Awe as a Self-Transcending Emotion

by

Alexander J. Stell

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Declaration

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Alexander J. Stell

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With love and awe for you all,

Alex

Contents

Preface

This thesis is written using the "papers-based" European/US format, which consists of a collection of studies as manuscripts submitted for publication. These studies are preceded by an introduction chapter which explores the aims and rationale for the work and presents relevant literature, and ends with a brief summary of each study. The conclusions chapter integrates the findings and relates them back to wider questions in the literature. Each empirical chapter can also be considered as a standalone piece of work. At the time of writing, data from Chapters 2 and 5 are being prepared for submission to international peer-reviewed journals, co-authored by myself and Dr. Tom Farsides.

Alexander J. Stell

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Summary

Although long evading scientific scrutiny, the emotion awe has recently come under sustained analysis by experimental social psychologists. Nevertheless, very little is known about its nature, function, elicitors and effects on human behavior. This thesis offers a data-driven experimental analysis of awe, exploring the theme that the emotion involves a transcendence from mental maps of the self and the world. From this central motif, we explore more narrowly-defined questions, such as whether awe is associated with transcendence from implicit social cognition, the desire to conform, and the need for social inclusion. We also explore whether other techniques that elicit self-transcendence serve to amplify the awe experience.

Utilizing a randomized control trial methodology, we found that awe, compared to other positive emotions and neutral states, was causally associated with lower implicit prejudice towards groups based on gender and ethnicity. We also proposed and successfully detected a mechanism for this effect, namely the strengthening of an identification with all humanity. We found mixed support for the idea that awe is associated with a lesser need to conform and be socially included. Finally, in exploring possible elicitors and amplifiers, we detected a positive association between dispositional awe and mindfulness and found that experimentally-elicited mindfulness can activate awe even towards relatively ordinary stimuli.

This thesis builds upon and refines the idea of awe as a self-transcending emotion, offering insights on particular aspects of cognition and behavior that are changed by the experience. We have also located some promising new paths of investigation that future researchers may find useful to follow further. In summary, the present work helps extend the exploration of the nature and function of an undeniably profound human experience.

Chapter 1

Introduction: Awe as a self-transcending emotion

*"*One cannot help but be in awe when contemplating the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of the mystery every day. The important thing is not to stop questioning; never lose a holy curiosity*"*

—Albert Einstein (cited in Isaacson, 2008, p. 548)

Throughout human history, the emotion awe has been central to the experience of art, religion, science, politics and nature. Although fleeting, moments of awe can change lives, fundamentally restructuring beliefs, motivations and values. Despite being a popular subject within philosophy and sociology, psychology has, up until recently, had very little to say about awe. Although research has begun appearing in top psychology journals, the deeper significance of awe, the reason the experience is cherished as one of life's most meaningful events, its centrality to many domains of human existence, would appear to outstrip current portrayals offered in the extant literature.

In any subject covered by the human sciences, there is a time for open exploration of emerging constructs and a time for confirming what we already suspect. Our position is that the status of awe – a relatively unexplored emotion, with unknown promise – lends itself more to the former of these. Thus, this thesis aims to dip its toes just a little bit deeper into the untapped significance of awe. Utilizing work that comes from diverse sub-disciplines of psychology, our aim is to locate and explore promising avenues that are, as yet, not accounted for within current research. Nevertheless, whilst

the breadth of this project can be considered in nature exploratory – and necessarily so – we have sought to provide a rigorous, confirmatory approach to data collection and analysis. In this sense, we hope to provide a data-driven account of some important questions that go to the heart of what awe "is" and what it "does". We maintain that as research on awe is preliminary, at this time it is difficult to provide a watertight definition and that attempting to do so would be putting the cart before the horse: it is only through further study that we will know how to properly define it. Nevertheless, we will now outline our working conception of awe, especially as it informs the hypotheses contained in this thesis.

Following the overwhelming majority of other awe researchers (Ekman, 1992; Izard, 1977; Keltner & Haidt, 1999, 2003; Piff, Dietze, Feinberg, Stancato & Keltner, 2015; Lazarus, 1991; Shiota, 2014a, 2014b, Shiota, Keltner & Mossman, 2007; Valdesolo & Graham, 2013), we agree that awe should be thought of as an emotion: a coherent package of perceptions, thoughts and feelings that is of limited duration, motivated by elicitors in the environment and that, in turn, motivates behavior towards the environment[1]. Research on awe, like that carried out on other emotions, has begun to identify common elicitors, phenomenological experiences and qualities associated with the state as well as observable effects on behavior. Although we will consider these in more detail below, in general, awe is believed to be elicited by powerful objects, events or persons that contravene expectations to the degree that individuals are motivated to update their working maps of the world (i.e. schemas) in response (Keltner & Haidt, 2003; Shiota, 2014a, 2014b; Shiota et al., 2007). A colloquial expression we

[1] It is, we believe, possible to contrast awe, the emotion, from awe the sentiment, in which the latter refers to a longer lasting attitude of approbation towards a given person, object or event. This sentiment might be likened to an intense form of respect or admiration and is captured by the phrase "being *in*-awe" of someone or something. It is awe as an emotion that we will be considering in the current work.

believe captures this quality is that of having one's "mind blown". The awe experience also seems to involve further downstream consequences for the self, such as fostering the feeling of being a small dot in an impossibly vast universe or that of having a deep connection towards all beings (Bonner & Friedman, 2011; Piff et al., 2015; Shiota et al., 2007). In subsequent chapters, we will explore how such qualities can influence identification with more universal categories of self, tendencies towards openness and curiosity as well as mindfulness.

The proposition that awe is an emotion is, of course, not uncontestable. Whilst such an approach has generated a good deal of empirical research, future scholars may find that it is better thought of as a blend of other emotions (e.g. Plutchik, 2001) or even something else entirely. This lack of certainty is not peculiar to awe; whether it is appropriate for psychologists to label any of the constructs we study as "emotions" is unclear as there is still no widespread consensus on what constitutes an emotion (Beck, 2015). Then there is the distinction some scholars make between "basic" emotions and ones that, although socially constructed, may not be hard-wired into human physiology and thus are not universally observed amongst our species (Ekman, 1992). In the case of awe, we believe it to be of limited value to debate such matters at the current juncture as it is not something that can be decided in an *a priori* fashion. Rather, the usefulness of such classifications will be borne out (or not) by sustained empirical research, especially that dealing with cross-cultural comparisons of the awe experience (see Bai et al., 2017 for an initial example of such work). With that said, research is beginning to find support for the 'basicness' of awe as an emotion. For example, it is reliably associated with particular elicitors and effects (Shiota et al., 2007) even across different cultures (Bai et al., 2017), produces specific changes in autonomic nervous system

responding (Shiota, Neufeld, Yeung, Moser, & Perea, 2011), as is associated with particular facial cues (Campos, Shiota, Keltner, Gonzaga & Goetz, 2013).

As the possible avenues for research are vast, in structuring our investigations, we have made use of a central narrative that provides a focus and serves to integrate our specific hypotheses. Exploring the importance and rationale of this characterization will be the aim of this introductory chapter. Specifically, we will propose that awe is to be understood as an emotion of self-transcendence.

Self-transcendence: an introduction

Changes in human society have frequently been the result of individuals who have, at one time or another, experienced a moment of self-transcendence. In such moments, the ordinary, every-day limits of a person's abilities, beliefs or understanding gives way to something that can be described as 'higher'. The prophet's illumination, the scientist's eureka moment, the civil-right's leader's 'dream' and the artist's inspiration all share the same quality: they speak of a reality that goes beyond that of the present.

Self-transcendence is the experience of seeing oneself and the world in a way that is less limited by the usual boundaries of one's ego identity and often involves a heightened sense of meaning and connectedness (Van Cappellen & Rimé, 2014). Self-transcendent emotions are those that function to focus individuals away from their own individual needs and desires and toward a greater good (Stellar et al., 2017).

We will argue that awe is fundamentally an emotion of self-transcendence. Awe's capacity to promote a journey beyond the boundaries of identity, beliefs, habit and understanding is perhaps its most important quality. It is also the aspect that most strikingly differentiates it from other positive emotions. Finally, self-transcendence may

be regarded as a general mechanism that connects awe's more 'down-stream' effects on cognition and behavior, some of which are investigated in our empirical chapters.

Although a present-tense experience of awe has a striking phenomenological quality, we must also acknowledge that, like other emotions, its roots are likely embedded in our evolutionary past and to some extent coded into our biology. For this reason, many parts of the awe story are spread across different domains of psychology. We will consider work conducted within social, cognitive, evolutionary and humanistic psychology.

In beginning this overview, we will start from the perspective that dominates research on emotions generally and awe specifically: the functional adaptive approach. Exploring the evolutionary underpinnings of awe helps us to answer the question "where has it come from?" and in so doing, provides a fertile ground for generating testable hypotheses regarding the emotion's effect on modern humans.

Adaptive approaches to positive emotions

The debate over which aspects of an emotion are innate rather than socially constructed is far from over. Nevertheless, since the early 1970s, studies conducted by two independent research teams had begun to document high-levels of cross-cultural agreement on the meaning of several prototypical emotional expressions (Ekman, 1971; Izard, 1977). This provided the first strong evidence that some aspects of emotion may be inherited rather than learnt. In the ensuing 40 years leading to the present day, evolutionary approaches to emotion have gained significant ground and there is now widespread agreement among researchers that human affect is fundamentally a product of natural selection (e.g., Ekman, 1992; Frijda, 1988; Lazarus, 1991; Nesse & Ellsworth, 2009; Russell, 2003; Scherer, 2009; Tooby & Cosmides, 2008).

Earlier evolutionary approaches tended to overlook positive emotions as the "selection pressures" that were thought to define an emotion's function were equated – too narrowly, it is now believed – with mortal threat. Given the tenets of evolutionary theory, it was straightforward to predict, for example, how complex patterns of behavior that served to promote escape from predators, avoidance of toxins and retaliation against untrustworthy conspecifics were adaptive. Thus, several negative emotions such as fear, disgust and anger became part of the evolutionary canon (Ekman, 1992; Lazarus, 1991; Levenson, 1999). In contrast, the emerging emotion science of the late 1980s and 1990s included just a single positive state (e.g. Ekman et al., 1987; Levenson, Ekman, Heider, & Friesen, 1992; Scherer, 1997).

It is only since the turn of the 21st century that evolutionary approaches began being consistently applied to positive emotions. In part, this has been due to an expansion of the thinking on what constitutes a selection pressure. As Cosmides and Tooby (2000) point out, adaptiveness is defined by the total lifetime fitness consequences of a mutation and its associated traits. In this regard, situations that either decrease or increase fitness can be considered adaptive. Thus, traits that promote opportunities to *enhance* fitness are as important as traits that prevent threats to life and limb (Kenrick & Shiota, 2008; Tooby & Cosmides, 2008).

The notion that positive emotions served to enhance fitness in our evolutionary past lies at the heart of most modern theories of positive emotion. One key inspiration for these approaches was the work of Jeffrey Gray (1982) who identified neural substrates underpinning two systems of mammalian motivation. Gray found that, in the face of a threat or punishment, one system served to inhibit behavior. However, when a reward is anticipated, another system activates behavior. The orthogonality of these two systems has been supported at the trait level and experimental situations priming either

punishment or reward have been found to elicit inhibition and activation respectively (Carver & White, 1994). At a neural level, many point to the dopaminergic circuit – an area that includes the nucleus accumbens, ventral tegmental area, amygdala and some parts of the pre-frontal cortex – as a substrate underlying a wide range of reward-approach behavior. (e.g. Bartels & Zeki, 2004; Blood & Zatorre, 2001; Glocker et al., 2009; Kampe, Frith, Dolan, & Frith, 2001; Koepp et al., 1998; Mobbs, Greicius, Abdel-Azim, Menon, & Reiss, 2003; O'Doherty, 2004; Small, Zatorre, Dagher, Evans, & Jones-Gotman, 2001). It is partly the ubiquity of the dopaminergic circuit within a large and diverse set of positively-valenced human experiences that caused earlier theorists to posit a common mechanism that served to connect positive states with fitness opportunities (Shiota, 2014a).

Whilst approach motivation theories focused on the immediate rewards of positive emotion, another theory that identified possible longer-term effects began gaining interest and scholarship. The broaden-and-build model (Fredrickson, 1998, 2001), whilst still undergirded by the idea that positive emotions promote opportunities to enhance fitness, posits several specific cognitive changes that positive states enact on individuals. These serve to broaden attention to the environment and build long-term material, cognitive and social resources. A growing body of research attests to the general plausibility of the broaden-and-build model. Experimentally-elicited positive affect has been found to enhance a global, big-picture attentional focus rather than a local, detailed-orientated focus (Fredrickson & Branigan, 2005). Positive emotions have been shown to operate by means of an "upward spiral" in which positive affect enhances social support, coping, resilience and physical health, which lead in turn to further positive emotions and higher well-being (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Kok et al., 2013; Tugade & Fredrickson, 2004).

Nevertheless, the broaden-and-build model inherits the legacy of earlier adaptive approaches in focusing on proposed global effects on cognition and behavior and minimizing the analysis of possible differences in the profiles of different positive emotions. Whilst the idea that positive emotions exert family-wise effects is not incompatible with the idea that different emotions exert specific effects, other researchers began drawing attention to the importance of these between-emotion differences.

Guiding work on discrete positive emotions is the proposal that, since different kinds of fitness-relevant opportunities would have been presented over the course of human evolution, it is likely that patterns of behavior aimed at solving specific adaptive problems would have emerged (Shiota, 2014a). Thus, emotions may be conceptualized as coherent packages of physiological, cognitive, motivational and behavioral responses that are united by their 'design' to solve a particular adaptive problem (e.g. Levenson, 1999; Tooby & Cosmides, 2008). The power of the functional-adaptive or simply, functional approach, has been in its capacity to utilize theories regarding the function of specific emotions to develop testable hypotheses about diverging, as well as overlapping effects on behavior (e.g. Campos, Shiota, Keltner, Gonzaga & Goetz, 2013). For this reason, the functional approach has generated a good deal of solid empirical science. Although a comprehensive review of this work is outside the scope of the current work (for a review see Shiota, 2014a and Table 1), its application to awe will be a valuable resource in the present work.

Emotion	Adaptive opportunity and function
Enthusiasm	Acquire food, other material resources
Contentment	Rest in safety to digest, encode route to success
Sexual desire	Attract high-quality mate
Nurturant love	Nurture altricial offspring, vulnerable kin
Attachment love	Elicit others' nurturance and care
Pride	Increase status among conspecifics
Amusement	Develop flexible, complex cognitive-behavioral repertoire (i.e., "play")
Awe	Accommodate new information from environment

Table 1: A taxonomy of functionally discrete positive emotions
(reprinted from Shiota, 2014a)

Awe's adaptive function

An early account of the evolutionary significance of awe is found in the work of McDougall (1910). Paralleling Einstein's words above, he identified what he called "wonder" as directly tied to the instinct of curiosity. For McDougall, instincts were defined in a way similar to what modern researchers refer to as basic needs: "an inherited or innate psycho-physical disposition which determines its possessor to perceive, and to pay attention to, objects of a certain class, to experience an emotion excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner or at least to experience an impulse to such action" (McDougall, 1910, p. 29). McDougall placed emotions generally, and wonder specifically, at the heart of his theory of motivation. Similarly, Izard (1977) conceptualized awe as as an intense variety of interest and viewed the capacity to promote curiosity and exploration as principle amongst its functions.

Beyond the two accounts just mentioned, up until the 21st century, a sustained consideration of awe has been lacking from theories of emotion. Lazarus (1991) treated awe as an ambiguous negative state that varied depending on elicitors and context. Ekman (1992), in an otherwise thorough work, notes only that there is a "reasonable chance" that awe may come to be considered a basic emotion.

Keltner and Haidt (2003) offered the first substantial treatment of the possible functions of awe in a paper that continues to be influential. Drawing on earlier psychological sources, as well as those from philosophy, sociology and the study of religion, Keltner and Haidt (2003) laid out a "prototype approach" in which awe was defined by identifying components or features that appear integral to the experience. The authors conceptualized prototypical awe as the combination of two components: the perception of a powerful (or what the authors termed "vast") object coupled with a felt need to accommodate the experience. This accommodation is meant in the Piagetian sense: the process of reorganizing existing mental structures to incorporate novel experiences. In postulating the adaptive relevance of the first of these components, Keltner & Haidt (2003) suggested that, in humans, awe may have emerged as a deferential response to powerful, high-status others, specifically those that displayed a high degree of technical skill or mastery, or what evolutionary theorists term "prestige" (Henrich & Gil-White, 2001). Such reactions may have held adaptive relevance to the degree they constituted a non-violent means of establishing hierarchies that are important for human survival (Fiske, 1991; Keltner & Haidt, 1999). This notion is consistent with ideas found in sociology and cultural anthropology (e.g., Durkheim, 1887/1972; Weber, 1978) in which awe has been understood to be a means by which powerful leaders or regimes leverage buy-in from their followers. Keltner and Haidt (2003) highlight that some of the features observable in the modern experience of awe –

e.g. passivity in the face of power and heightened attention – may be the vestiges of the primordial dynamic between subordinate and superior.

Evidence that comparative judgments such as higher/lower or greater/lesser are present in the modern experience of awe lend credence to Keltner and Haidt's (2003) proposal. Recent work in social psychology has shown that in awe, contact with a vast elicitor is accompanied by the perception that the self rescinds in comparison; the awe-inspired feel themselves to possess a "small self" (Bai et al., 2017; Piff et al., 2015). This momentary alteration of selfhood was found to be a mechanism by which awe effects increases in pro-social, helpful behavior (Piff et al., 2015).

Whilst Keltner and Haidt's (2003) account focuses on the the first component of awe – experiential vastness – it offers little in the way of explanation for the second: accommodation. Whilst submissive behavior towards high-prestige conspecifics may have held adaptive importance in isolation, awe's profile suggests that it is the working *combination* of vastness coupled with accommodation that suggests its full evolutionary significance. Indeed, it is possible that a high-prestige figure possessing information assessed to be beyond existing schemas may have provided circumstances that maximized learning in the era of evolutionary adaptedness (EEA). For example, when learning new skills, modelling a high status person's effective behavior is often more efficient than trial and error (Boyd & Richerson, 1985; Henrich & Boyd, 1998). Likewise, showing deference to a high-status other increases the odds of learning from them (Henrich & Gil-White, 2001). Fortunately, other theorists have picked-up from what is mostly implied in Keltner and Haidt's (2003) analysis: Namely, the striking informational and cognitive quality of awe.

