma synchronicity as well as a decrease in specific regions, such as the frontal lobe. The elimination of a specific set of firing patterns reflects neuroplasticity. With decreased executive processing, thoughts become less affected by subjective perception. This leads to the affirmation of the Buddhist claim that practicing meditation promotes clarity towards a true reality.

As opposed to task-specific, conditioned, highly-localized thought patterns, Sharp claims that "meditation practice somehow initiates global, synchronous activation of the cholinergic groups which, in turn, pace the synchronous cortical theta and gamma oscillations" (2011, p. 164). Sharp further speculates that higher acetylcholine levels can also mediate attractor networks. Learned behaviors are accomplished through conditioning. Conditioning may be evinced by amplified input strength of afferent inputs through Acetylcholine (Giocomo and Hasselmo, 2007 cited in Sharp, 2011, p. 159). Likewise, acetylcholine mediates the response to sensory inputs as an excitatory secondary messenger. Learning is likely conditioned by the integration of working memory into long-term memory.

Identity and experience are tied to our sense of uniqueness. If we maintain a perspective that each of our phenomenal consciousnesses is different, then a unified theory of consciousness could not include phenomenal consciousness in its foundation. As experience

is conditioned, there is a possibility that it can be unconditioned. If the unconditioning of experience is a promised outcome of meditative practices, then these practices can be used to research a default conscious network, which Sharp refers to as "primordial awareness" (p. 158). Not only that, increased meditation also promises greater control over attention and awareness. It may provide insight into the nature of the self as the modulator of consciousness. Essentially, in the PMM centers the floating self in an ongoing balance between Everyday/Phenomenal Consciousness and Buddha-Awakening/Pure Consciousness, with the latter reachable through meditative practice.

IV. Proposed Experiment

3. Literature Review

Introduction

The argument substantiating Sharp's claims

by looking at implicit bias

4. Materials and Methods

Participants

Materials and Procedure

Meditation Technique and Administration

5. Predicted Results

6. Conclusion and Discussion

3. Literature Review

Introduction

Implicit Bias is brought about unconsciously by a typical conditioned response. The most popular test for implicit bias is the Implicit Association Test, which was devised as a method to measure automatic associations (Greenwald et al., 1998 cited in Lueke and Gibson, 2015, p. 285). As Sharp concludes, meditation should weaken a conditioned response by reducing the role of previously formed attractor networks. In defining Implicit Bias, the creator of the Implicit Association Test, Anthony Greenwald claims "the science of implicit cognition suggests that actors do not always have conscious, intentional control over the processes of social perception, impression formation, and judgment that motivate their actions" (Greenwald, 2006, p. 946). To connect this definition to Sharp's claims, existing attractor networks that are modulated by social conditioning may form implicit beliefs. Greenwald defines a social *stereotype* as "a mental association between a social group or category and a trait" (Greenwald, 2006, p. 948).

Reducing implicit bias through meditation can show the effectiveness of reducing the rigidity of attractor networks. Attachment to socially conditioned notions of race should become less prevalent in bias-based examinations. Racial bias arises from media influenced (often negative) portrayals of race as part of the experiences catered by our environment. Lacking familiarity with the differences between a specific construct, a racialized identity, causes for incomplete conceptualizations to be formed based on available information. For instance, unfamiliarity with "out-groups" is likely to contribute to the formation of incomplete stereotypes (Dasgupta, Greenwald & Banaji, 2003). Instead of treating each

person as different, one creates ideas based on minimal amounts of information. These constructs, reflected by the formation of attractor networks mediated by long-term potentiation

This examination attempts to integrate previous scientific data on racial bias to answer the overarching question of "How conscious is racial bias?" This question is further broken down into two parts: (1) How does bias fit into a model of consciousness? and (2) How do measures of bias indicate conscious integration of stimuli? Briefly, these questions will be answered, with a linear literature review to follow.

(1): Bias reflects learned associations based on memory that is used to further categorize novel stimuli. Racial bias is one example of how subjective experience can affect the processing of objective information towards an emotionally modulated response.

(2): Integration of stimuli in response to faces requires both limbic and executive processing. The concurrent and recurrent processing of these multiple pathways results in Hebbian attractor networks at both lower (limbic) and higher (executive) levels of conscious integration. A measure of bias would indicate the formation of a particular attractor network that pairs two or more ideas (e.g., "good" with "Black") together in a network. The pairing of these ideas represents subjective associations particularly if the associations involve an immediate, largely involuntary fear response.