Shiota (2014a) suggests that awe may have conferred selective advantage by promoting the capacity to form and update abstract mental representations of the world,

enhancing the degree to which novel information is processed from the environment and increasing cognitive flexibility. This account undergirds a growing body of empirical research. Dispositionally, awe is associated with high openness-to-experience (Shiota, Keltner, & John, 2006) and low need for cognitive closure (Shiota et al., 2007). Experimentally-elicited awe is accompanied by a pronounced withdrawal of sympathetic nervous system influence on the heart, consistent with an elevated intake of information from the environment (Shiota, Neufeld, Yeung, Moser & Perea, 2011). Compared to other positive emotions, awe seems to promote a more systematic approach to information processing. Typically, positive affect has been found to promote schematic thinking, where cognition tends towards the use of mental shortcuts (e.g. Bless, Bohner, Schwarz, & Strack, 1990; Bodenhausen, Kramer, & Süsser, 1994; Fiedler, 2001; Forgas, 1998). In one study investigating the effect of emotions on processing persuasive messages (Griskevicius, Shiota, & Neufeld, 2010), participants relied on heuristics if beforehand they had been induced to feel either anticipatory enthusiasm, amusement or love. In contrast, those elicited to feel awe showed *decreased* reliance on heuristics. Similarly, awe was found to decrease the tendency to remember details of an audio story that are consistent with schemas, but false (Danvers & Shiota, 2017).

Shiota (2014b) argues that some of the observable, behavioral features of awe may also indicate that it is driven by a motivation towards learning, rather than the affiliative focus seen in many other positive emotions. For example, facial expressions associated with awe are quite different from those of other positive emotions and lack the smile that is thought to indicate affiliative intent (Campos et al., 2013). The activities that individuals are motivated to partake in after experiencing awe are also somewhat different. Those elicited to feel happy cite social activity as an ideal next-

hour activity while the awe-inspired cite solitary activities such as walking in nature and creative activity (Shiota et al., 2007). Such evidence points to the possibility that awe may differ from other positive emotions in an important way. Specifically, awe may not only represent a specific solution to an adaptive problem, but also that it may reflect an entirely different *class* of adaptive problems.

Although different theoretical traditions carve up the territory of motivation in different ways, many agree that the need for *affiliation* is fundamentally distinct from the drive towards what may be called *mastery*. Maslow (1954) differentiated between needs for affection and belongingness from the pursuit of knowledge found in the higher stages of his pyramid of needs. Alderfer's (1969) ERG theory contrasted "relatedness" from "growth" motivations. Deci and Ryan (2000) differentiated between "relatedness" and "competence". Of relevance to the present discussion, Deci and Ryan's (2000) basic psychological needs are considered in terms of sets of specific adaptive problems.

Deci and Ryan (2000) argue that a domain-general drive for mastery would have conferred adaptive advantage in the EEA by "aiding in the discovery of alternative food sources, mapping the complexities of game migrations, or taking interest in skills, rituals, and social rules transmitted by other members" (p. 252). They argue that a motivation towards learning for its own sake would increase the likelihood of engaging inherited skills and increase a flexibility for adapting to new situations. Whilst Deci and Ryan (2000) do not mention awe, they argue that, in general, emotions are regulated by such basic psychological needs. They also suggest the need for mastery drives curiosity-based exploration and openness to the sensory experiences of nature.

The proposal that awe may motivate exploration and learning is reminiscent of McDougall's (1910) position presented at the beginning of this section. For this reason,

it is perhaps useful to address one of the chief concerns he had about it. McDougall (1910) reasoned that if wonder motivated curiosity and exploration, then it may not have been selected for due to the increased exposure to potential dangers that would occur. There are two possible answers to this. The first is that, as we have already mentioned, in the time McDougall (1910) was writing, the focus in evolutionary theory was on adaptations as solutions for preventing a loss of fitness, and not as opportunities for fitness enhancement. It is plausible that whatever dangers were inherent in exploration, they were outweighed by the opportunities it presented. Another possibility is that an appropriate mechanism that safeguards against reckless behavior is built into the awe adaptation. Some have noted the difficulty, if not impossibility, of experiencing awe if there is an immediate threat present in the environment (Konečni, 2005). This is a sentiment shared by both Burke (1757/1990) and Kant (1790/1986). Likewise, Maslow (1964/2014) argued that peak experiences – states that include awe – are available to individuals only once they experience a modicum of satisfaction in their basic needs, including the need for safety. Animal studies indicate that curiosity is only engaged when there are sufficient energy stores and no pressing emergencies (Nissen 1930; Panksepp, 2005). Such observations may be evidence of the evolutionary trade-off between the risk of danger and the opportunities for growth and exploration inherent in an experience of awe.

In summary, theories of the adaptive significance of awe portray it as an information-rich emotion that may have been selected for due to the advantages it presented in promoting flexibility in processing novel events, enhancing the capacity to update outmoded schemas, inspiring curiosity-based exploration, and developing new skills. As such, awe may be considered a “knowledge emotion” (Silvia, 2010) in that, rather than the drive for *affiliation* that underlies many other positive emotions, the

function of awe concerns what may be generally termed *growth*. However, adaptive accounts would predict this growth is one that specifically occurs in the presence of something judged as vaster, higher, greater or more powerful than ourselves.

The adaptive focus that lies at the heart of most emotion science has offered clear advantages for the emerging field of positive emotion. It has enabled researchers to use biologically grounded theory to develop a priori hypotheses that can be confirmed empirically. Such a framework has kick-started work on awe; an emotion that has long been considered too rare and too special to be subjected to scientific scrutiny (Keltner & Haidt, 2003). Nevertheless, it is important to recognize that any kind of evolutionary analysis of awe is limited in a number of ways. Firstly, we possess no direct knowledge of the circumstances in which any awe adaptation could have taken place such as particular selection pressures, or in which stage of phylogenetic history this may have occurred. Awe's emergence may not even have been an adaptation at all but rather an "exaptation" (an earlier adaptation that is modified to answer a new adaptive problem) or a "spandrel" (a trait that has no adaptive significance but has become species-typical due to a shared genetic origin with another adaptation; Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998). Additionally, whilst adaptive approaches seek to understand the form of a trait as encountered by ancestral humans or ancestor species, they lack the scope to understand how it is experienced in the modern day. For example, Keltner & Haidt (2003) make the distinction between primordial and elaborated awe: "Primordial emotion refers to the relatively hard-wired pre-cultural sets of responses that were shaped by evolution and built into the central and peripheral nervous systems of the human species. Elaborated emotion refers to the full set of culture-specific norms, meanings, and practices that cultures build up around primordial emotions" (p. 306). As such, in the next section we will be setting aside questions of

origin and evolutionary function and turn to work that explores the significance of awe to modern humans.

Awe as a self-transcending emotion

Although awe has occupied a central place in humanistic, existential and transpersonal traditions of psychology, its importance is often overlooked by those working outside of these areas. Although mostly eschewing confirmatory approaches to data analysis, these traditions offer a wealth of rich, qualitative data that may serve as an alternative ground on which to develop testable hypotheses.

For Kirk Schneider (2004, 2008, 2009), awe is not simply an emotion, but rather a lens through which he advances a far-reaching critique of modern society, as well as of the social sciences. Schneider argues that it is the depletion of awe in contemporary life that has created a modern malaise in which the depths of emotion are avoided and individuals instead seek the "quick-fix". He argued that psychology, as an extension of modern culture, may be complicit in promoting an illusion of superficial happiness, devoid of the depths of pain but also the pinnacles of joy: a watered down facsimile of human experience. Within Schneider's argument is the contention – one that is shared by other existentialists (e.g. May, 1981) – that the more a culture banishes mystery and uncertainty, the more it curtails individual growth: "There is little freedom, in other words, to suspend our resolution-mania, and dwell in the doubts, tangles, and uncertainties that lead to growth" (Schneider, 2008, p. 68). For Schneider, awe represents humans' "fundamental relationship to mystery" (Schneider, 2008, p. 68) and argues that it possesses the power to transform lives and facilitate optimal individual development by guiding individuals to face what is unknown or uncertain.

Schneider's position is the outcome of extensive case-studies and a career spent as a therapist and he is not alone in locating awe within a context of personal

development. Others have pointed out how awe is implicated in "quantum" shifts within psychotherapy (Miller, 2004; Resnicow & Page, 2008). Awe has been linked to the development of an advanced awareness in which fear of 'otherness' is replaced with reverence (Andresen, 1999). It has been argued to signal a moment of important insight; a bodily marker that something profound is taking place, and should be learnt from (Braud, 2001; Elkins, 2001). Others have echoed Schneider's position that awe may facilitate growth and transformation by increasing individuals' capacity to accept ambiguity (Armstrong & Detweiler-Bedel, 2008). Indeed, some have argued that awe may be considered a necessary condition for psychotherapeutic change (Adame & Leitner, 2009).

Perhaps the most substantial treatment on the role of awe in affecting personal transformation is found in the work of Abraham Maslow (1962/2010, 1964/2014, 1971). Emotions such as awe were central to what he famously termed "peak experiences" (Maslow, 1964/2014). Maslow believed that the capacity to have such experiences was an indicator of development within his stage-theory of motivation. Specifically, individuals operating at the higher stages of the pyramid – those he termed "self-actualizers" and "self-transcenders" –were thought to be more prone to peak experiences. Additionally, he believed that peak experiences could offer a fleeting taste of the values, cognitions and behavioral tendencies characteristic of those higher stages: "Any person in any of the peak experiences takes on temporarily many of the characteristics which I found in self-actualizing individuals" (Maslow, 1962/2010, p. 97).

Maslow proposed the term "being cognition" or "b-cognition" for the cognitive style characteristic of peak experiences and the higher stages of development. He contrasted this with "deficiency cognition" or "d-cognition" which typified the lower

stages. d-cognition operated when individuals are striving to meet their basic needs (safety, food, shelter), but also those that are more social (intimacy, belongingness, esteem). Maslow provided extensive analysis, garnered from numerous interviews, of the thoughts, emotions, perceptions and motivations associated with b-cognition. As such, Maslow's thoughts provide a promising source of hypotheses about awe.

For Maslow, b-cognition was associated with a transcendence from the purely personal concerns that dominate lower developmental stages.

> "The fully developed (and very fortunate) human being working under the best conditions tends to be motivated by values which transcend his *self*. They are not selfish anymore in the old sense of that term. Beauty is not within one's skin nor is justice or order. One can hardly class these desires as selfish in the sense that my desire for food might be. My satisfaction with achieving or allowing justice is not within my own skin... It is equally outside and inside: therefore, it has transcended the geographical limitations of the self."
>
> (Maslow, 1971, pp. 3–4)

Self-transcendence is both at the heart of Maslow's approach to peak experiences as well as placed atop his theory of motivation (for a helpful discussion of the importance of self-transcendence to Maslow's work, see Koltko-Rivera, 2006). Maslow's more specific claims regarding the effects of peak experiences follow from this central motif. Contextualizing awe within self-transcendence, Maslow preceded the position of more recent scholars (Haidt, 2003; Van Cappellen, Saroglou, Iweins, Piovesana & Fredrickson, 2013). Self-transcendent positive emotions are thought to be distinct from other emotions in that they do not concern primarily the goals of the self (Algoe & Haidt, 2009; Haidt & Keltner, 2004; Schindler, Zink, Windrich & Menninghaus, 2013). From the key assertion that peak experiences involve a

transcendence from the self, Maslow traced a host of more proximate differences in the cognition and behavior of "peakers". Some of these predictions will now be discussed with reference to current awe research.

By lessening the degree to which the world is experienced in terms of the goals of the self, peakers were thought to possess an enhanced perception of objects:

> "Peak-experiences are states in which striving, interfering, and active controlling diminish, thereby permitting Taoistic perception, thereby diminishing the effect of the perceiver upon the percept. Therefore, truer knowledge (of some things) may be expected and has been reported."
>
> (Maslow, 1964/2014, p. 85).

Such observations cohere with reports that the awe-inspired tend to be more focused on the world around them, and less concerned with the goals of the self (Shiota et al., 2007). Maslow linked this shift from self to object-focused attention with more specific cognitive changes. Echoing accounts that awe increases systematic processing of incoming information and reduces reliance on internal knowledge structures such as heuristics (Danvers & Shiota, 2017; Griscevicius et al., 2010), Maslow noted how "Another kind of cognitive process which can occur in peak-experiences is the freshening of experience and the breaking up of rubricizing" (1964/2014, p. 84). Maslow pointed to how, rather than being wedded to outcomes relevant to the self, peak experiences are experienced as self-justifying and inherently valuable:

> "The peak-experience is felt as a self-validating, self-justifying moment which carries its own intrinsic value with it. It is felt to be a highly valuable – even uniquely valuable – experience, so-great an experience sometimes that even to attempt to justify it takes away from its dignity and worth. As a matter of fact, so

> many people find this so great and high an experience that it justifies not only itself but even living itself".
>
> (1964/2014, p. 72)

Whilst there is little confirmatory work on the subject, it is widely thought within psychotherapeutic traditions that awe might imbue life with deeper sense of existential significance (Andresen, 1999; Braud, 2001; Elkins, 2001; Robbins, 2003; Schneider, 2004, 2008, 2009).

Maslow noted how peak experiences can involve a distortion in the perception of time: "In the peak-experience there is a very characteristic disorientation in time and space, or even the lack of consciousness of time and space... This kind of timelessness and spacelessness contrasts very sharply with normal experience" (Maslow, 1964/2014, p. 72). Recent work has confirmed that experimentally-elicited awe does indeed change time perception with individuals feeling like that they have more of it (Rudd, Vohs, & Aaker, 2012).

Maslow reported that, alongside transcendence of self, comes a transcendence of polarities, boundaries and conflicts: "In peak-experiences, the dichotomies, polarities, and conflicts of life tend to be transcended or resolved. That is to say, there tends to be a moving toward the perception of unity and integration in the world. The person himself tends to move toward fusion, integration, and unity and away from splitting, conflicts, and oppositions". This position is consistent with research pointing to how awe increases a sense of universalism. For example, those who dispositionally experience increased awe are more likely to identify with universal self-concepts such as "a person" or "an inhabitant of the earth" (Shiota et al., 2007). Likewise, awe-inspiring videos have been found to increase the "tendency to orient oneself toward a larger transcendent reality" (Saroglou, Buxant, & Tilquin, 2008, p. 169).

There may be tendency to equate transcendence with a loss of personal autonomy, but Maslow reports that the opposite is true. “In peak experiences, there is a tendency to move more closely to a perfect identity, or uniqueness, or to the idiosyncrasy of the person or to his real self, to have become more a real person… the person feels himself more than at other times to be responsible, active, the creative center of his own activities and of his own perceptions, more self-determined, more a free agent, with more “free will” than at other times” (Maslow, 1964/2014, p. 75). Whilst there is a growing body of research that documents how awe can increase individuals’ dedication to the “greater good” (Bai et al., 2017; Piff et al., 2015), as far as we can tell, there is no work that demonstrates that awe can also increase self-determinism and agency.

In conclusion, humanistic and transpersonal sources are both consistent with and move beyond the adaptive profile advanced in the previous section in which awe is understood as connected to a fundamental need for growth and exploration. Specifically, awe is framed in terms of a transcendence from the self’s everyday concerns, beliefs and actions and towards a connection with a larger, more meaningful and more inclusive vision of the world. Therefore, this experience can be considered one of both great agency and also great communion. The self that was previously concerned with deficiencies and a narrow goal-oriented behavior can momentarily step past its limitations, out into the unknown, which instead of being imbued with fear is lit by Einstein’s “holy curiosity” (Isaacson, 2008, p. 548). The sources presented in this section would suggest that this is the space in which personal growth may take place.

As we have seen, the assertion that awe involves self-transcendence is consistent with approaches found in both evolutionary and humanistic psychology. Whilst adaptive accounts emphasize the function awe may have held for ancestral humans,

humanistic treatments focus on the significance of the experience for individuals in the modern day. Although separated by differing epistemological foundations and methodological preferences, it is striking that the overall profile that emerges from each exhibits a good deal of convergence. Throughout the thesis, we will be utilizing work carried out across these disciplinary lines. Nevertheless, it is worth pointing out that we are mainly using particular theoretical perspectives – evolutionary or otherwise – as a means to generate hypotheses and take the perspective that these interpretations can (and should) be contested and critiqued. Whilst our empirical work may hold implications for such discussions, we are not primarily setting out to address the suitability of, for instance, particular evolutionary theories regarding awe.

Summary of studies

In four empirical chapters containing a total of twelve studies, we explored some of the implications of constructing awe as a self-transcending emotion. Chapters 2-4 focus on hypotheses regarding the effects of awe while Chapter 5 investigates factors that may facilitate its activation.

In Chapter 2, we explored whether awe may reduce the harmful effect of implicit stereotypes. This hypothesis was built on previous work demonstrating that awe may both reduce the reliance on heuristics (Danvers & Shiota, 2017; Griscevicius et al., 2010) – Maslow's "rubricizing" (1964/2014, p. 84) – and promote a more universal sense of identity (Saroglou et al., 2008; Shiota et al., 2007). In six studies (total N = 1,077), we found support for the contention that awe is associated with lower bias. Compared to another positive emotion and a neutral state, experimentally-induced awe was associated with lower amounts of both gender bias (Studies 1 & 2) and ethnic bias (Studies 3 & 4). Furthermore, we explored identification with all humanity as a mediator for awe's effects on bias. This was positively associated with awe (Study 5)

and mediated the effects of both experimentally-induced and dispositional awe on ethnic bias (Studies 3 & 6). Our results suggested that awe facilitates a more universal identity that, in turn, reduces prejudice.

Inspired by Maslow's (1964/2014) suggestion that states such as awe can lead to an elevated sense of self-determination – what he referred to as idiosyncrasy – in Chapter 3, we investigated the effects of awe on agency and conformity. In Study 1, while controlling for other positive emotions, dispositional awe was found to be positively associated with agency and negatively associated with conformity. In Study 2 awe's effect on conformity was found to be mediated by curiosity. In Study 3, experimentally induced positive affect increased conforming responses versus a neutral control however awe showed no significant differences.

In Chapter 4, we hypothesized that one benefit of awe might lay in its capacity to be a source of connection that transcends the social. As such awe may help socially excluded individuals create a 'stable base' from which to better navigate interpersonal relationships. In a randomized control trial, we found mixed support for the proposal that those elicited to feel awe, compared to amusement or a neutral state, experienced less negative effects of social exclusion.

In Chapter 5, we sought to move our focus from the effects of awe to intrapersonal factors that may facilitate the experience by exploring the link between awe and another self-transcending state: mindfulness. Specifically, we predicted that mindfulness might serve as a gateway to awe, even within the context of relatively ordinary events. In Study 1, while controlling for other positive emotions, dispositional positively associated with mindfulness through a shared association with curiosity. In Study 2, a brief experimental manipulation of mindfulness was found to increase feelings of awe in the context of a virtual river walk. Our findings suggest that in

situations in which curiosity and exploration are salient, mindfulness can serve as a gateway to awe.

In the concluding Chapter 6, we discuss how our findings illustrate our central idea of awe as self-transcending emotion.

Chapter 2

Awe, implicit stereotypes and identification with all humanity

Abstract

Awe is an emotion associated with transcending current frames of reference as they relate to the environment and the self. Such qualities make it a good candidate for reducing harmful automatic stereotypes that support inter-group suffering. In six studies (total $N = 1{,}077$, 58% female, median age = 27), we investigated awe's relationship to implicit bias. Compared to another positive emotion and a neutral state, experimentally induced awe was associated with lower amounts of both gender bias (Studies 1 & 2) and ethnic bias (Studies 3 & 4). Furthermore, greater identification with all humanity was positively associated with awe (Study 5) and mediated the effects of both experimentally-induced and dispositional awe on ethnic bias (Studies 3 & 6). Awe seems to offer those who experience it an opportunity to find a wider identity with other humans that, in turn, reduces prejudice.

Keywords: awe, common in-group identity, identification with all humanity, implicit bias, positive emotions.

"The greatest attainment of identity, autonomy, or selfhood is itself simultaneously a transcending of itself, a going beyond and above self-hood."

—Abraham Maslow (1962/2010, p. 117)

Decades of research on implicit biases have shown that humans hold attitudes that are to some extent outside of conscious control (Devine, 1989; Nosek et al., 2007). These can take the form of stereotyping people of particular races, genders and other social categories. There is a need to understand ways to reduce such stereotypes as they influence prejudiced behavior towards these groups (Greenwald, Poehlman, Uhlmann & Banaji, 2009; McConnell & Liebold, 2001). In this chapter, we consider the relationship between the emotion awe and implicit prejudice. Specifically, we predict that due to awe's association with transcending old frames of reference, as well as its ability to elicit a more universal sense of identity, it is a good candidate for an emotion that will reduce bias. In six studies, we demonstrate that awe is indeed associated with lower implicit bias and identify a candidate mechanism for this effect in the form of identification with all humanity.

Awe and implicit stereotypes

Negative emotions such as anger and disgust can increase certain implicit prejudices (Dasgupta, DeSteno, Williams & Hunsinger, 2009; DeSteno, Dasgupta, Bartlett & Cajdric, 2004). By implication, some have predicted that positive emotions may have instead an ameliorating effect (Lai, Haidt & Nosek, 2013). Nevertheless, despite growing interest, there exists scant and inconsistent evidence about the relationship between positive affect and implicit stereotypes. Johnson and Fredrickson (2005) posited that since positive emotions appear to broaden attention, they may activate more inclusive categorization

strategies (see also Isen, Niedenthal, & Cantor, 1992). Johnson and Fredrickson (2005) found that participants who were made to feel happy, showed less 'own-race face bias'; a phenomenon whereby individuals belonging to another ethnic group are recognized and distinguished between with more difficulty than those of one's own ethnic group. Johnson and Fredrickson's (2005) study is notable in that, as far as we can tell, it is the only published work that purports to show a general effect of positive emotion in reducing a bias-related measure. Indeed, in their comparative review of 18 interventions to reduce racial prejudice as measured with the implicit association test (IAT), Lai et al. (2014) stated that "no published result demonstrates an emotional state that decreases preferences for ingroups compared with outgroups".

Alongside the lack of evidence for an ameliorative effect on bias, there is also evidence for, and theoretical grounds to expect that positive affect (in general) may have the opposite effect of *increasing* bias. Specifically, positive affect has been associated with more superficial or cursory styles of cognition (Bless, Bohner, Schwarz & Strack, 1990; Forgas, 1998). This is relevant as stereotypes can be the result of mental shortcuts (Macrae, Milne, Bodenhausen, 1994). Stereotypes thus can result less from enmity and more from inadequate cognitive processing. One study found that recalling a happy memory was found to increase reliance on racial stereotypes in deciding an unknown target's guilt (Bodenhausen, Kramer, & Süsser, 1994). In another, Huntsinger, Sinclair, and Clore (2009) found that, compared to those who heard sad music, people who listened to happy upbeat music were more likely to display prejudice in an ethnicity-focused IAT.

The lack of clarity within work on positive emotions and bias is likely due, in part, to contrasting global positive and negative affect without distinguishing between different emotions within these heterogeneous groups. Functional-adaptive theory has provided

modern researchers with a framework for better understanding the different cognitive and behavioral profiles of distinct emotions (Ekman, 1992; Frijda, 1988; Frijda & Mesquita, 1994; Horberg, Oveis, & Keltner, 2011; Lazarus, 1991; Nesse & Ellsworth, 2009; Russell, 2003; Scherer, 2009; Tooby & Cosmides, 2008). Due to the fact particular emotions evolved to serve particular biological needs and social functions, emotions are thought to affect cognition in a manner concordant with the function they were adapted for. For instance, Dasgupta et al. (2009) predicted and found that individuals induced to feel incidental anger (anger unrelated to the situation or group for which the prejudice is being measured) showed greater implicit prejudice towards an ethnic out-group stereotypically associated in their subject pool with threat (Arabs) but exhibited no increases in prejudice toward a group that was not perceived as threatening (gay men). Priming disgust, on the other hand, exerted the reverse effect; sexual prejudice was increased and bias towards ethnically-based groups was unaffected (Dasgupta et al., 2009). The authors argued that this result was due to each emotion's functional specificity: Anger is an action-tendency associated with threat while disgust is a reaction to perceived moral contamination. Similarly, Lai et al. (2014) predicted and found that the elevation, believed to be the emotional opposite of disgust, exerted a small reduction of implicit bias towards gay men. Concordant with the results of Dasgupta et al.'s, (2009) study, elevation failed to have any effect on racial bias. The functional analysis applied in these studies has, in part, inspired our current approach. In order to ground the forthcoming hypotheses, we will now turn to the possible ways awe has been adapted for in humans.

Awe involves the felt presence of vast and novel stimuli coupled with a need to accommodate the experience (Keltner & Haidt, 2003). Very little is known about the evolutionary origins of awe, although some theorists believe it may have served to enhance

cognitive fluidity and the updating of schemas (Keltner & Haidt, 2003; Shiota, 2014a). Throughout evolutionary history, human survival has depended on the ability to develop strategies that ensure survival in changing circumstances and environments. We appear to differ from other animals to the extent that information is encoded in the form of mental representations, or "schemas" (Piaget, 1973). These allow the freeing up of cognitive resources by approaching new situations with old wisdom. However, when information is sufficiently novel, schemas need to be updated or replaced altogether. Keltner and Haidt (2003) have argued that awe may have emerged as a response to powerful, high-status others who possess a high degree of skill or technical knowledge. Shiota (2014a) has posited that such a situation may have enabled the acquisition and encoding of fitness-relevant information by learning from or even mimicking this high-prestige individual's behavior. As the presence of the awe elicitor and the motivation to learn from it may have required giving up a previous, perhaps now obsolete strategy, it may have catalyzed the development of cognitive flexibility. In short, awe may be associated with the efficient uptake of new knowledge and the relinquishing of old knowledge.

This characterization offers two avenues in which to ground our hypotheses regarding how awe may affect bias. The first concerns how biases may be affected by generalized changes to the processing and encoding of incoming information. The second is how the perception of a vast or powerful elicitor may alter bias-relevant social cognition processes.

Two ways awe may effect bias: Enhanced information processing and enlarged common in-group identity

If the characterization of awe as an information-rich emotion is correct, we might expect awe to reduce bias via changes in information processing. Unlike other positive

emotions, which have been linked to less optimal judgments and decision making (Bless et al., 1990; Bodenhausen et al., 1994; Forgas, 1998; Griskevicius, Shiota, & Neufeld, 2010), awe appears to decrease the power of heuristics and increases systematic processing. Griskevicius et al. (2010) compared the effects of six distinct positive emotions, measuring how persuadable participants were to logically fallacious arguments. Whilst those induced with contentment, anticipatory enthusiasm, attachment love or amusement were more persuaded by weak arguments, compassion and awe showed the opposite effect (Griskevicius et al. 2010). The authors interpreted this as indicating that those induced with awe and compassion were utilizing less heuristical thinking as both emotions are functionally associated with careful processing of incoming information. In compassion, attention is acutely tuned to a suffering other, towards developing strategies for help and maintaining vigilance towards potential threats, while awe signals a need to update schematic information in the face of a challenge to one's view of the world. As implicit biases are a form of heuristic, awe may lessen the effect of these insofar as it reduces reliance on heuristics *in general*.

If stereotypes consist of 'closing down' people or groups to over-simplified categories, it is of relevance that awe has been found to associate with openness. Individuals that experience more awe in a day-to-day sense score higher on the openness-to-experience personality trait (Shiota, Keltner & John, 2006) and score lower on the need for cognitive closure (Shiota, Keltner & Mossman, 2007). In short, awe may decrease bias to the extent it reduces reliance on more closed, schematic styles of cognition.

Self-identity processes and related social cognitions offer another route through which awe may affect bias. Awe has been linked to a phenomenological 'small self' (Piff, Dietze, Feinberg, Stancato & Keltner, 2015) whereby one's day-to-day concerns retreat

from focus and there is a perception of merging with something larger. For example, those who dispositionally experience increased awe are more likely to identify with universal self-concepts such as “a person” or “an inhabitant of the earth” (Shiota et al., 2007). Awe-inspiring videos have likewise been found to increase the “tendency to orient oneself toward a larger transcendent reality” (Saroglou, Buxant & Tilquin, 2008, p. 169). The sense of connection that awe fosters also appears to lead to an enhanced opportunity for pro-sociality. In one recent set of studies, experimentally-induced awe increased scores on multiple indicators and behavioral tests of altruism and helpfulness (Piff et al., 2015).

Nevertheless, increased prosociality may be just one of many outcomes of the ‘universalizing’ effects of awe. If awe connects individuals to larger sense of identity it may offer something more fundamental: namely, an extension of the locus within which other-concern is felt.

Expanding the locus of concern from self to more universal elements is a developmental arc found in some of the earliest self developmental models (Adler, 1927/1954; Maslow, 1954) as well as more recent theories in social psychology. In self-categorization theory for instance, Turner, Hogg, Oakes, Reicher, and Wetherell (1987) proposed three levels of self-categorization with “human self” categorization as the highest level, marked by universal concern. This contrasts with either in-group /out-group (level 2) or within group (level 1) differentiation. One habit of Maslow’s (1954) “self-actualized” individuals is that they display “a deep feeling of identification, sympathy, and affection for human beings in general . . . [a] feeling of identification with mankind” (p. 138). Of relevance to us, one quality Maslow identified in self-actualized people is an increased capacity to have “peak experiences”, phenomena that are closely related to awe. Importantly, Maslow also appears to have suggested a direct causal link between the onset

of a peak experience and a temporary adoption of qualities and capacities consistent with self-actualization. "…any person in any of the peak experiences takes on temporarily many of the characteristics which I found in self-actualizers.. Not only are these his happiest and most thrilling moments, but they are also moments of greatest maturity, individuation, fulfillment—in a word, his healthiest moments." (1962/2010, p. 91). In other words, one of the effects of awe is that it may activate a heightened sense of self-hood which may include an enlarged common in-group identity (Gaertner, Dovidio, Anastasio, Bachman & Rust, 1993). If awe expands this circle of concern, it may also decrease bias towards groups that are now perceived to be incorporated within it.

Whilst to our knowledge, awe's specific effect on bias has not been experimentally investigated, a recent randomized control trial (Stell & Farsides, 2016) on the effects of loving-kindness meditation found that awe was part of a suite of 'other-regarding' positive emotions that mediated a training-induced reduction of racial bias. Conversely, more self-related positive emotions had no such effect. Taken together, we believe that extant research gives us reason to predict that awe will reduce the effects of bias.

Overview of Studies

In five studies we investigated the effects of awe on implicit bias. In Studies 1 and 2, we examined whether awe would be associated with less gender stereotyping while Studies 3-6 focused on ethnic bias. Studies 1-4 utilized experimental manipulations of awe while Study 5 and 6 explored dispositional varieties of the emotion. Different potential mediators were investigated in each study, i.e., need for cognitive closure in Study 1, mental accommodation of counter-stereotypical imagery in Study 2, and identification with all humanity in Studies 3-6.

As awe and implicit bias have not been studied together before, across our five studies, we determined our sample sizes through a combination of consulting existing research on positive affect-based IAT interventions (e.g. Huntsinger at al., 2009; Stell & Farsides, 2016) as well as iteratively, once effect size analysis could be conducted for initial studies. The results of these calculations indicated a need to recruit generally between 30-50 per experimental condition, although such considerations were subject to time and resource constraints and varied across the different types of study. For example, we aimed for larger samples for studies conducted on Amazon Mechanical Turk (mTurk) as we expected lower effect sizes due to the diverse environments in which participants encountered the experimental manipulations. Unless indicated otherwise, for all studies, we report all data exclusions, manipulations, and measures. Participant overlap was avoided by screening IDs prior to testing and excluding those that had already done any other of our studies.

Study 1

Study 1 was designed to test whether incidental awe, compared to amusement or a neutral state is associated with less implicit stereotypes regarding gender roles. Despite advances in gender egalitarianism – in the US more women than men enrol in college, and women now obtain approximately half of advanced degrees in law, business and other high status careers – women are still underrepresented in positions of power and underpaid relative to men (Proctor, Semega & Kollar, 2016). Additionally, many people hold to essentialist attitudes where men are seen as possessing more ‘natural’ aptitude for certain jobs and disciplines (Jacobs & Eccles, 1985; Rudman & Kilianski, 2000). However, national differences in the nature and extent of ‘gender gaps’ attest against the plausibility of such naturalist positions (Nosek et al., 2009). Rather, the strength of gender stereotypes

themselves predict women's decreased engagement with traditionally male-dominated areas such as math and science, decreases in self-efficacy and increases in stereotypically feminine self-beliefs (Aronson, Quinn, & Spencer, 1998; Davies, Spencer, & Steele, 2005; Inzlicht & Ben-Zeev, 2000; Pronin, Steele, & Ross, 2004). Implicit gender role stereotypes often exist in opposition to more egalitarian conscious beliefs and are thus more resistant to change (Nosek, Greenwald, & Banaji, 2007). However, due to the profile of awe suggested above – it may reduce reliance on unconscious heuristical judgments, promote more open-mindedness and foster a more universal identity – we predicted that those elicited to feel awe would display less bias than those elicited to feel neutral or amused.

Method

Participants

One hundred fifty undergraduate students (129 women, median age = 20, 74% White/Caucasian) participated for course credit or a random draw for a cash prize of £25.

Procedure

Participants were randomly allocated to watch one of three videos that elicited either awe, amusement, or a neutral state. The awe video depicted a murmuration of starlings flocking in grand, sweeping formations. The amusement video was a montage of humorous clips of animals taken from the BBC's *Walk on the Wild Side*. The neutral video was a cartoon rabbit giving examples of objects that contain repeated patterns. Each video lasted two minutes and therefore had in common the duration and depiction of animals but differed in the emotion elicited. We chose amusement as an active control as it is often used to induce general positive affect (Bartlett & DeSteno, 2006; Forgas, 2001). Additionally, amusement has been found to increase the power of heuristics in some contexts (Griskevicius et al., 2010).

To test for gender bias, participants were administered the gender-roles implicit association test (IAT), which tests the relative strength of associations between men and women within the spheres of either work or home (Greenwald & Banaji, 1995). Category words “Male” and “Female” were presented in each corner at the top of the screen. Below each was either the category word “Work” or the category word “Home”. Pairings of the words in each corner varied. A series of words relating to either work or home (e.g. “office”, “children”) and men or women’s names were presented in the middle of the screen and participants used either the ‘E’ or ‘I’ computer key to identify them as belonging to a category shown in the top-left or the top-right. How long participants took to press the correct key following presentation of the target word was recorded. Gender bias was indicated by faster identification of words relating to work when these are paired with the male category term than when paired with the female one, and also by faster identification of words relating to home when this category term was paired with the female category than when it was paired with the male one.

Participants then completed two surveys. The first of these was a brief version of the Need for Closure scale (NFC; Roets & Van Hiel, 2011), which asked participants to rate their agreement with statements relating to the tendency to want definitive answers on a given topic. Previous research has suggested that dispositional awe is associated with a reduced need for cognitive closure (Shiota et al., 2007), and despite the scale being designed primarily as a trait-level measure, we predicted that awe would induce measurable state-level changes. The second survey asked participants to what extent they were feeling each of eight discrete emotions (“happiness”, “amusement”, “awe”, “gratitude”, “anger”,

"sadness", "fear" and "disgust"; 1 = *not at all*, 7 = *very much*) and constituted our manipulation check.

Results

Dependent variables in the experimental studies were submitted to the same data analytic procedure: omnibus tests followed by two sets of planned orthogonal contrasts. The first of these compared the awe condition to the amusement and neutral conditions ("awe contrast"; coded as awe = -2, amusement = 1, neutral = 1). The second ("control contrast"; coded as awe = 0, amusement = 1, neutral = -1) tested the residual difference between the two control conditions. This process enabled us to test both whether awe differed from the other states elicited and that the control conditions did not significantly differ.

Manipulation checks. Independent t-tests confirmed that participants in the awe condition ($M = 4.91$) experienced stronger feelings of awe than both those in the amusement ($M = 2.22$), $t(98) = 10.42$, $p < .001$, $d = 2.06$, and the neutral ($M = 1.62$) conditions, $t(102) = 10.96$, $p < .001$, $d = 2.12$. Participants in the amusement condition ($M = 4.76$), likewise reported more amusement than those in the awe ($M = 3.46$), $t(98) = 5.10$, $p < .001$, $d = 1.03$, and neutral conditions ($M = 3.58$), $t(94) = 4.40$, $p < .001$, $d = 0.91$. Participants in the neutral condition ($M = 3.22$) reported less happiness than those in the awe ($M = 4.50$), $t(147) = 4.62$, $p < .001$, $d = 0.84$, and amusement conditions ($M = 4.54$), $t(147) = 4.606$, $p < .001$, $d = 0.86$. There was no difference between the awe and amusement groups on self-reported happiness ($p > .50$), confirming that both emotions were rated as similarly positive. Other between-group differences in emotions are presented in Table 1.