The argument substantiating Sharp's claims by looking at Implicit Bias

- **Attractor networks are characterized as a pattern of activation that is reinforced through learning** (Fig. 6) (Sharp, 2011).

- **Meditation can act to regulate the longevity of synaptic plasticity through an increase in modulatory neurotransmitters**. Serotonin and norepinephrine are typically increased through meditation (Newberg & Iverson, 2006). These neurotransmitters play a role in modulating the longevity of a memory (Bliss & Cooke, 2011). Furthermore, meditation has shown to correlate with self-induced, global activation gamma wave patterns in long-term practitioners (Lutz et al., 2004). Thus, short term and long term neural effects of meditative practice can be observed and correlated to behavioral output. Furthermore, global changes of brain patterns induced by meditation allows for the reduction of Hebbian weight placed on any sort of localized attractor network, corresponding to reduced subjectivity and heightened awareness (Sharp, 2011, p. 164).

- **Implicit bias can influence memory, perception and behavior** (Blair et al., 2013). Bias originates from social conditioning brought about by our environment. This learning would create synchronized Hebbian networks that reflect such bias stored in memory. Racial bias, particularly towards unfavorable perception of African-Americans is likely formed by negative media portrayal that creates negative social stereotypes especially related to crime (Dixon, 2008). Furthermore, conditioned racial bias is associated with more rapid *learned* avoidance of threatening out-group individuals (Lindstom, Selbing, Molapur & Olson, 2013). Learning bias can be characterized as an adaptive characteristic, as would be long-term potentiation and attractor networks.

- **Implicit bias is evinced through the speed at which novel stimuli are categorized**. When presented with a "White" or "Black" face prime at a sub-awareness threshold (200 msec), participants were asked to identify an object as a tool or a gun (Amodio et al., 2004). Participants were not only more likely to categorize an item as a gun following a "Black" face, but they also tended to wrongly categorize a tool as a gun following a "Black" face. These findings imply strengthened associations between "Black" faces and weapons as an indicator of implicit bias. Essentially, racial bias shortens response times and shapes our perceptions without regard to objective accuracy.

- **The Implicit Association Test (IAT) measures rapid, conditioned processing and categorization**. Limbic processing reflecting a fear response likely occurs at a level below awareness. Instead of directly measuring complex decision-making facilities, the IAT reflects implicit biases formed at an automatic level of processing most likely based in amygdala activation. For instance, a patient with damaged right-hemisphere posterior inferior parietal lobe (a region critical to complex perception of emotions in faces) exhibited an amygdala response when presented with perceived and extinguished fearful faces (Vuilleumier et al., 2002). Unlike other emotions, fear is more likely to be perceived and processed even at low levels; this is demonstrated by "enhanced amygdala activity and increased functional coupling between the amygdala and ventral visual system" supporting the strengthening of attractor networks based on fear conditioning (Amting, Greening & Mitchell, 2010, p. 10045). Moreover, a higher amygdala response to African-American faces was demonstrated by both Caucasian-American and African-American subjects potentially signifying "a reflection of culturally learned negative associations" regarding African-Americans (Lieberman et al., 2005, p. 721).

4. Materials and Methods

To my knowledge, only one study so far has applied mindfulness meditation to reducing implicit race bias (Lueke & Gibson, 2015). Central Michigan Psychology Professors, Adam Lueke and Bryan Gibson's experimental set-up will be used as a basis for designing an experiment. They split their participants into two conditions: a 10 minute guided mindfulness meditation tape and a short historical text. Subjects took both age and race implicit bias tests following either condition. Participants who underwent the meditation condition had significantly lower mean meditation results.

Participants

- 60 "White" (European-American/Caucasian-American) college students: 25 male, 25 female
- Study advertised as 20-week biweekly, 30 minute meditation training
- Preferably students with pre-existing high initial race bias

Lueke & Gibson accepted participants of all races, but only used the data points from European-Americans for their final results for consistency of participant demographics. A similar practice will be followed here. A flaw in their experiment was the use of a between-group design. There exists the possibility that the mindfulness group has initially lower bias to begin with. Additionally, longitudinal analysis can provide us with results showing more significant trends than through looking at the effect of one isolated session. With training, meditative abilities tend to improve, as evinced through Buddhist philosophy (Lutz et al., 2005). Since the attainment of Pure Consciousness requires prolonged, directed effort, the deterioration of subjectivity should be most pronounced through meditative practice.