Preliminary analysis. Preliminary analysis showed that neither gender, $F(1, 148) = 1.94$, $p = .06$, $\eta_p^2 = .04$, ethnicity, $F(4, 145) = 0.98$, $p = .42$, $\eta_p^2 = .03$, nor age, $B = .01$, $t(148) = 1.32$, $p = .19$ significantly affected bias so data analysis was collapsed across these categories.

Implicit Bias. To test the hypothesis that those in the awe condition would exhibit less implicit gender bias than those in the other conditions, we conducted an analysis of variance (ANOVA) on the IAT '*d*' score. This outcome measure was calculated in accordance with Greenwald, Nosek and Banaji, (2003) by subtracting *SD*-corrected latencies for men/career responses from women/career responses and men/home responses from women/home responses. A marginally significant omnibus effect of emotion condition emerged, $F(2, 147) = 2.94$, $p = .06$, $\eta_p^2 = .04$. As predicted, participants in the awe ($M = .40$) condition had less gender bias than those in the amusement ($M = .57$) and neutral ($M = .49$) conditions, $t(147) = 2.16$, $p = .03$, $d = 0.37$. The control contrast yielded no significant difference between conditions, $t(147) = 1.13$, $p = .25$, $d = 0.23$.

Comparing Awe & Gratitude. Due to the fact that gratitude was also found to be higher for those in the awe condition, it is possible that gratitude was driving the effect of treatment condition on bias. In order to rule out this possibility we decided to investigate the zero-order correlations between awe, gratitude and bias. Whilst gratitude did not significantly correlate with bias ($r = -.02$, $p = .80$), a significant correlation did emerge for awe ($r = -.20$, $p = .01$). This strengthens the case that changes in awe are driving the effect of condition on bias.

Mediation Analysis – Need for Closure (NFC). To investigate the causal theory that changes in NFC accounted for treatment group differences in implicit bias, we

conducted a mediation analysis using assignment to the awe condition as a dichotomous independent variable, changes in NFC as mediator and implicit bias as dependent variable. A bias-corrected and accelerated bootstrapping procedure with 5,000 resamples indicated that, although in the predicted direction, the effect of condition on implicit bias through NFC featured 95% confidence intervals that included zero, indicating a non-significant mediation (B = -.02, SE = .01, [-.06, .00]).

Discussion

Study 1 showed that, relative to amusement and a neutral state, participants elicited to feel awe exhibited less gender bias. This supports the idea that awe may differ from other positive emotions, and non-emotional states in reducing reliance on automatic judgments and enable an embodiment of gender egalitarianism. Awe was also associated with decreases in NFC, which accords with previous work (Shiota et al., 2007). Nevertheless, NFC failed to significantly mediate the effect of awe on bias. This indicates that while open-mindedness is indeed an effect of awe, it may not be an important mechanism for its effect on bias. Study 2 sought to replicate the primary findings of Study 1 and investigate other factors that might account for an affect on implicit bias.

Table 1. Mean Scores for Self-Reported Emotional States in Studies 1-3

Study and condition	Awe	Amusement	Happiness	Gratitude	Fear	Sadness	Anger	Disgust
Study 1								
Awe	4.91[bc] (1.07)	3.46[b] (1.46)	4.50 (.97)	3.89[bc] (1.30)	0.44[bc] (0.84)	0.43 (0.69)	0.33 (0.58)	0.09[b] (0.35)
Amusement	2.22[a] (1.50)	4.78[ac] (.99)	4.54 (1.01)	2.41[a] (1.48)	0.13[a] (0.45)	0.24 (0.60)	0.30 (0.73)	0.43[a] (1.05)
Neutral	1.62[a] (1.90)	3.58[b] (1.55)	3.38[ab] (1.63)	1.48[a] (1.53)	0.22[a] (0.76)	0.44 (1.00)	0.62 (0.88)	0.32 (0.87)
Study 2								
Awe	4.92[bc] (1.16)	3.26[b] (1.59)	4.41[c] (4.41)	3.77[bc] (1.31)	0.90[b] (1.39)	0.54 (1.00)	0.36 (1.01)	0.33 (0.77)
Amusement	1.91[a] (1.18)	5.03[a] (.73)	4.49[c] (4.49)	2.67[a] (1.53)	0.33[a] (0.82)	0.33 (0.85)	0.55 (0.83)	0.46 (1.00)
Neutral	1.32[a] (1.55)	3.44[b] (1.44)	3.21[ab] (1.55)	1.41[a] (1.42)	0.47 (1.11)	0.47 (1.02)	0.74 (.75)	0.47 (1.05)
Study 3								
Awe	4.55[bc] (1.51)	3.19[bc] (1.43)	4.17[bc] (1.38)	3.23[bc] (1.61)	0.72[bc] (1.39)	0.83[bc] (1.40)	0.57 (1.23)	0.28 (0.72)
Amusement	2.36[a] (1.52)	5.02[ac] (0.89)	4.74[ac] (1.26)	2.02[a] (1.62)	0.12[a] (0.44)	0.20[a] (0.50)	0.38 (0.97)	0.16 (0.65)
Neutral	1.93[a] (1.63)	4.00[ab] (1.58)	3.38[ab] (1.60)	1.80[a] (1.66)	0.16[a] (0.52)	0.31[a] (0.67)	0.82 (1.23)	0.22 (0.60)

Note: Standard deviations are shown in parentheses. For all items, responses were made using 7-point scales, with higher values indicating greater intensity of emotion. [a]These means are significantly different from those in the awe condition ($p < .05$). [b]These means are significantly different from those in the amusement condition ($p < .05$). [c]These means are significantly different from those in the neutral condition ($p < .05$).

Study 2

One approach to bias reduction found in the literature is the priming of information that is incongruent with the held stereotype or belief (Blair, Ma & Lenton, 2001; Dasgupta & Greenwald, 2001; Lai et al., 2014, interventions 4-7; Rudman & Kilianski, 2000). Nevertheless, the effectiveness of such techniques is mixed (Joy-Gaba & Nosek, 2010) and there is little research that considers what factors moderate the effectiveness of counter-stereotypical information in decreasing bias. We proposed that awe, given its suggested function of aiding the development new mental schemas, will increase the effective uptake of bias-relevant information, compared to other positive emotions and to no emotional state and in turn reduce bias. Study 2 therefore tested the hypothesis that, relative to another positive emotion and neutral control, awe would reduce bias through an enhanced uptake of counterstereotypical information.

Method

Participants

One hundred six undergraduate students (90 women, median age = 20) participated for course credit or a random draw for a cash prize of £25.

Procedure

We replicated the procedure used in Experiment 1 with two exceptions. Following the video stimuli, participants were presented with four biographies (with photos) of women with successful careers. These were presented in random order and served as our manipulation of counterstereotypical imagery. We decided to use fictitious rather than famous people as we sought to limit confounds related to specific details of a celebrity's life. Additionally, as a way to gauge the impact of the presented information, participants were tested on their recall of the counter-stereotypical passage

(e.g. “which university did Annette study at for her degree?”, “where was Annette born?”).

Results

Manipulation checks. Independent t-tests confirmed that participants in the awe condition ($M = 4.92$) experienced stronger feelings of awe than both those in the amusement ($M = 1.91$), $t(70) = 10.91$, $p < .001$, $d = 2.58$, and the neutral ($M = 1.32$) conditions, $t(71) = 11.39$, $p < .001$, $d = 2.63$. Participants in the amusement condition ($M = 5.03$), likewise reported more amusement than those in the awe ($M = 3.25$), $t(70) = 5.92$, $p < .001$, $d = 1.44$, and neutral conditions ($M = 3.44$), $t(65) = 5.68$, $p < .001$, $d = 1.39$. Participants in the neutral condition ($M = 3.21$) reported less happiness than those in the awe ($M = 4.41$), $t(71) = 3.87$, $p < .001$, $d = 0.90$, and amusement conditions ($M = 4.49$), $t(65) = 3.96$, $p < .001$, $d = 0.97$. There was no difference between the awe and amusement groups on self-reported happiness ($p > .50$), confirming that both emotions were rated as similarly positive. Other between-group differences in emotions are presented in Table 1.

Preliminary analysis. Preliminary analysis showed that neither gender, $F(2, 103) = 0.11$, $p = .90$, $\eta_p^2 = .002$, ethnicity, $F(4, 101) = 1.58$, $p = .19$, $\eta_p^2 = .06$, nor age, $B = .01$, $t(104) = 1.56$, $p = .12$ significantly affected bias so data analysis was collapsed across these categories.

Implicit Bias. To test the hypothesis that awe was associated with lower implicit gender bias we conducted an ANOVA on the IAT ‘*d*’ score. A significant omnibus effect of emotion condition emerged, $F(2, 103) = 4.04$, $p = .02$, $\eta_p^2 = .07$. The awe contrast revealed that participants in the awe ($M = .31$) condition exhibited significantly less gender bias than those in the amusement ($M = .51$) and neutral ($M =$

.52) conditions, $t(103) = 2.84$, $p = .01$, $d = 0.53$, conditions. The control contrast found no significant differences between conditions, $t(103) = -0.06$, $p = .95$, $d = -0.02$

Counter-stereotypical information recall. A 1-way ANOVA testing recall of counterstereotypical imagery as a function of condition was not significant, $F(2, 80) = 2.46$, $p = .09$, $\eta_p^2 = .06$. Counter to predictions, those in the awe condition ($M = 6.65$) displayed no better recall than those in the amusement ($M = 6.15$) or neutral ($M = 7.84$) conditions, $t(80) = 0.55$, $p = .59$, $d = -0.13$. However, the control contrast found that those in the amusement condition displayed significantly worse recall than those in the neutral condition = $t(80) = 2.16$, $p = .03$, $d = 0.60$.

Comparing Awe & Gratitude. As in Study 1, we to inspected the zero-order correlations between awe, gratitude and bias due to the fact that gratitude was once again found to be higher for those in the awe condition. Gratitude did not significantly correlate with bias ($r = .03$, $p = .80$). Although in the inspected direction, the correlation between awe and bias was non significant ($r = -.15$, $p = .10$).

Discussion

Study 2 replicated the primary results of Study 1: those elicited to feel awe displayed significantly less implicit gender bias relative to those in the positive emotion and neutral groups. Additionally, although those in the awe group did not display better conscious recall of counter-stereotypical information, those in the amusement group displayed worse recall than those in neutral control. This seems to cohere with accounts that, in some situations, positive affect can be somewhat antagonistic to working memory tasks (Martin & Kerns, 2011). Awe, in comparison, would appear to be more resistant to such effects. Nevertheless, Study 2 again failed to identify a successful mediator of awe's effects on bias. It is possible that the addition of counterstereotypical imagery did indeed increase the extent to which awe reduced bias – Study 1's effect size

was d = -0.37 while Study 2's was d = -0.53 – but that the unique effect of the the imagery was not accessible to conscious awareness, and thus not measurable in our recall task. Future research that aims to measure awe's purported role in enhancing learning should perhaps look to more implicit measures of schema modification. One complication in our findings was that self-reported awe, whilst in the expected direction, did not significantly correlate with bias. This may reflect issues with the emotion scale employed to assess the effects of the manipulation. Nevertheless, our main prediction was supported: particpants elicited to feel awe exhibited less bias than those in the other groups. This lends more support to the proposal that the awe decreases prejudice.

Study 3

Given that Studies 1 & 2 indicated that inducing people with awe may have an ameliorative affect on implicit gender stereotypes, Study 3 tested the hypothesis that such an effect may be observed in the context of ethnically-based prejudice. If awe enables an embodiment of qualities such as universal identity and egalitarianism, its effect should apply to ethnic out-groups. In addition, we proposed and tested another candidate mediator that reflected awe's ability to transcend the self and orient towards a more universal common in-group identity.

Method

Participants

One hundred forty-eight undergraduate students (128 women, median age = 20, 83.3% 'White/Caucasian') participated for course credit or a random draw for a cash prize of £25.

Procedure

Study 1's procedure was partially replicated again, although this time, the IAT featured color photos of black and white people taken from the Multi-Category Implicit Association Test (Nosek, Sriram, Smith, & Bar-Anan, 2013). Additionally, participants completed a version of the Identification with All Humanity scale (IWAH; McFarland, Webb, & Brown, 2012), which measured the extent to which individuals identified with and had concern for either their "community" or "people all around the world". We adapted the IWAH scale by removing items that measured identification with people of a particular nation due to the diverse nationalities present in the university's participant pool. We predicted that those induced with awe would exhibit higher IWAH scores based on research showing that awe is often associated with more 'universal' identity groupings (Shiota et al., 2007). As IWAH can be considered a measure of the size or extent of one's common in-group identity, we predicted that changes in this measure would mediate the effects of awe on bias.

Results

Manipulation checks. Independent t-tests confirmed that participants in the awe condition ($M = 4.55$) experienced stronger feelings of awe than both those in the amusement ($M = 2.36$), $t(101) = 7.31$, $p < .001$, $d = 1.44$, and the neutral ($M = 1.93$) conditions, $t(96) = 8.23$, $p < .001$, $d = 1.66$. Participants in the amusement condition ($M = 5.02$), likewise reported more amusement than those in the awe ($M = 3.19$), $t(101) = 7.75$, $p < .001$, $d = 1.54$, and neutral conditions ($M = 4.00$), $t(93) = 3.92$, $p < .001$, $d = 0.79$. Participants in the neutral condition ($M = 3.38$) reported less happiness than those in the awe ($M = 4.17$), $t(96) = 2.63$, $p < .001$, $d = 0.53$, and amusement conditions ($M = 4.74$), $t(93) = 4.64$, $p < .001$, $d = 0.95$. This time, self-reported happiness was found to be significantly higher in the amusement group compared to the awe group, $t(101) =$

2.18, p = .03, d = 0.53. Other between-group differences in emotions are presented in Table 1.

Preliminary analysis. Preliminary analysis showed that neither gender, $F(2, 145) = 0.25$, $p = .78$, $\eta_p^2 = .003$, ethnicity, $F(4, 142) = 1.55$, $p = .19$, $\eta_p^2 = .04$, nor age, $B = .003$, $t(145) = 0.47$, $p = .64$ significantly affected bias, so data analysis was collapsed across these categories.

Implicit Bias. To test the hypothesis that those in the awe condition would exhibit less ethnic bias than those in the other control groups, we conducted an ANOVA on the IAT '*d*' score. Although the omnibus effect of emotion condition was non-significant, $F(2, 145) = 2.71$, $p = .07$, $\eta_p^2 = .04$, planned contrasts revealed that participants in the awe ($M = .37$) condition exhibited significantly less racial bias than those in the amusement ($M = .53$) and neutral ($M = .52$), $t(145) = 2.32$, $p = .02$, $d = -0.39$, conditions. The control contrast again indicated no significant difference between the amusement and neutral control conditions, $t(145) = .13$, $p = .90$, $d = -0.03$.

Mediation analysis: Identification with all humanity. To test whether higher IWAH accounted for awe-induced reductions of prejudice, a bias-corrected and accelerated bootstrapping mediation was performed with 5,000 resamples. We entered treatment group (awe vs. both control conditions) as IV, implicit bias as DV and IWAH as candidate mediator. Standard practice for analyzing the IWAH is to compare the identification with humanity scores with the identification with community (IWAC) and nation scores (McFarland et al. 2012). This is because the measure aims to test for unique variance of universal vs more local group identifications. For this reason, IWAC was entered into the mediation model as a covariate. This analysis showed that the effect of condition on implicit bias through IWAH featured 95% confidence intervals that excluded zero, indicating a significant mediation ($B = -.03$, $SE = .02$, [-.084, -

.001]). Finally, to check the robustness of our results, we employed an additional mediation analysis, whereby a difference score was computed by subtracting the mean of responses to IWAC from those measuring IWAH. This difference score was then entered as the candidate mediator. Once again, the analysis showed a significant effect of condition on implicit bias through IWAH (*B* = -.03, *SE* = .02, [-.090, -.003].

Comparing Awe & Gratitude. Once again we inspected the zero-order correlations between awe, gratitude and bias due to the fact that gratitude was again found to be higher for those in the awe condition. Gratitude did not significantly correlate with bias ($r = .05$, $p = .53$) whilst the correlation between awe and bias was significant ($r = -.17$, $p = .04$).

Discussion

Study 3 found that those in the awe condition displayed significantly less implicit racial bias, relative to another positive emotion and a non-emotional state. This appears to indicate that the bias-ameliorating effects of awe extend to stereotypes regarding ethnicity. Furthermore, we found that greater identification with humanity partially accounted for the effects of awe on bias. This finding seems to support the idea that awe can extend the circle of self-identity, so that more groups are included within a person's common in-group. Whilst the IWAH scale has previously been tested against a number of other measures, some of which relate to prejudice (McFarland et al., 2012) this appears to be the first time IWAH has been successfully linked to implicit bias. Such results provide supportive evidence for the ameliorative qualities of identifying with a larger common in-group (Gaertner et al., 1993) and contextualize awe as an emotion that aids the extending of such identities.

Nevertheless, the study was limited by exclusively recruiting British undergraduates and so the findings cannot easily be used to make inferences in non-

student settings. To address this concern, in Study 4, we partially replicated Study 3 within a more representative online sample located in the United States.

Study 4

In Study 4 we sought to replicate the results of Study 3 in a larger, more representative sample of participants using Amazon's Mechanical Turk (mTurk) subject pool.

Method

Participants & Procedure

The procedure from Study 3 was adapted in order to maximize power and operationalize the design for an online environment. As Studies 1-3 had failed to detect any significant differences in bias between the amusement and neutral control conditions, a finding supported by the extant literature (Lai et al., 2014), Study 4 utilized a two-condition design comparing those induced with the awe and neutral stimuli. Three hundred fifty respondents from Amazon's Mechanical Turk online subject pool participated for $1.50 each. To limit the effect of participants simply 'clicking through' the study, we excluded those with an error rate of over 40% in the IAT task, leaving a total *n* of 333 (51.4% women, median age = 33, 86.8% 'Caucasian/White'). The IAT from Study 3 was used again as our measure of implicit prejudice. In an effort to streamline the study for the online domain, we omitted the manipulation check questions, since all 3 previously reported studies had obtained highly similar results.