Materials and Procedure

Implicit Association Test is used from Project Implicit web site to measure implicit race bias. It presents a series of six European-American faces and six African-American faces (Fig. 3) along with eight positive (joy, love, peace, wonderful, pleasure, glorious, laughter, happy) and eight negative words (agony, terrible, horrible, nasty, evil, awful, failure, hurt). Participants are asked to sort the faces according to race (European-American or African-American) and the words as positive or negative. It is split in a traditional seven-block format with sections for learning and testing categorization.

A within-groups longitudinal model will be used to maintain consistency of individual differences across all conditions and to show the cumulative effect of practice over time. The five conditions are: no meditation experience, one hour of meditation, ten hours, twenty hours, and forty hours. Participants take the IAT following the completion of each condition. Potential changes to the IAT may be advised to introduce novel faces and words to reduce familiarity or learning. Journaling about the meditative experience would be encouraged to provide for extra sources of data analysis.
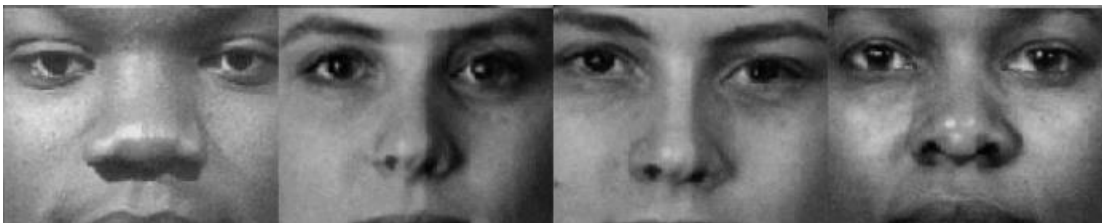

Fig. 4. Sample images from Race Implicit Association Test (Ambridge, 2014).

Meditation Technique & Administration

Participants will be instructed in *Vipassanā-Samatha* breathing meditation twice a week for 30 minutes in a group setting. Instead of drawing from religiously-affiliated texts, instructional text from secularist Sam Harris will be used for meditation training to avoid scientific conflict with faith-based dogmatic beliefs. As a neuroscientist and atheist, Harris treats Buddhist meditation as a philosophy and extracts it from religious teachings. Likewise, he presents the most concise and clear guide to meditation. Furthermore, the directions are surprisingly similar to the ones I received from a Theravada Buddhist temple in Thailand, so I believe they correspond well to *Vipassanā* tradition.

How to Meditate (Sam Harris, p. 39 – 40)

1. Sit comfortably, with your spine erect, either in a chair or cross-legged on a cushion.
2. Close your eyes, take a few deep breaths, and feel the points of contact between your body and the chair or the floor. Notice the sensations associated with sitting—the feelings of pressure, warmth, tingling, vibration, etc.
3. Gradually become aware of the process of breathing. Pay attention to wherever you feel the breath most distinctly—either at your nostrils or in the rising and falling of your abdomen.
4. Allow your attention to rest in the mere sensation of breathing. (You don't have to control your breath. Just let it come and go naturally.)
5. Every time your mind wanders in thought, gently return it to the breath.
6. As you focus on the process of breathing, you will also perceive sounds, bodily sensations, or emotions. Simply observe these phenomena as they appear in consciousness and then return to the breath.
7. The moment you notice that you have been lost in thought, observe the present thought itself as an object of consciousness. Then return your attention to the breath—or to any sounds or sensations arising in the moment.
8. Continue in the way until you can merely witness all objects of consciousness— sights, sounds, sensations, emotions, even thoughts themselves—as they arise, change, and pass away.
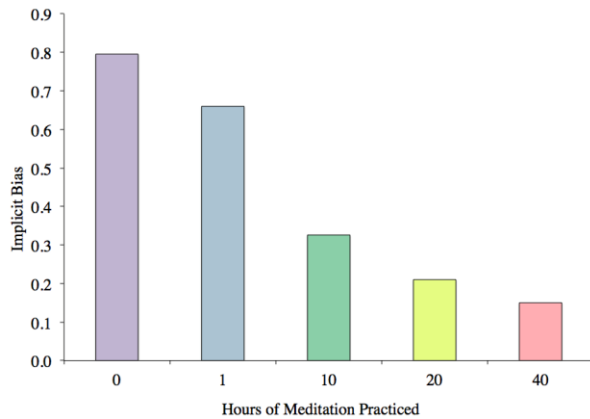
5. Predicted Results