Results

Implicit Bias. Independent t-tests on treatment group differences on the IAT score showed that, although once again those in awe condition (M = .40) exhibited less

racial bias than those in the control condition (M = .49), this time the effect only reached threshold significance $t(331) = -1.90$, $p = .06$, $d = -0.24$.

Mediation analysis: IWAH. This time, as participants were not drawn from an international student population, we used the full 3-category version of the IWAH scale (McFarland et al., 2012), which includes identifying with one's nation (IWN) as one of the response categories. This meant that our mediation analysis was identical to that of study 3, aside from IWN being added alongside IWC as a covariate. Another bootstrapped mediation of the effect of condition on implicit bias through IWAH featured 95% confidence intervals that included zero, indicating that the mediation was non-significant (B = -.004, SE = .01, [-.025, .005]).

Discussion

Although Study 4 once again seemed to detect an effect of awe on racial bias, this time the result gained only threshold significance. While this seems, in part, due to a smaller effect size in the online setting, our findings may also mirror other work on positive emotions and bias in which weak, yet reliable aggregate effects are detectable despite individual experiments not always gaining sufficient levels of significance (e.g. Lai et al., 2014). In order to test whether, taken together, our first four experiments indicated that awe has a significant reduction on bias, we conducted a meta analysis.

Meta Analysis

Results

The goal of the meta-analysis was to ascertain the average magnitude of the effect of awe on implicit bias across Studies 1-4. Despite Study 4's threshold effect, we predicted that the evidence for an aggregate effect would be strong. Figure 1 shows the results of this analysis.

Heterogeneity analysis. An analysis of heterogeneity indicated that it was appropriate to treat the studies analyzed in the meta-analysis as a set, $Q(3) = 2.79$, $p = .43$

Random and Fixed effects models. A random effects model indicated that, on average, awe exerted a robust negative effect on bias scores across the four experimental studies with a small yet reliable effect size, Hedge's $g = -0.33$, CIs [-.49, -.17]. A fixed-effect model produced similar results, Hedge's $g = -0.32$, CIs [-.47, -.18]. This analysis represents strong support for our primary hypothesis.

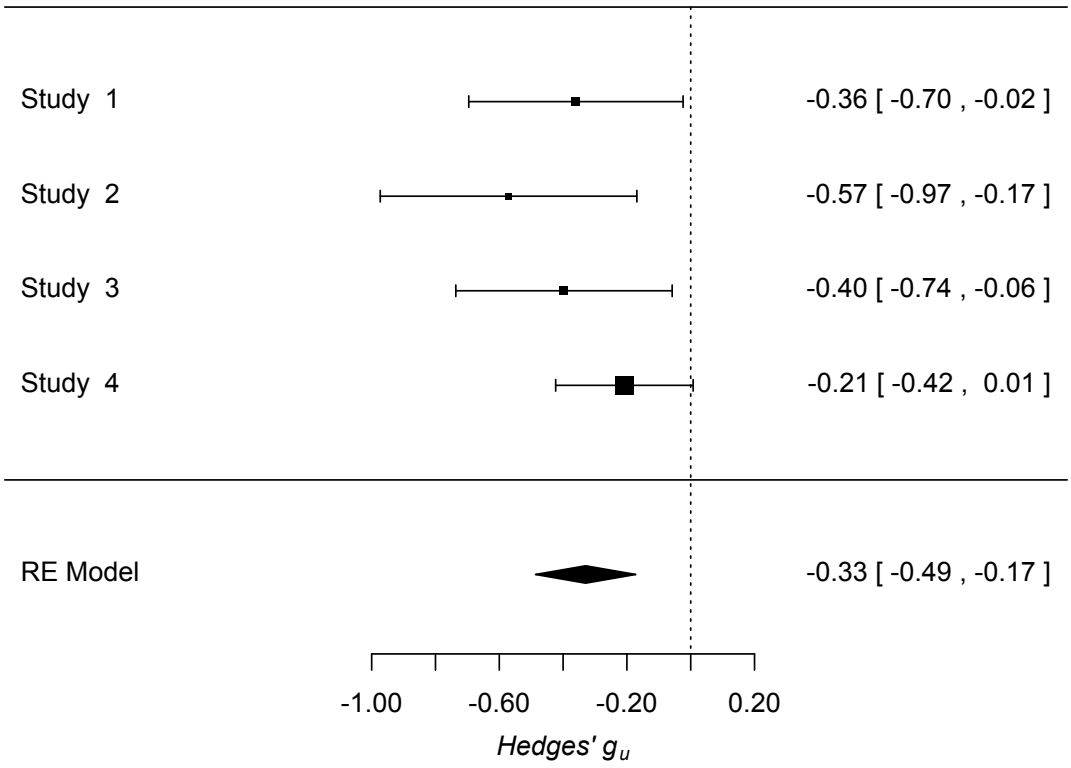

Figure 1: Forest plot showing aggregate effect size and 95% confidence intervals for experimental manipulations of awe on implicit bias compared to controls.

Study 5

The conducted meta-analysis supported a consistent effect of experimentally-induced awe in reducing bias. Nevertheless, such experiences of awe, limited to a single stimulus for a brief duration, may not reflect how awe is encountered in a more enduring sense. In order to provide a richer operationalisation of awe, in Studies 5 and 6, we turned our focus to dispositional awe, its association with IWAH (Study 5) and finally the mediated relationship of awe, IWAH and bias (Study 6). Since the only

comparison emotion used so far was amusement, a second aim of Studies 5 and 6 was to compare the effects of awe to six other positive emotions. A valence-based approach may expect effects based on whether the emotion in question is positive or negative. Thus, the disposition to experience all positive emotions should increase IWAH as all positive emotions have been linked to broadened group-membership (see Johnson & Fredrickson, 2005). If, on the other hand, we look to the functions and action-tendencies associated with each discrete emotion, a different set of predictions emerge. Of the seven emotions, we predicted that only awe, love and compassion would be associated with greater IWAH. We will now briefly state our reasons for these predictions. Awe, as stated previously, is an emotion that appears to concern self-transcendence and mastery. Those that have the propensity to feel more awe may also experience themselves beyond smaller, narrowly defined identities (e.g. Maslow, 1962/2010). Compassion is another self-transcending emotion in that it motivates pro-social behavior, even if that behavior is costly to the self (Goetz, Keltner, & Simon-Thomas, 2010). Additionally, given that the scope for whom one may feel compassion for is integral to understanding 'how much' compassion someone has (Batson, Floyd, Meyer & Winner, 1999), we expected that those high in compassion would also be somewhat definitionally associated with higher IWAH. A similar effect was hypothesized for love. Although attachment love may be expected to promote more local identifying – the emotion is believed to be adapted in humans to promote care-giving of offspring (Shiota, 2014a) – as with compassion, the extent to which one loves is, in part, defined by the number of objects towards which love is directed. Therefore, an identification with humanity may be expected to be associated with feeling more love. Of the remaining emotions, we did not predict an association between IWAH and either joy, contentment, amusement or pride. Joy, contentment and pride are commonly associated with goal-orientated

behavior given the opportunity for material reward for the self and, as such, seem to implicate self-goals more than an expansion of self-identity (Shiota, 2014b). Amusement, was also deemed to hold little relevance towards IWAH.

Method

Participants & Procedure

Two hundred sixty-five (53% male, median age = 34, 78.1% 'Caucasian/White') respondents from mTurk participated for $1.50. Embedded in a series of unrelated questionnaires, participants completed the dispositional positive emotion scale (DPES; Shiota et al., 2006), which measures the disposition to experience seven discrete positive emotions: joy, contentment, pride, love, compassion, amusement and awe. To measure IWAH, participants also gave responses to a 2-item pictorial version of the IWAH scale, which requires selecting one of seven pairs of circles. A small circle labelled 'self' is shown in varying distances from a larger circle labelled either 'my community' or 'people all over the world'. A low score is indicated by the circles being far apart, while a high score is represented by the smaller circle being entirely within the borders of the larger one.

Results

Identification with all humanity. To test the predicted association between awe and identification with all humanity, we performed a multiple regression with two blocks of predictors. To control for more local identification, we entered identification with community (IWC) In block 1. To test whether awe predicted IWAH, over and above the effect of other positive emotions, in block 2, we entered all positive emotions simultaneously. Of the seven emotions tested, only two significantly predicted IWAH: awe, $\beta = .27$, $t(256) = 3.83$, $p < .001$, and more weakly, love, $\beta = .13$, $t(256) = 2.02$, $p = .04$ (see Table 2 for full regression results).

Table 2: Dispositional positive emotions that predict identification with all humanity in Study 5

Model	Predictor	β	SE
Block 1	Identification with community	.56***	.07
Block 2	Identification with community	.38***	.05
	joy	-.07	.08
	contentment	-.09	.08
	pride	.11	.09
	love	.13*	.06
	compassion	.07	.06
	amusement	.03	.05
	awe	.27***	.07

*** $p < .001$, ** $p < .01$, * $p < .05$

Discussion

This study identified a positive association between the disposition to experience awe and identification with all humanity, even while controlling for six other positive emotions. This result coheres with those of Study 3, which also indicated that awe may differ from other positive emotions (i.e. amusement) by extending the locus of identification out beyond the self and more local groups, towards a more universal connection with humanity as a whole. As such, this appears to indicate that awe's ability to induce a wider sense of self-identity is not simply a function of general positivity. Rather, it appears to speak to the specific nature and function of awe as an emotion of self-transcendence.

Study 6

In order to clarify the role of IWAH, specifically as a mechanism for dispositional awe's effect on bias, in Study 6, we tested a more fully-formed

mediational hypothesis that dispositional awe is negatively associated with implicit bias to the extent it is positively associated with IWAH. We tested the model resulting from this theoretical prediction with structural equation modelling (SEM) as this enabled the testing of associations between multiple, hierarchically-structured predictors. Whilst dispositional awe may differ from that induced by our experimental manipulation, we expected that those who experienced greater awe in their day-to-day life would hold a wider, more universal, sense of self-identity (as in Study 5), and that this universal identity would constitute a mechanism by which dispositional awe associates with less implicit prejudice.

Method

Participants & Procedure

Three hundred sixty-three respondents from Amazon's Mechanical Turk online subject pool participated, each for $1.50. Excluding people who made more than 40% mistakes in the IAT task left a total *n* of 341 participants (50.4% male, median age = 33). Stated ethnicities included 80.9% 'Caucasian/White'. Alongside demographic items, participants gave responses to the dispositional positive emotion scale (DPES; Shiota et al., 2006), which measures the disposition to experience seven discrete positive emotions: joy, contentment, pride, love, compassion, amusement and awe. In Studies 3-5 we had employed a 2-factor version of the IWAH scale in which identity with one's nation was not measured. In Study 6, participants completed the full 3 factor 27-item version of the IWAH scale, which measures identification with community (IWC), nation (IWN) and all humanity (IWAH). Finally, participants also took the ethnicity IAT used in Studies 3 and 4.

Results

Associations between positive emotions and levels of identification. Table 3 details associations between different positive emotions and levels of identification. Joy significantly predicted identification with community (IWC) while pride predicted identification with one's nation (IWN). Both love and compassion predicted all three forms of identification, while awe was unique in predicting only identification with all humanity (IWAH).

Structural Equation Model. As our main goal was to test the relationships between the seven positive emotions, three levels of identification and implicit bias, path analysis was chosen as an appropriate analytical strategy. We tested a 'fully saturated' model in which both direct and indirect relationships between emotions, identification and bias were measured. Analysis utilized a bias-corrected and accelerated bootstrapping procedure with 5,000 resamples. Figure 2 summarizes the results of this analysis. Of the direct relationships between each emotion and bias, no single emotion emerged as a significant predictor (95% CIs included zero). Neither IWC nor IWN significantly predicted bias. However, crucial to our main hypothesis, IWAH was associated with significantly less racial bias, $\beta = -.22$, *SE* = .06, [-.34, -.09], and awe was associated with significantly more IWAH, $\beta = -.35$, *SE* = .06, [.22, .47]. Confirming the successful mediation, a significant negative indirect effect was found between awe and bias, through IWAH, $\beta = -.07$, *SE* = .06, [-.14, -.03]. Only one other emotion, compassion, was also found to have a significant, indirect effect on bias, $\beta = -.05$, *SE* = .02, [-.10, -.01]. These results suggest that dispositional awe and compassion predict reduced racial bias to the extent they are associated with greater identification with all humanity.

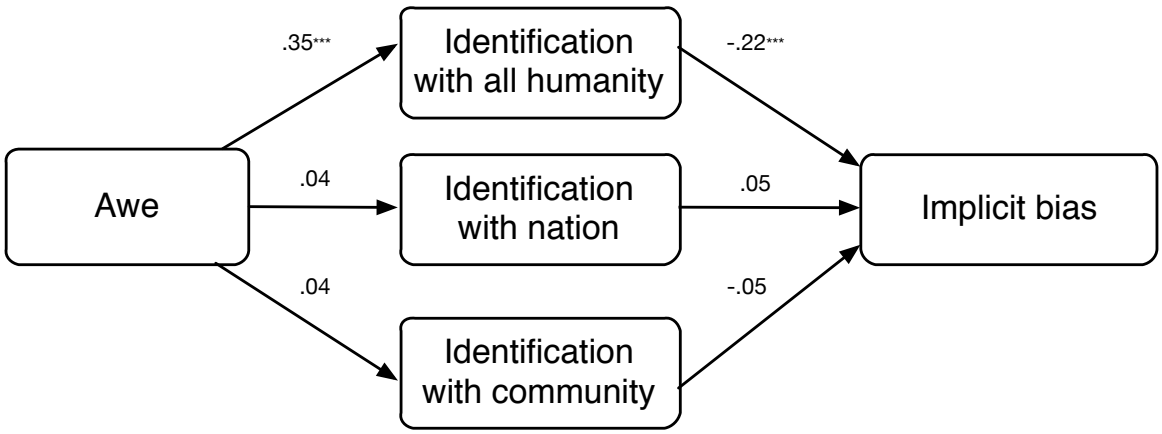

Figure 2: Study 6's mediation model showing paths involved in the significant indirect effect of dispositional awe on implicit bias through identification with all humanity. For sake of clarity, not shown are the six other control positive emotions (amusement, joy, contentment, pride, love & compassion) or direct paths between positive emotions and implicit bias. Paths are standardized regression coefficients with bias corrected and accelerated bootstrapped significance, $^{***}p < .001$

Discussion

Study 6 supported the idea that awe, to the extent it motivates a more universal sense of self-identity, is associated with less implicit bias. Whilst the disposition to experience any single emotion, including awe, was not associated with less bias, our results indicated a more contingent, and thus more interesting, pathway towards reducing prejudice. Our mediation model indicated that individuals who lead an awe-filled life have less bias to the extent they have also experienced an attendant enlargement of self-identity. Therefore, it appears dispositional awe reduces bias only if it is the kind of awe that promotes self-expansion. As this study did not employ a controlled manipulation, it is likely that the heterogeneity of what people consider to be awe is too diverse for direct effects to be detected. Furthermore, some of the items in the awe sub-scale relate to stimuli that are assumed to produce awe ("I have many opportunities to see the beauty of nature") but may in fact not. There are many ways in which the progression to feeling awe can be frustrated so that the process never reaches

the point of promoting openness or updating schemas. However, these results suggest that dispositional awe can lead to an orientation of self-expansion, which is associated with less bias.

General Discussion

Across 6 studies with 1,077 participants, we have found that awe, operationalized as an experimentally-induced state, as well as a disposition, is associated with less implicit prejudice. We have replicated this finding in both the realms of gender (Studies 1 & 2) and ethnicity (Studies 3-6). Furthermore, we have proposed and successfully tested a candidate mechanism for awe's effects on ethnic bias, namely, a greater identification with all humanity (IWAH). We have found that this universal self-identity drove the effect of awe on bias. Our findings add to the understanding of awe as a self-transcending emotion that enables a more expansive sense of common in-group identity that is somewhat freer of the automatic judgments that plague inter-group relations.

Whilst some models posit that, as a set, all positive emotions share qualities that should prime more inclusive group categories (Johnson & Fredrickson, 2005), this proposal does not account for why different positive emotions can have very different outcomes on biases and stereotypes. Indeed, positive emotions at times can *increase* prejudice (Bodenhausen et al., 1994; Huntsinger et al., 2009). In aiming to discern the unique effects of awe on bias vis-à-vis other positive emotions, we have found marked differences between awe and other states with similar hedonic valence. Our amusement condition, replicating that of other work (Lai et al., 2014) displayed no significant effect on bias compared to our neutral control. Relatedly we were also able to contrast the effect of awe with that of other positive emotions such as gratitude. In Studies 1-3, we found that gratitude was also higher for participants in the awe condition. Whilst this is

not surprising – feelings of thankfulness may be expected given the deep and salutary meaning that awe experiences hold – it presented the possibility that gratitude was driving the effect of condition on bias. Nevertheless, with further correlational analysis we found that gratitude showed little relationship with bias whilst awe exhibited a more stable pattern of negative correlations. Our findings provide more reason to doubt the utility of approaches to emotions that place much explanatory value in valence alone.

We also explored whether cognitions toward openness could serve as mechanisms for the effect of awe on bias. Although awe was indeed associated with a lesser need for cognitive closure, a finding concordant with other work (e.g. Shiota et al., 2007), our analysis failed to detect a significant mediation. Two plausible explanations are possible here. The first is theory-centered: perhaps openness, whilst being an effect of awe, is unrelated to bias, and hence not a mechanism. The second is methodological: openness may indeed be a mechanism for the effects of awe on bias, but the measures employed failed to capture the relevant type of openness, or that the data lacked power to detect a significant mediation. Whilst not as powerful as IWAH, the confidence intervals for the indirect effect of need for closure only just crossed zero in Study 1. Additionally, the sample size for Study 1 was smaller than subsequent studies. Whilst not claiming that such details lend support for the role of open-mindedness, we feel it would be premature to discount it entirely.

By aiming to disentangle the effects of awe from those of other positive emotions, we were also able to identify emotions that shared some similarity. Out of the seven dispositional positive emotions, we found alongside awe, compassion was also associated, through IWAH, with reduced bias. Interestingly, compassion and awe were the only two positive emotions (out of seven) identified in the persuasion paradigm work to improve systematic processing of weak arguments (Griskevicius et al., 2010).