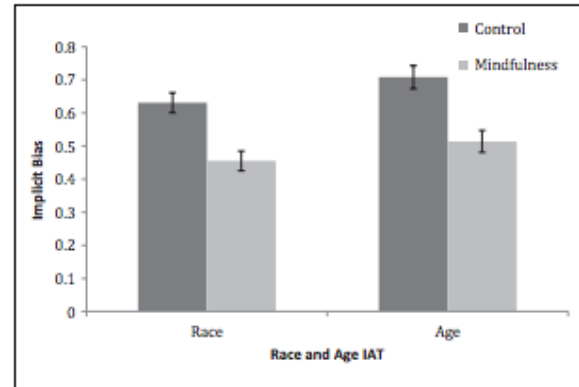**Figure 6.** Anticipated results from Implicit Association Test

Figure 7. Implicit bias on race and age IAT for the control and mindfulness conditions in Lueke & Gibson (2015)

Higher scores correspond to higher amounts of implicit bias. A reduction of bias over time is expected (Fig. 6). It is assumed that an exponential decrease is more likely than a linear one as 0 implicit bias is potentially unattainable. Numbers are based on results from Lueke & Gibson (Fig. 7). The ideal group would start with high implicit bias to demonstrate a great reduction over time.

An analysis of variance (5 x 1 ANOVA) will likely show differences between all conditions, with the greatest differences between the earlier conditions (no meditation, 1 hour, 10 hours). It is likely that implicit association scores will not become significantly lower with over 20 hours of meditative practice, but that the within-group variability will be lower as meditation practice increases.

6. Conclusion and Discussion

Ultimately, a conditioned fear response inhibits positive social behavior in a diverse global society. The formation of prejudice reflects a consciousness that subjectively perceives an external reality.

The results suggest that by focusing on the perception of awareness through *Vipassanā-Samatha* meditation, subjectivity in the form of a conditioned negative or fearful response to African-American faces is reduced. Bias towards other groups should be investigated, as well as towards skin tone, facial expression and portrayals of stereotyped groups in the media. An interesting confound occurs in "White" participants who actively try to suppress racist remarks. They fare much worse on the IAT than their White counterparts who are not consciously trying to appear without racial prejudice (Frantz, Cuddy, Burnett, Ray & Hart, 2004). It is perhaps due to their fear of appearing biased that elicits a biased response by activating fear-conditioned attractor networks.

Implicit bias is caused by conditioned experiences, particularly through exposure to negative stereotypes about certain groups of people. These influences fit into Baars's construct of "unconscious resources" (Fig. 4). Since it affects the Global Workspace of information, implicit bias should be characterized as conscious, but below the threshold of explicit awareness. Experiencing awareness is necessary for the modulation of attention to transform conditioned Phenomenal Consciousness into unconditioned Pure Consciousness. Figure 5 illustrates a working model for differentiating between the two poles of consciousness. The experience of awareness through directed meditative focus towards the nature of awareness strengthens the influence of Pure Consciousness on creating an objective

base for perception. On the other hand, the awareness of experience (through feeling, perceiving, sensing) increases the effect of Phenomenal Consciousness on modulating inputs, often based on working within pre-existing attractor networks.

The implicit association test (IAT) trains you to categorize words into "positive" and "negative" as well as people into "European-American" and "African-American." This categorization works to enforce separating faces into groups. Being considered a member of one of the groups, for instance, like identifying as a "White" person, can lead you to favor faces that are like yours, thereby indicating a preference for "in-group" members. However, the consistency of what a person considers to be a part of their group can differ based on cultural context, such as being raised in a multi-racial home or community. Impressions of the self and of other seem to be formed by interaction with the external world. As a human who feels and thinks, one would wonder what underlies such processes of mental formations? Baars identifies the self, intentions, expectations and perceptual contexts as influencing conscious experience (Fig. 4). The way these are formed, probably through experience, then affects the way we perceive things. Memory, especially working memory must also affect perception.