Both emotions – we contend, for different reasons – appear to activate action-tendencies that prepare the organism to respond to information-rich environments. In awe, this centers on expanding or replacing schematic systems in the presence of an object that violates expectations. In compassion, it concerns care and vigilance after an appraisal of another's suffering. In terms of IWAH, compassion may also be somewhat definitionally associated with the construct given that 'how much' compassion an individual has is often defined by the degree it extends beyond people close to them (Batson et al., 1999). Like awe, compassion directs attention to targets beyond the self, although the quality of attention and related cognitions appear to be different. Future work on self-transcending emotions is needed to map out the distinct behavioral profiles of these states, especially in their relationship to bias.

To our knowledge, the present work is the first to explore awe's effect on bias and suggests that the emotion has the potential to be a tool to combat entrenched and largely unconscious attitudes. Additionally, it is also the first time IWAH has been demonstrated to have a negative effect on implicit forms of prejudice. Such a finding provides support for the common in-group identity model which, although being tested against explicit forms of prejudice, has rarely been so directly linked to reductions in implicit prejudice (Gaertner & Dovidio, 2014).

To conclude, the present set of studies suggest that by transcending the self through an experience of awe, it is possible to find a wider identity with other humans and momentarily step aside from the largely automatic, but nonetheless harmful distinctions that contribute to inter-group suffering.

Chapter 3

Awe, Agency and Conformity

Abstract

Empirical treatments of the emotion awe have indicated that it may promote prosocial, affiliative behaviors; in other words, it may enhance communion. However, very little is known regarding awe's effects on agency. In three studies (total $N = 840$, 60% female, median age = 27) we explored the relationship between awe and agency, with a particular focus on one aspect of agency: non-conformity. In Study 1, while controlling for other positive emotions, dispositional awe was found to be positively associated with agency and negatively associated with conformity. In Study 2 we tested a candidate mechanism and found that awe's effect on conformity was mediated by curiosity. In Study 3, those induced to feel positive were more likely to provide conforming responses than those in a neutral control group, however those elicited to feel awe showed no significant difference to either group. Our findings lend tentative support to the idea that, while some positive emotions may increase conformity and a preference for the status quo, awe may catalyze a desire for creative idiosyncrasy and strategic non-conformity.

Keywords: awe, conformity, agency, communion, positive emotions.

"…any person in any of the peak experiences takes on temporarily many of the characteristics which I found in self-actualizers.. Not only are these his happiest and most thrilling moments, but they are also moments of greatest maturity, individuation, fulfillment—in a word, his healthiest moments."

—Abraham Maslow (1962/2010, p. 91)

In his treatment of peak experiences, Maslow (1962/2010) linked the emotion awe with individual growth. Maslow contended that such states "can release [a person] for greater creativity, spontaneity, expressiveness, idiosyncrasy" (p. 95). Although there is mounting work on awe's role in aiding *communal* qualities such as helpfulness and altruism, there is little empirical work exploring Maslow's proposal: that awe may also enhance *agentic* qualities, such as self-development, autonomy, learning and creativity.

In order to be effective social actors, individuals must balance agentic and communal concerns. Baumeister (2005) writes that "the human self has to seek both common ground with others (to gain acceptance) and distinctive capabilities (to perform a unique role within the system)" (p. 45). Bakan (1966) introduced the terms agency versus communion and argued that they constituted "two fundamental modalities in the existence of living forms, agency for the existence of an organism as an individual and communion for the participation of the individual in some larger organism of which the individual is part" (pp. 14 –15). Agency relates to the task of individuating and expanding the self and concerns qualities such as competence, creativity, self-determination, wisdom and mastery. Communion relates to task of connecting with and integrating oneself within a community and related qualities include care, honesty, kindness, trust and compassion.

Many positive emotions appear to enhance communion. Acting prosocially, although crucial for functioning social relationships, carries the risk of non-reciprocation or exploitation. 'Collective emotions' (Durkheim, 1887/1972; Horberg, Oveis & Keltner, 2011) such as gratitude and love may function as a kind of reward system for potentially costly altruistic behavior and as such, may help balance the inherent risks of the trade-off (e.g., Bartlett & DeSteno, 2006; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010; Gonzaga, Keltner, Londahl, & Smith, 2001; Schnall, Roper, & Fessler, 2010; Piff, Kraus, Côté, Cheng, & Keltner, 2010).

Although empirical treatments of awe are relatively new, some work suggests that it too may be classed as a collective emotion and, as such, may serve communion (Horberg et al., 2011; Piff, Dietze, Feinberg, Stancato & Keltner, 2015). Those induced to feel awe displayed increased helping behavior and generosity in five studies using different measures of prosociality (Piff et al., 2015). In another study, after watching a short awe-inspiring video, participants were more likely to offer their time to a charitable cause (Rudd, Vohs & Aaker, 2012). Exposure to more awe-inspiring nature versus less awe-inspiring nature resulted in more generosity as measured by the dictator game (Zhang, Piff, Iyer, Koleva & Keltner, 2014).

Nevertheless, despite the utility of grouping awe with other communal emotions, doing so may obfuscate certain important differences, especially regarding awe's possible relationship to agency. Adaptive/functional approaches to emotions (e.g., Ekman, 1992; Frijda, 1988; Lazarus, 1991; Nesse & Ellsworth, 2009; Russell, 2003; Scherer, 2009; Tooby & Cosmides, 2008) posit that emotions developed in response to particular evolutionary challenges and that the profile of each will reflect the specificity of such challenges. For example, gratitude may have evolved to ensure reciprocity between

members of the same species (McCullough, Kimeldorf & Cohen, 2008) and consequently motivates behavior consistent with this function such as helping and generosity. As different positive emotions reflect different evolved functions, each emotion may differ to the extent it promotes agentic or communal behavior.

Whilst the evolutionary significance of awe is far from agreed upon, one possibility is that it may have have been adapted to promote learning and the mastery of fitness-relevant skills (Shiota, 2014a). Over the course of evolution, humans have developed strategies to ensure survival in changing environments. Although much of this technical knowledge is held in relatively inflexible schema's (Piaget, 1973), when information is sufficiently novel, these cognitive maps may need to be updated or replaced altogether. Keltner and Haidt (2003) have argued that awe may have evolved as a response to a high-status conspecific who possessed a high degree of skill or knowledge. Awe as encountered by modern humans may retain certain aspects of this developmental focus; by directing attention and curiosity to objects, persons or actions that lie beyond or at the edges of current frames of reference, it enables those frames of reference to be refined, upgraded or replaced. Deci and Ryan (2000) have posited the adaptation of a domain-general need to "to engage optimal challenges and experience mastery or effectance in the physical and social worlds'' (p. 252). Although they do not mention awe, they argued that certain emotions are self-regulated by such needs. Earlier treatments of awe classified it as an intense variety of interest (Izard, 1977), a state assumed to be crucial for the development of skills, competencies, and intelligence. Like interest, awe primes an action tendency towards openness and curiosity towards a novel elicitor and features similar facial expressions and gestures such as a widening of the eyes, turning the head in the appropriate

direction and, compared to other positive emotions, less smiling (Hass & Brownjohn, 1973; Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013).

If awe is an emotion that can promote the updating of outmoded schemas, it would appear to offer routes toward self-expansion. In this sense, there appears a resemblance between adaptionist accounts of awe and Maslow's (1962/2010) observations, where he noted that peak experiences often involved the attainment of wisdom or insight: "the person in the peak-experience usually feels himself to be at the peak of his powers, using all his capacities at the best and fullest" (p. 99). A cross-cultural study spanning six continents found that 'learning and growing' emerged as one of the most important shared themes to describe peak experiences (Mouton & Montijo, 2016). If such a characterization of awe is correct, we might predict that it would enhance aspects of self-growth. In other words, awe may be considered agentic.

Although there exists little direct evidence of a general relationship between awe and agency, some empirical studies appear suggestive of such a proposal. Compared to other positive emotions, awe appears to increase the desire to engage in individual, developmental pursuits. When asked about an ideal next-hour activity, those who have recently experienced awe cite solitary activities such as walking in nature and creative activity (Shiota, Keltner & Mossman. 2007).

One aspect of agency – epistemic or rational agency – is the capacity to attend to and accurately process information relevant to individual action (Bandura, 1989; Wallace, 1999). A small but growing body of work suggests that awe may be effective at promoting cognitions that may be conducive for agency. At a trait level, the disposition to experience awe positively correlates with openness to experience (Shiota, Keltner & John, 2006) and negatively correlates with the need for cognitive closure (Shiota et al., 2007), indicating

that the awe prone show more tolerance for and curiosity towards uncertainty. The tendency to feel curiosity in the event of a violation of expectation is one of the reasons given by Valdesolo, Shtulman and Baron (2017) as to why awe may prove an important catalyst for inspiring learning in science. One study showed that the awe-inspired are less reliant on quick automatic judgments. Griskevicius, Shiota, and Neufeld (2010) compared the effects of six distinct positive emotions, measuring how amenable participants were to logically fallacious arguments. Those induced with contentment, anticipatory enthusiasm, attachment love or amusement were more persuaded by these weak arguments, while awe showed the opposite effect. That is, those in the awe condition displayed lower persuadability than those in the neutral condition.

Another foundational aspect of agency is the ability to assert one's wishes, beliefs or judgments, rather than feeling compelled to conform to those of other people or situations. Maslow predicted that peak experiences may help bolster a person's ability to express themselves uniquely, or in his words, idiosyncratically (1962/2010). If awe differs from other positive emotions in activating a more agentic behavioral profile, it may also differ with respect to the desire to conform.

Although there are no studies that address the relationship between awe and non-conformity, there exist suggestive links in work conducted on the relationship between psychological distance and creativity (Förster, Friedman & Liberman, 2004; Jia, Hirt & Karpen, 2009; Liberman, Polack, Hameiri, & Blumenfeld, 2012). Whilst not an exact antynom of conformity, creativity is defined by aspects of non-conformity such as originality, imaginativeness and inventiveness. According to construal level theory (Liberman & Trope, 2008; Trope & Liberman, 2010), objects perceived as more distant from the self's current experience promote more abstract and creative thought. In one

study, children's creative performance was enhanced when they were primed with distal objects (images of the universe) compared to proximal objects (their own desk) (Liberman et al., 2012). Awe is thought to be elicited by objects perceived as 'vast' vis-à-vis the self (Keltner & Haidt, 2003). Notably, it is one of the key emotions astronauts report while viewing the earth in its totality, from space (Yaden et al., 2016). Awe was not measured in Liberman and colleagues (2012) study, but it is possible that the same types of vast stimuli that are frequently found to elicit awe also elicit heightened creativity.

That the awe-inspired show less reliance on heuristics (Griskevicius et al., 2010) may also serve as an indication that awe may ameliorate some of the pressures to conform. In Asch's (1956) famous line experiments, participants seem to have succumbed to the power of a particular heuristic; in this case, the *argumentum ad populum* fallacy. If awe activates a more systematic approach to exploring incoming information, such fallacies may exert less power on decision making and result in less compulsion to conform.

Finally, Yen & Chaung (2008) found support for the idea that, in general, positive affect inspires a preference for the status-quo. However, this effect was mediated by the degree the affective experience included an appraisal of uncertainty with more intense uncertainty appraisals linked to less status-quo preference. Although Yen and Chuang (2008) did not measure awe, as the prototypical positive emotion of uncertainty, one might predict that compared to other positive states, the awe-inspired would show less preference for the status-quo.

Taken together, we believe extant research points to the possibility that compared to other positive emotions, awe may activate a more agentic profile associated with reduced conformity. However, to our knowledge, no work has explored this proposal directly. In the present work, we explore two related hypotheses: 1. dispositional awe will be a) positively

associated with agency, b) positively associated with communion and c) negatively associated with conformity; and 2. Individuals induced to feel awe will display less conformity than those feeling another positive emotion and a neutral state.

Overview of Studies

In three studies, we investigated the relationship between awe, agency and conformity. In Study 1 we examined to what extent the disposition to experience seven discrete positive emotions was associated with agency, communion and conformity. In Study 2 we proposed and tested a candidate mechanism for dispositional awe's relationship with conformity: curiosity. In Study 3 we investigated whether, compared to a neutral control, those induced with awe would perform better at a task measuring non-conforming responses and whether those induced to feel joy would do worse.

Study 1

Study 1 was designed to test whether awe differed from six other discrete positive emotions in the extent it is associated with agency, communion and conformity. The seven emotions considered were joy, contentment, pride, love, compassion, amusement and awe. We hypothesized that out of the seven emotions, awe would be positively associated with agency and communion and negatively association with conformity.

Method

Participants

Three hundred nineteen undergraduate students (267 women, median age = 19, 87% White/Caucasian) participated for course credit.

Procedure

After providing informed consent, participants were asked to respond online to three sets of questionnaire items. The first was the 38-item Dispositional Positive Emotions Scale

(DPES; Shiota et al., 2006), which measures the extent to which seven discrete positive emotions are experienced in day-to-day life. Emotions measured were joy (e.g. "I often feel bursts of joy"; $\alpha = .86$), contentment (e.g. "I am generally a contented person"; $\alpha = .92$), pride (e.g. "I am proud of myself and my accomplishments."; $\alpha = .77$), love (e.g. "I develop strong feelings of closeness to people easily."; $\alpha = .85$), compassion (e.g. "When I see someone hurt or in need, I feel a powerful urge to take care of them"; $\alpha = .88$), amusement (e.g. "I find humor in almost everything"; $\alpha = .82$) and awe (e.g. "I often feel awe"; $\alpha = .83$; 1= *strongly disagree*, 7 = *strongly agree*). The second measure presented was Mehrabian and Stefl's (1995) Conformity Scale (CS), an 11-item measure assessing individuals' tendencies to conform to situations and people around them (e.g. " I tend to rely on others when I have to make an important decision quickly"; $\alpha = .73$; 1 = *very strong disagreement*, 9 = *very strong agreement)*. Finally, participants were directed to the 20-item Big Two Personality Scale (Gebauer, Paulhus & Neberich, 2013) which asks "How well does the following generally describe you?" and presents a list of agentic (e.g. adventuresome, ambitious, outgoing; $\alpha = .76$) or communal (e.g. caring, affectionate, trusting; $\alpha = .83$; 1 = *not at all*, 7 = *very much*) personality traits.

Results

Conformity. To test the hypothesis that awe is, compared to other positive emotions, associated with less conformity, we conducted a multiple regression. First, we inspected the zero-order correlations. Whilst in the expected direction, awe did not significantly correlate with conformity ($r = -.10$, $p = .09$). Significant correlations did however emerge for two out of the seven emotions: Love was found to associate positively with conformity ($r = .19$, $p = .001$) whilst pride was linked with less conformity ($r = -.28$, p

< .001). We then conducted a multiple regression in which all seven emotions were entered simultaneously into Block 1 and regressed onto the conformity composite. Supporting our hypothesis, awe was found to significantly and negatively predict conformity (β = -.14, *SE* = .05, *p* = .02). Pride again emerged as a strong negative predictor of conformity (β = -.44, *SE* = .06, *p* < .001). In the positive direction, love (β = .31, *SE* = .05, *p* < .001) and joy (β = .18, *SE* = .07, *p* = .03) were both associated with greater conformity. The remaining three emotions (contentment, compassion and amusement) showed no significant relationship (all *p*s > .60). Full results from this analysis can be found in Table 1.

Agency. The same data analytic procedure was used to assess the relationship between our seven positive emotions and agentic and communal personality traits. Inspection of zero-order correlations revealed all seven emotions to have a positive relationship with agency. Nevertheless, the multiple regression was able to discern important differences between each emotion in predicting agency and communion. Supporting our hypothesis, awe was found to significantly predict greater agency (β = .11, *SE* = .03, *p* = .03). Reflecting the conformity results, awe was joined by pride by also evidencing a positive association (β = .68, *SE* = .04, *p* < .001). Amusement was the only other emotion to display this direction of relationship (β = .13, *SE* = .04, *p* = .01). Contentment was the only emotion to evidence a significant negative association (β = -.27, *SE* = .04, *p* < .001) whilst joy, love and compassion showed no significant association with agency.

Communion. Once again, zero-order correlations revealed a positive relationship between each emotion and communal personality traits (see Table 1) while the multiple regression ascertained differences in each emotion's association with communion. This

time, awe while controlling for other positive emotions, was not found to have any significant association with communion (β = -.02, *SE* = .03, *p* = .76). Three emotions displayed a positive relationship to this trait: compassion (β = .51, *SE* = .04, *p* < .001), love (β = .21, *SE* = .03, *p* < .001) and pride (β = .12, *SE* = .04, *p* = .03). None of the remaining emotions showed any significant association with communion (all *p*s > .30).

Discussion

Study 1 showed that, while controlling for other positive emotions, awe evidenced a small but significant negative association with conformity, as well as a positive relationship with agency. Counter to predictions, awe did not significantly predict communion. Thus, our results place some doubt on the characterization of awe as simply another communal emotion. To the extent that it predicted agency and conformity, awe resembled an agentic emotion such as pride more than it fitted with the behavioral profile of emotions often linked to communion such as love and joy. Nevertheless, due to the functional specificity of different emotions, it is likely that awe and pride activate agency and non-conformity for different reasons. Pride concerns positive self-evaluation and is thought to have evolved as means of displaying status, in order to claim access to resources (Gilbert, 2001; Hrdy, 1999). Those that dispositionally experience more pride may have elevated agentic tendencies through a greater desire to gain status. Another possibility is that prideful individuals have an inflated sense of their own positive agentic traits. In contrast, as discussed above, awe appears to have evolved as a response to objects perceived as greater than the self with a behavioral profile linked to learning, curiosity and exploration. One possibility is that pride is linked to agency through the motivation to *display* status, whereas awe is linked to agency through the motivation to *develop* competence.

In order to make further sense of the mechanisms by which dispositional awe may associate with agency, in Study 2 we narrowed our focus to conformity in addition to exploring a candidate mechanism for action, namely, curiosity.

Table 1: Results of Study 1's multiple regression showing discrete positive emotions that predict agency, communion and conformity

Dependent Variable	Joy	Contentment	Pride	Love	Compassion	Amusement	Awe
Agency							
β	.09	-.27***	.68***	-.06	.000	.13**	.11*
SE	.05	.04	.04	.04	.04	.04	.04
Communion							
β	-.01	.07	.12*	.21***	.51***	-.05	-.02
SE	.05	.04	.04	.03	.04	.03	.03
Conformity							
β	.17*	-.01	-.44***	.31***	.03	.01	-.14*
SE	.07	.06	.06	.05	.06	.05	.05

***$p < .001$ **$p < .01$ *$p < .05$.

Study 2

In Study 2, we investigated whether curiosity is a means by which awe may reduce conformity. Although Study 1 showed a significant, albeit small ($\beta = -.14$), association with conformity while controlling for other positive emotions, we also found non-significant zero-order correlations between these variables. As such, we must caution against interpreting that awe has some general association with conformity. Rather, it is possible that awe may only be linked robustly to conformity to the extent it motivates other motivational states and cognitions. Providing an account of such contingencies is important for understanding the dynamic and complex nature of awe's effects on behavior.

Curiosity is thought to link cues reflecting novelty and challenge with growth opportunities (Kashdan, Rose, & Fincham, 2004). Whilst awe is believed to be elicited by novel objects (Keltner and Haidt, 2003), little is known of how this experience causes more significant down-stream effects on cognition. In other words, how does a brief encounter with novel or challenging stimuli turn into an opportunity for the kind of growth Maslow might have expected? It is possible that curiosity may serve as such a link in that it may transform a short moment of awe-inspired interest into a longer-term orientation towards exploration. Therefore, we propose that curiosity may constitute a mechanism that activates and enables certain behaviors, in this case, non-conformity.

In Study 2, we also sought to collect data from a more representative sample, which was not based in the UK, and not predominantly students.

Method

Participants

Two hundred sixty-five participants from Amazon's Mechanical Turk (mTurk) service (143 men, median age = 34, 79% White/Caucasian) participated for a payment

of $1.50. Criteria for participants was that they were based in the US, had above a 97% approval rating and had done at least 1,000 previous tasks with the service.

Procedure

Participants navigated to an online questionnaire which included the previous DPES and CS items. Additionally, this time they were also asked to respond to the 7-item Curiosity and Exploration Inventory (CEI; Kashdan et al., 2004). This includes two sub-scales. The exploration sub-scale (4 items) measures individuals' disposition to pursue novelty and opportunities for growth (e.g. "everywhere I go, I am looking for new things or experiences"; $\alpha = .83$) while the absorption sub-scale measures individuals' capacity to become absorbed in in activity (e.g. "When I am participating in and activity, I tend to get so involved that I lose track of time."; $\alpha = .84$).

Results

Linear Regression. As a preliminary stage, we re-ran the linear multiple regression from Study 1. This time, awe showed no significant association with conformity ($\beta = .05$, $SE = .07$, $p = .54$). Love ($\beta = .54$, $SE = .06$, $p < .001$) and joy ($\beta = .20$, $SE = .08$, $p = .03$) both predicted greater conformity, while pride ($\beta = -.41$, $SE = .09$, $p < .001$) was the only emotion to predict a reduction.

Mediated Multiple Regression. To test the hypothesis that awe is associated with conformity to the extent that it is associated with curiosity, we conducted a mediated multiple regression with all seven positive emotions entered as predictor variables, exploration and absorption as mediators (together constituting curiosity) and conformity as dependent variable. We utilized a bias-corrected and accelerated bootstrapping procedure with 95% confidence intervals and 5,000 resamples as this provides a robust (and more conservative) estimate of significance in smaller sample sizes (Preacher & Hayes, 2008). In line with guidelines on using multiple mediators

(Preacher & Hayes, 2008), the error terms of exploration and absorption were permitted to covary. Supporting part of our hypothesis, a significant direct effect was found between awe and both exploration (*B* = .40, *SE* = .07, CIs = [.26, .53]) and absorption (*B* = .35, *SE* = .09, CIs = [.18, .52]). Additionally, a direct negative effect emerged between exploration and conformity (*B* = -.25, *SE* = .09, CIs = [-.41, -.05]) but not between absorption and conformity (*B* = .05, *SE* = .06, CIs = [-.07, .19]). Supporting our mediational hypothesis, a significant indirect effect was found between awe and conformity via curiosity (*B* = -.08, *SE* = .04, CIs = [-.18, -.01]). In addition, a negative indirect effect also emerged for pride (*B* = -.08, *SE* = .04, CIs = [-.17, -.02]). Nevertheless, since the direct effect between absorption and conformity was non significant, we must conclude that it was the exploration aspect of curiosity that drove the mediated effect.

Discussion

Study 2 found that, to the extent that awe is associated with aspects of curiosity, specifically, the disposition to seek out novelty and opportunities for growth, it is linked with reduced conformity. As such, curiosity appears to be a good candidate activating mechanism between awe and more downstream effects on cognition and behavior. Nevertheless, pride was also found to have such a relationship with conformity via curiosity. At least two interpretations are possible. One possibility is that pride may indeed, like awe, motivate curiosity and, in turn, reduce the disposition to conform. There is however a more prosaic explanation: individuals high in pride may be especially prone to self-presentation bias. Inspection of zero-order correlations across Studies 1 & 2 revealed large associations between pride and all outcome variables considered (non-conformity, agency, communion, exploration, absorption). It is feasible that prideful individuals are more likely to inflate their responses, behavior that is in line

with pride's posited function of displaying status. Such difficulties are partly an outcome of using non-experimental, self-report data. We sought to remedy this in Study 3 by conducting a randomized control trial.

Study 3

In Study 3 we conducted an online experiment to test two hypotheses: (1) That participants manipulated to feel joy, compared to those in a neutral control group, would perform worse at a task that measured non-conformity and (2) that those induced to feel awe would do better. Our rationale for predicting this centered on the proposal that, while positive emotions may, in general, be expected to motivate affiliative behavior, awe may instead promote a greater focus on agency and therefore enable more non-conforming responses. Positive emotions are often linked to affiliative behaviors (Van Kleef, De Dreu & Manstead, 2010). This behavior appears to include the *desire* to affiliate. For example, participants manipulated to recall a moment of joy cited social interaction as an ideal next-hour activity (Shiota et al., 2007). One outcome of the desire to affiliate is behavioral mimicry. Lakin & Chartrand (2003) found that participants given an affiliation goal were more likely to mirror a confederates face-touching behavior than those given no such goal. Leighton, Bird, Orsini and Heyes (2010) recorded the speed of participants' hand movements during a task in which the subjects were asked to follow the movements of a hand opening or closing. Those primed with affiliative words performed significantly better at this task. As such we predicted that those induced to feel joy would display greater conformity whereas those induced to feel awe would display less conformity.

Method

Participants

Two hundred fifty-six mTurk participants (144 women, median age = 33, 81% 'White/Caucasian') participated for a payment of $1.50

Procedure

Participants were randomly assigned to watch one of three 2-minute videos that served as our awe, joy and neutral manipulations. The awe condition featured starlings flocking in dramatic formations above a lake, backed by stirring post-rock music. The joy condition was a collage of cute animal slides set to jovial banjo music. The neutral condition was an educational video that featured a cartoon rabbit explaining what a repeated pattern is with a light jazz 'muzak' backing. As such, each video included the depiction of animals but differed in the emotion elicited. After the manipulation, participants were directed to our conformity task, which was replicated from that of Alquist, Ainsworth & Baumeister (2013). Participants were asked to imagine that they were interviewing for a top marketing firm in which they would be tested on their business aptitude by being asked to generate novel product names. Participants were asked to think of three names for each of the three categories of product: pasta, nuclear elements and analgesics. For each of the products, participants were provided with six example names, but importantly, all six names conformed to a particular format in that they included one of two or three common endings. The pasta examples ended in either 'na', 'ti', or 'ni' (e.g., lasagna, spaghetti, fettuccini); the nuclear element examples ended in 'ium' or 'on' (e.g., plutonium, thanon), and the analgesic examples ended in 'ol' or 'in' (e.g., Tylenol, aspirin). To discourage conformity, the instructions stressed that participants should attempt to generate novel product names rather than follow the

examples given. The total number of responses across product categories that diverted from the given examples constituted our measure of non-conformity. A survey placed at the end of the experiment asked participants to what extent they were feeling each of three discrete emotions while watching the video that served as our manipulation ("happiness", "amusement", "awe"; 1 = *not at all*, 7 = *very much*) and constituted our manipulation check.

Results

Manipulation checks. Independent t-tests confirmed that participants in the awe condition ($M = 4.35$) experienced stronger feelings of awe than both those in the amusement ($M = 2.04$), $t(176) = 12.96$, $p < .001$, $d = 1.94$, and the neutral ($M = 1.74$) conditions, $t(171) = 15.01$, $p < .001$, $d = 2.32$. Participants in the amusement condition ($M = 3.99$), likewise reported more amusement than those in the awe ($M = 3.28$), $t(176) = 3.65$, $p < .001$, $d = 0.55$, and neutral ($M = 3.18$) conditions $t(159) = 4.12$, $p < .001$, $d = 0.65$. There were no self-reported differences in happiness between the awe ($M = 3.28$) and amusement ($M = 3.65$) conditions, $t(176) = 1.93$, $p = .06$, $d = 0.29$.

Preliminary analysis. Preliminary analysis showed that neither gender, $F(1, 254) = 0.08$, $p = .79$, $\eta_p^2 < .001$, ethnicity, $F(6, 249) = 1.60$, $p = .15$, $\eta_p^2 = .04$, nor age, $B = .02$, $t(254) = -1.50$, $p = .13$ significantly affected conformity so data analysis was collapsed across these categories.

Conformity. To test whether our three treatment groups differed to the extent they elicited conforming responses, we first computed a non-conformity score by adding the total number of brand names offered, out of a possible nine, that did not conform to examples given. This score was then reverse coded. We were then able to conduct an ANOVA on the composite conformity score. The omnibus effect of emotion condition was non-significant, $F(2, 253) = 2.50$, $p = .08$, $\eta_p^2 = .02$. To test our specific

hypotheses, two sets of planned contrasts were conducted. The first tested the difference between those in the joy and neutral conditions (coded as awe = 0, joy = 1, neutral = -1). This analysis indicated that, supporting hypothesis (1), those in the joy condition (M = 6.42) produced more conforming responses than those in the neutral condition (M = 5.64), $t(159) = 2.18$, $p = .03$, $d = 0.33$. The second contrast tested the difference between the awe and neutral conditions (coded as awe = 1, amusement = 0, neutral = -1). Contrary to our hypothesis (2), this analysis revealed that there were no significant differences in conformity between those in the awe condition (M = 6.12) versus those in the neutral condition, $t(253) = -1.58$, $p = .12$, $d = 0.23$.

Discussion

Study 3 found that those induced to feel joy, evidenced greater reliance on the given examples in their product name suggestions. This appears to support the idea that certain positive emotions can activate more conforming behavior, an observation consistent with other research (Yen & Chuang, 2008), as well as the proposition that many positive emotions function to regulate affiliative behavior. Nevertheless, our hypothesis that awe be associated with less conformity versus the control condition was not supported. Whilst it is tempting to interpret the absence of a significant difference between awe and the control condition as an indication that awe may differ from other positive emotions by *not* increasing conformity, such conclusions are ill advised since non-significant comparisons do not support the absence of an effect. As such, in the context of this particular paradigm, we must conclude that although we have found support for the idea that general positive affect may motivate conforming behavior, we have yet to find support for the relationship between experimentally-elicited awe and conformity.

General Discussion

Across 3 studies with 850 participants, we have found tentative support for the idea that whilst some positive emotions seem to evidence a positive relationship with conforming behavior, awe appears absent of such a relationship and in some circumstances evidences a negative association. We have also shown that the disposition to experience awe is associated with more agentic rather than communal personality traits, a finding that appears inconsistent with the characterization of awe as one of a suite of communal emotions.

One aim of the present work was to provide greater granularity on the relationship between discrete positive emotions and two fundamental domains of human life: agency and communion. Our results suggest that some of the positive emotions considered such as love, joy and compassion may be considered primarily communal, whereas awe and pride showed more relationship with agency. Thus, although positive emotions are often supposed to have equivalent effects, due to their shared valence, it is possible that some positive emotions more greatly affect our capacity to function as individuals whilst others affect our capacity to act within a larger community.

Positive emotions may diverge in catering to either agency or communion (or both) due to the extent to which they reflect fundamental fitness needs. Many positive emotions are thought to serve the need to affiliate (Shiota, 2014b; Van Kleef et al., 2010), triggering action-mechanisms consistent with communion which enable actors to more easily fold in to the needs of society. However, distinct from the need to affiliate, is the need for competence/mastery: a domain-general need “to engage optimal challenges and experience mastery or effectance in the physical and social worlds’’ (Deci & Ryan, 2000, p. 252). It is possible that the emotion awe is regulated by this need, and on this basis, differs from other positive emotions. If this is correct, the awe-

prone may be expected to strategically seek novelty as a means to challenge existing schemas, and grow beyond the limitations set by self and society. This characterization also leads to the proposal that greater awe results in a greater capacity for non-conformity, where appropriate.

Joyful, happy or contented states often indicate the achievement of socially valued, and fitness-relevant goals. In addition, it is thought such emotions signal that the organism should 'proceed along trusted paths' towards these goals, as they have lead to success (Shiota, 2014b). For instance, rats that had just found and consumed a food treat in a maze showed a sequence of hippocampal place cell firing in reverse of the sequence during the search itself, suggesting a greater encoding of successful pathways (Foster & Wilson, 2006). In general, many positive emotions may signal to the organism "keep doing what you are doing". Unsurprisingly, positive affect has been linked with stability, cohesion and upholding the status quo rather than divergence, challenge and originality (Yen & Chuang, 2008). In the case of awe, rather than being activated in situations in which goal-fulfilment has occurred, it is elicited by what might be considered an opposite case: when the maps of the world one possesses are deemed to be inadequate and change must occur to make sense of events, objects or persons. Rather than encoding the path to success, awe may be a catalyst that initiates new, uncharted paths as the old ones are deemed insufficient. This is one explanation for why awe may, relative to other positive emotions promote a capacity for non-conformity.

We have also proposed a mechanism that may lead individuals from a moment of awe to down-stream outcomes such as the updating of schemas, namely: curiosity. In the case of dispositional awe, we found that to the extent the awe-inspired are motivated to become more curious and explore novelty as an opportunity to grow, they also tend to be less conforming. This result bolsters the proposal that curiosity is a means by

which novel and challenging experiences can offer opportunities towards self-expansion (e.g. Kashdan et al., 2004). By highlighting the important link between awe and curiosity, we have sketched out a more contingent picture of awe's relationship with conformity. It is likely that awe-inspiring experiences can lead to any number of diverse responses and reactions. Not all of these will include curiosity. However, when they do, our results suggest they may lead to non-conformity.

Nevertheless, whilst offering a good first attempt to capture the differing dynamics between discrete positive emotions and conformity, agency and communion, there have been limitations that prevent the study from being entirely conclusive. In our experimental paradigm, only one of our two hypotheses was supported. Whilst we found that general positive affect was associated with more conforming responses, we did not find evidence for the reverse in awe. Future research should attempt to investigate under which circumstances, if any, experimentally-manipulated awe may stimulate non-conformity. One suggestion, given the role proposed for curiosity, is that following an awe manipulation, participants take part in a task that primes curiosity. Another is that a task that more saliently represents the social aspects of conformity is used. For instance a task could be created in which participants' responses are judged by other participants (real or would be).

By proposing that states such as awe lead to a heightened capacity to act as an individual, Maslow (1962/2010) provided a characterization that appears to be absent from the extant empirical literature, which has so far focused on awe's role as a communal emotion. In conclusion, we contend that future work should further investigate to what extent awe can bolster positive aspects of agency, non-conformity, and the individuation of the self.

Chapter 4

Awe and Social Exclusion

Abstract

Social exclusion and loneliness are pernicious phenomena associated with profound negative sequelae in humans and so there is a need to understand factors that might intervene in this 'loneliness loop'. Although positive emotions show promise as they may instil a greater sense of social connectedness, many positive emotions are most often elicited by positive social interaction which may be beyond the grasp of socially-isolated individuals. In contrast, the emotion awe is often elicited in asocial situations yet felt to be a source of profound connectedness. We propose that awe may represent a means by which socially-excluded individuals can achieve a sense of connectedness that transcends the social world and, in turn offers a 'secure base' for better navigating interpersonal relationships. In a randomized control trial (N = 238, 53% male, median age = 30) we found mixed support for the proposal that those elicited to feel awe, compared to amusement or a neutral state, experienced less of the negative effects of social exclusion.

Keywords: awe, social exclusion, wellbeing, cyberball, positive emotions.

"Awe conjures up the feeling of being a small, separate entity, and yet significant somehow and connected to the universe."

—Candice Hershman (quoted in Schneider, 2009, pp. 81–82)

Humans possess a fundamental drive to be accepted by others (Baumeister & Leary, 1995). Individuals that feel accepted, recognized and valued in their social interactions benefit from enhanced self-esteem (Leary, Tambor, Terdal, & Downs, 1995), perceive themselves to have more control over (Taylor & Brown, 1988) and increased meaning (Greenberg, Solomon, & Pyszczynski, 1997) in their lives. The negative consequences of social exclusion include increased aggression (Leary, Kowalski, Smith, & Phillips, 2003; Warburton, Williams, & Cairns, 2006), impaired cognitive processing (Baumeister, Twenge, & Nuss, 2002), and suicide attempts (Williams & Zadro, 2001). Feeling excluded is often experienced as a form of pain. Indeed, in one study, participants experimentally manipulated to feel excluded displayed activation in brain areas linked with feeling physical pain (Eisenberger, Lierberman, & Williams, 2003).

When the sense of being excluded extends longitudinally, it may be perceived as loneliness, which Hawkley and Cacioppo (2010) define as: "a distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships" (p. 218). A growing body of research documents the dramatic negative effects of loneliness, which include increased morbidity and mortality (Caspi, Harrington, Moffit, Milne & Poulton, 2006; Eaker, Pinsky & Castelli, 1992; Holt-Lunstad, Smith, Baker, Harris & Stephenson, 2015), elevated risk of personality disorders and psychosis (DeNiro, 1995; Neeleman & Power,

1994; Richman & Sokolove, 1992), impaired cognitive performance and decline over time (Gow, Pattie, Whiteman, Whalley & Deary, 2007; Tilvis, Kahonen-Vare, Jolkkonen et al., 2004; Wilson et al., 2007), increased depressive symptoms (Cacioppo, Hughes, Waite, Hawkley & Thisted, 2006; Heikkinen & Kauppinen, 2004; Wei, Russell & Zakalik, 2005) and heightened risk of suicide (Goldsmith, Pellmar, Kleinman & Bunney, 2002).