Since participants are taught to categorize and to form associations in the IAT, this can result in learning of bias. Even such a small amount of bias can be formed as a result of testing sequence. When the first testing category places "White" and "positive" on the left side, this could result in a minor form of learning bias. Likewise, hand dominance may also affect the rate of response to visual stimuli. These effects are countered by balancing the order of testing categories across the group. This means that for every person who received "White and positive" on the left, there will be a person who receives "White and negative" as

well as "Black and positive" and "Black and negative" as categories on that side. The effect of learned categorization has not been measured explicitly and how it may subtly affect results is ambiguous, but worth investigating. Different measures of bias may be useful, as opposed to word and race pairing. Yet because it is widely accessible, well established, and temporally based, the IAT works to measure amounts of implicit bias and provide data for speculation of how it can arise and be reduced through training. For instance, meditation practice could be used for future research as police sensitivity training to reduce automatic fear responses and to measure increased harmony in a society.

Measures of implicit bias reflect how our perceptions of reality may be skewed based on feelings and subjective experiences. Implicit bias was chosen to exemplify how these attractor networks function because speculating how bias functions changes the way we describe consciousness. A more accurate description brings in the aspect of awareness. Also, a more comprehensive definition would aim to draw in subjectivity into the description. If consciousness is defined as a waking state, then sleep and coma states are used to distinguish between conscious and unconscious states. Vegetative patients who cannot willfully modulate their brain are considered unconscious, while those that can might be minimally conscious (Monti et al., 2010). However, looking at minimally conscious states may not be able to fully capture an experience that is as rich as our own waking life.

The existing studies on meditation have already shown the ways that meditation works. It tends to decrease anxiety and depression (Peterson & Pbert, 1992). Likewise, meditation improves one's ability to control attention (Tang et al., 2007; Lutz et al., 2008). Just as with consciousness, we can often describe *how* something works but not *why*. A speculation for *why* meditation works is explained in this thesis by identifying a neural output, namely the

increase in secondary neurotransmitters or diffusion of gamma waves across the entire brain. Those processes underlie how the loosening of attractor networks occurs. As opposed to looking at the well-evidenced effects of meditation, bringing in implicit bias to the conversation allows for tests of the more obscure claims of Buddhist philosophy, particularly that meditation brings about a more objective view of reality. By creating an objective observer, meditation can train participants to use introspection to better understand their own consciousness. This can provide scientists with further insight on how Phenomenal Consciousness works and how it can be transcended. The attainment of Pure Consciousness is no easy task, though, and requires extreme directed effort, potentially in a monastery away from the everyday influences of society. Regardless, the effects of meditation, even small amounts, can prove beneficial towards removing attachment to notions which cause harm to us and others, such as prejudice.

We know certain things about consciousness in the sense that we know certain parts of the story, and many existing theories attempt to put together pieces of research to tell a story. Implicit bias ties in the part of the story regarding plasticity of one's conscious, and how that could be achieved and evidenced through meditation. As studies on meditation have shown how it affects the mind, we can use this information to further delve into our own minds by practicing meditation. A future investigation towards the discussion of non-duality, the self, and free will in Buddhism would be useful towards how conceptualization are formed and who is in control of internal change. Buddhists would suggest that the nature of *Truth* would reveal itself through practice, and result in non-dual awareness in which object and subject are no longer separate. Yet this theorizing lacks testing to defend it. Therefore, it would be fruitful to find ways to measure how meditation produces the changes that Buddhist

philosophy advocates that it does. Moreover, as these substantial mental changes are often accompanied by moralistic text, looking at Buddhist monks who uphold religious text may offer different results that using meditation solely as a tool. Indeed, it grew as part of a religion promising spiritual and cognitive enlightenment, not stress-reduction.

The nature of all things as impermanent is a Buddhist idea. Actually, it's more than that, "it's Real. It is right in front of you, now. Your body and mind are nothing but impermanence. But we generally see impermanence as an object. We don't see it as ourselves" (Katagiri, 1998, p. 39). Our mental conceptualizations of things are essentially subject to change much like leaves decompose and stars expand. Buddhist meditation advocates for the training of the mind to tune in to ultimate *Truth*: "The spiritual life is about approaching Truth directly" (Katagiri, 1998, 138). By realizing the true nature of things as impermanent, we can be released from attachment. Like this, we release our minds from the formulations that are created in the same way Sharp claims that attractor networks are loosened through Buddha-Awakening. Until then, we may be stuck in worlds inside our minds that may be quite unlike the one in front of our eyes.

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