One pernicious aspect of loneliness is that it begets itself. Individuals that lack social support are at a greater risk of developing a hyper-vigilant response to others who are perceived as (additional) sources of threat. This leads lonely individuals to expect more negative social interaction, and remember more negative information about social interactions; factors that ultimately lead to even greater withdrawal from social life (Hawkley & Cacioppo, 2010). There is a need to investigate factors that might intervene in this "loneliness loop".

Positive emotions have been associated with what might be considered the antonym of loneliness and exclusion: social connectedness (Baldassare, Rosenfield & Rook, 1984; Chan & Lee, 2006; Helliwell, 2003; Lyubomirsky, Tkach, & DiMatteo, 2006; Pinquart & Sörensen, 2000; Steptoe, Dockray & Wardle, 2009). Although this relationship is likely bidirectional, experimental studies have indicated that inducing positive emotions can result in a greater sense of being socially connected (Hutcherson, Seppala & Gross, 2008; Kok & Fredrickson, 2010; Kok et al., 2013). Research in this area has made notable use of training participants in loving-kindness meditation (LKM). By self-generating positive emotions through LKM, individuals perceive increased satisfaction with their social connections which, in turn, increases various indicators of positive health (Kok et al., 2013). In contrast to the "loneliness loop", this process has been likened to an "upward spiral" (Fredrickson & Joiner, 2002).

Nevertheless, focusing exclusively on LKM is a relatively narrow means to understand the effect of positive emotions on connectedness as it is difficult to distinguish between the effect of discrete elicited emotions and other elements of LKM practice such as mindfulness, empathy and visualization. Additionally, although it is likely that discrete positive emotions differ in their effects on cognition and behavior, the LKM work treats positive emotions that result from practice as a set, assumed to have the same or similar function.

Many positive emotions are thought to be undergirded by a fundamental need to integrate within a community (Keltner & Haidt, 1999; Shiota, Campos, Keltner & Hertenstein, 2004). Consequently, positive emotions are thought to both aid and be elicited by social relationships (McIntyre, Watson, Clark, & Cross, 1991; Vittengl & Holt, 2000). However, since socially excluded individuals may lack the existing interpersonal networks that make such situations easily accessible, attempting to leverage positive emotions to reduce social exclusion arrives at an impasse.

In contrast to other positive emotions, the emotion awe possesses a relatively asocial nature. It is often felt in the presence of non-social elicitors such as striking natural formations, music, works of literature and poetry (Keltner & Haidt, 2003). It also appears to motivate activities that can be enjoyed alone. In one study, those having just experienced awe cited solitary activities such as walking in nature or creative activity as an ideal next-hour activity (Shiota, Keltner & Mossman, 2007). In contrast, the same study found the most common elicitor of joy was “other people” and individuals having just experienced joy cited instead “social interaction” as an ideal next-hour activity.

Nevertheless, connectedness is an integral component of the phenomenology of awe (Bonner & Friedman, 2011). It may be worth asking what, if not other people, awe

connects individuals to. Sources of connection are often described by those experiencing awe in abstract terms: “I am caught up in experiencing being a part of something larger than myself and larger than my previous experience” (Schneider, 2009, p. 125). For other people, it takes on a more divine character: “That moment of transcendence in which the human experience melded with the Divine. The response to this is awe” (Schneider, 2009, p. 134). Whether perceived in spiritual terms or not, both sources of connection are beyond the proximate social realm. If awe facilitates a sense of connectedness that is not reliant on particular social interactions, what implications may this have for those that feel socially excluded?

By making available a source of connection that is beyond the social, awe may help individuals build confidence and inner resources which, in turn, help them escape the loneliness loop. One framework relevant to understanding this proposition is the attachment theory concept of the “secure base” (Ainsworth & Bell, 1970). The dynamics of adult attachment, although first studied in the context of the family, are thought to operate in multiple areas of human life, including other interpersonal domains such as friendship and romantic relationships (Mikulincer & Shaver, 2007). However, attachment relationships are also possible towards non-social entities such as geographical places (Hidalgo & Hernández, 2001) objects (Keefer, Landau, Rothschild & Sullivan, 2012) and deities (Kent, Bradshaw & Dougherty, 2016) and secure attachments within these non-social domains can predict salutary outcomes, including a greater confidence to engage in explorative social behavior. If awe can induce a sense of asocial connection, it is possible that it provides a form of secure base, from which emerges a greater confidence to navigate the social world.

In summary, extant research points to the possibility that awe may foster a sense of connectedness, even in situations in which tangible social connection is lacking. As such, it may help buffer the negative effects of feeling social excluded.

In the present work we conducted a randomized control trial comparing the effects of eliciting awe, amusement or a neutral state on the negative effects of being socially excluded. A growing body of work documents how the pain of social exclusion can be found even in seemingly trivial situations such as in an online game. Williams, Cheung and Choi (2000) found participants who were made to feel excluded during the Cyberball ball-tossing game experienced a significant worsening of their sense of belonging, control, self-esteem and mood. Nevertheless, no published research has explored the effect (if any) of inducing positive emotions prior to being excluded in this game. We utilized the Cyberball paradigm to test the hypothesis that, compared to experiencing amusement or a neutral state, those induced to feel awe will experience less negative effects of being socially excluded.

Method

Participants

Two hundred thirty-eight users of Amazon's Mechanical Turk (mTurk) subject pool (126 men, median age = 30, 75.2% White/Caucasian) participated for $1.50.

Procedure

The experiment utilized a 3 (emotion: awe, amusement, neutral) × 2 (level of ostracism: included, excluded) between-subjects design. After providing informed consent, participants were randomly allocated to watch one of three two-minute videos. In the awe condition, participants watched a video depicting birds flocking in grand impressive shapes over a lake. In the amusement condition, participants watched a clip of the BBC's *Walk on the Wild Side*, which featured a montage of comedic animal

behavior dubbed with human voices. In the neutral condition, participants watched an educational video in which a cartoon rabbit explains what a repeated pattern is using everyday examples. These three videos have been previously demonstrated to robustly elicit the intended emotions in a sample of 1,077 participants across UK university and US mTurk sample pools (Stell & Farsides, 2017). After the video manipulation, participants were instructed to play the Cyberball game (Williams et al., 2000). Participants were told that they were to play a simple ball tossing game involving two other players which measures the effect of mental visualization on task performance and that they should make concerted effort to mentally place themselves in the game, imagining what the other players are like, and features of the game environment. Participants were asked to enter a handle to indicate their in-game character and led to believe that the other players were also mTurk workers. In the following screen, they were presented with a status bar labelled "connecting to server", then "connecting to other players" and finally "connected!" before the game began. Participants were then randomly allocated to conditions that manipulated the level of exclusion. In the included condition, participants were passed the ball roughly the same amount as the two other players. In the excluded condition, they were passed the ball once at the beginning of the game before the ball was passed between the two other players for the remainder. Following the game, as a manipulation check, participants indicated the extent to which they felt included, accepted and rejected (reverse coded) during the game ($\alpha = .78$). Participants then completed the 12-item Need Threats scale (Gonsalkorale & Williams, 2007), which assesses perceived levels of belonging (e.g. 'I felt disconnected'; $\alpha = .90$), self-esteem (e.g. 'I felt good about myself'; $\alpha = .89$), control (e.g. 'I felt powerful'; $\alpha = .80$), and meaningful existence (e.g. 'I felt invisible; $\alpha = .90$, reverse-coded). They also completed four bipolar items (good–bad, happy–sad, friendly–unfriendly, relaxed–

tense) to indicate their mood ($\alpha = .91$). These items have been used in previous studies to indicate the negative effects of social exclusion (Eisenberger et al., 2003; Williams et al., 2000; Zadro, Williams, & Richardson, 2004).

Results

Manipulation Checks. To check that the Cyberball game manipulated feelings of social exclusion, we conducted a 3 (emotion: awe, amusement, neutral) × 2 (level of ostracism: included, excluded) between-subjects ANOVA with self reported feeling of inclusion as the dependent variable. Our manipulation was judged successful as, across treatment groups, an effect of social exclusion emerged, F (1, 232) = 156.85, $p < .001$, partial $\eta^2 = .40$. A follow-up t-test indicated that those included in the game ($M = 4.28$) reported increased levels of inclusion compared to those excluded ($M = 2.39$), $t(236) = 12.77$, $p < .001$, $d = 2.07$.

Need threats. To test the hypothesis that awe buffers the negative effects of social exclusion, we conducted a 3 (emotion: awe, amusement, neutral) × 2 (level of ostracism: included, excluded) between-subjects MANOVA on the 4 types of need threats (belonging, self-esteem, control & meaningful existence). Multivariate tests indicated a significant effect of ostracism on need threats, F (4, 229) = 6.10, $p < .001$, Wilk's $\Lambda = 0.91$, partial $\eta^2 = .10$. However, the effect of treatment group was non-significant, F (8, 458) = 1.11, $p = .36$, Wilk's $\Lambda = 0.91$, partial $\eta^2 = .02$. The interaction between need threats and treatment group was also non-significant, F (8, 458) = .33, $p = .96$, Wilk's $\Lambda = 0.98$, partial $\eta^2 = .01$. ANOVAs indicated three out of four types of need threats were affected by social exclusion: belonging, F (1, 232) = 22.53, $p < .001$, partial $\eta^2 = .09$; self-esteem, F (1, 232) = 14.23, $p < .001$, partial $\eta^2 = .06$, and meaningful existence, F (1, 232) = 18.61, $p < .001$, partial $\eta^2 = .07$. The effect of exclusion on control was found to be non-significant, F (1, 232) = 4.46, $p = .04$, partial

η^2 = .02. ANOVAs indicated the effects of emotion condition on self-esteem, control & meaningful existence to be non-significant (all *p*s > .20). The effect of emotion condition on belonging was, however, significant, F (2, 232) = 3.66, p = .01, partial η^2 = .03. Follow-up *t*-tests qualified this result by showing that those in the awe condition (M = 6.12) exhibited a greater sense of belonging compared to those in the neutral control group (M = 5.71), t(161) = 2.71, p = .01, d = 0.42. No other significant comparison emerged between the control groups on this dependent variable. Despite the lack of a significant interaction between treatment group and level social exclusion, splitting the data file by the emotion elicited permitted further exploratory analysis that aimed to understand the nature of the difference within each of the treatment groups between those who were included or excluded on levels of belonging. Those in the neutral group were found to display the smallest differences in belonging between those that were included (M = 5.93) or excluded (M = 5.47) from the game, t(76) = 2.04, p = .05, d = 0.46. Those in the amusement condition that were included (M = 6.31) displayed the largest divergence in mood compared to those excluded (M = 5.61), t(73) = 3.35, p < .001, d = 0.82. Within the awe condition, although those that were included (M = 6.37) displayed a greater mood than those who were excluded (M = 5.80), the difference was less pronounced, t(73) = 2.90, p = .01, d = 0.62. Thus, in the neutral condition there was relatively low belonging in both conditions of exclusion, in the amusement condition there was high belonging but only for those that were included, while in the awe condition both included and excluded participants evidenced relatively high degrees of belonging.

Mood. To test the hypothesis that awe buffers the effects of social exclusion on mood, we conducted a 3 (emotion: awe, amusement, neutral) × 2 (level of ostracism: included, excluded) between-subjects ANOVA on mood. These results are displayed in

Figure 1. A significant effect of social exclusion on mood emerged, F (1, 232) = 10.86, $p < .001$, partial $\eta^2 = .05$. An effect of emotion condition on mood reached threshold significance, F (2, 232) = 2.95, $p = .06$, partial $\eta^2 = .03$. The interaction between social exclusion and emotion condition was not significant, F (2, 232) = 1.96, $p = .14$. Follow-up t-tests qualified the effect of emotion condition by indicating that, across the two levels of exclusion, those elicited to feel awe ($M = 5.52$) had significantly greater mood after playing Cyberball than those in the neutral ($M = 5.00$), $t(161) = 2.55$, $p = .01$, $d = 0.40$ and amusement ($M = 5.03$), $t(161) = 2.23$, $p = .03$, $d = 0.35$, conditions. Once again, we split the data file by emotion elicited to understand the effects of exclusion within each of the treatment groups. Those in the neutral group were found to display no significant differences in mood, whether they were included ($M = 5.06$) or excluded ($M = 4.93$) from the game, $t(76) = 0.42$, $p = .68$, $d = 0.09$. Those in the amusement condition that were included ($M = 5.60$) displayed significantly lower mood compared to those that were excluded ($M = 4.63$), with a large effect size $t(73) = 2.98$, $p = .004$, $d = 0.71$. Within the awe condition, although those that were included ($M = 5.78$) displayed greater mood than those who were excluded ($M = 5.17$), the difference was, once again, less pronounced, $t(73) = 2.98$, $p = .004$, $d = 0.48$, and both groups were relatively high compared to the other emotion conditions. Thus, compared to the neutral control group, both positive emotions induced greater mood in participants when they were also included in the game. However, when participants were excluded, those elicited to feel amusement actually displayed a trend towards worse mood than those in the neutral group. Contrastingly, participants who were included in the game after being elicited to feel awe had the highest mood of all, and those who were excluded but felt awe self-reported roughly the same mood as those who were included in the neutral condition.

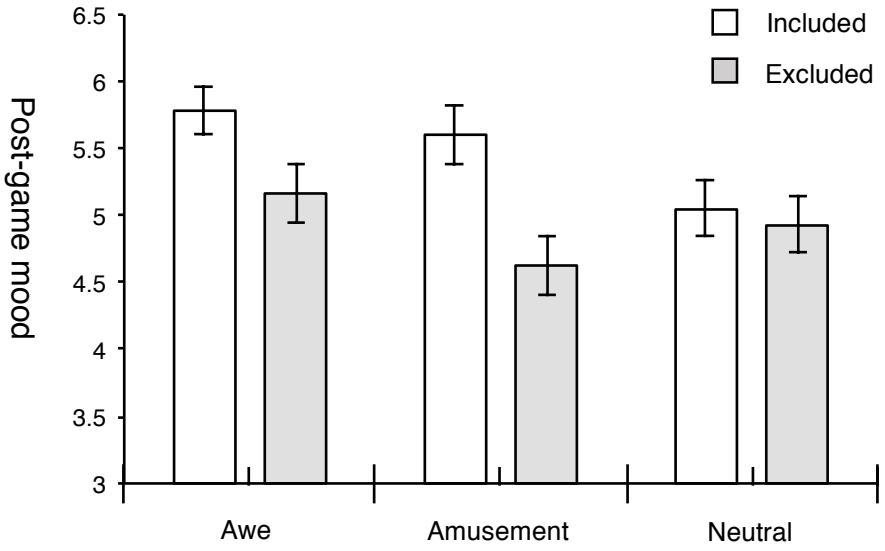

Figure 1: The effects of elicited emotion on post-game mood for participants included or excluded during a game of Cyberball. Error bars represent 1 standard error of the mean.

Discussion

Our results indicate that, after an opportunity for either social inclusion or exclusion, a heightened sense of belonging was found for those manipulated to feel awe compared to those in a neutral control group. Additionally, even though awe and amusement are perceived as similarly positive emotions, those that were primed with awe displayed elevated mood, compared to those in the neutral and amusement conditions, after playing a game in which half of the group were made to feel excluded. Thus, we have found limited support for the idea that, in a situation that primes either inclusion or exclusion, awe, compared to other emotions and non-emotional states, increases a general sense of belonging and lifts mood.

Despite not finding a significant interaction between level of inclusion and emotion, our more exploratory analyses did uncover some patterns in the data worthy of consideration, even if only to ground future confirmatory work: notably, the finding that

those elicited with amusement had *worse* mood when they were excluded than those in the neutral control group, and that, in comparison, participants in the awe group showed a heightened mood and belonging vis-à-vis the other groups whether they were excluded or included. This pattern of results may indicate that more typical positive emotions such as amusement prime sociality to a degree that, if a subsequent social interaction is not satisfactory, individuals may experience disappointment and therefore feel more negative than if they had not felt the preceding positive emotion. This coheres with accounts of positive emotions largely serving the motivation to integrate within proximal social groups (Shiota, 2014a; Van Kleef, De Dreu & Manstead, 2010). Awe appears to, rather than motivate a search for tangible social connection, induce a sense of connection that is to a degree transcendent of the social domain, a profile that matches other work on the effects and elicitors of awe (Shiota et al., 2007).

Although some question whether attachment relationships to some non-social constructs are merely compensatory in nature (e.g. to material possessions, Keefer et al., 2012), it is likely that some asocial attachment configurations provide benefits to well-being that extend beyond a compensation for lack of adequate social attachments. By inducing a sense of connection and belonging that is less contingent on specific social interactions, awe may provide an opportunity for a 'secure base', from which individuals can more confidently navigate the social world.

Nevertheless, despite somewhat promising patterns observed in the data, our main *a priori* predicted interaction effect was not supported in the current study. We do feel however, that it would be premature to rule out the possibility that awe may help buffer, or else ameliorate some of the negative effects of social exclusion. Various strategies for improving the current methodology are possible. Positive emotions can exert relatively small effect sizes (e.g. Lai, Haidt & Nosek, 2013), and so it is possible

that with a more power, the predicted interaction effect may have been detected. This may be achieved by increasing sample size or increasing the strength of our experimental manipulations. Despite our chosen manipulations being demonstrated to elicit the intended emotions and exert significant changes on aspects of behavior (Stell & Farsides, 2017a), altering aspects such as the duration, content or medium may produce different results.

In conclusion, we have provided a preliminary indication that awe may have a role to play in the mitigation of social exclusion and loneliness. We hope future work extends and refines the theoretical proposals contained herein and builds upon the empirical results offered in this exploratory study

Chapter 5

When is the Ordinary Awe-Inspiring? Awe, Mindfulness and Curiosity

Abstract

The emotion awe has been found to exert salutary effects on cognition and behavior. However, very little is known about the intrapersonal factors that facilitate the experience. To this end, in two studies (total $N = 514$, 53% female, median age = 29) we explore the association between awe and mindfulness. In Study 1, while controlling for other positive emotions, dispositional awe was found to positively associate with mindfulness through a shared association with aspects of curiosity. In Study 2 we found that a brief experimental manipulation of mindfulness elicited heightened feelings of awe for individuals participating in a virtual river walk. Our findings suggest that in situations in which curiosity and exploration are salient, mindfulness can serve as a gateway to awe.

Keywords: awe, mindfulness, curiosity, exploration, positive emotions.

"The great lesson from the true mystics [is that] the sacred is in the ordinary, that it is to be found in one's daily life, in one's neighbors, friends, and family, in one's backyard."

—Abraham Maslow (1964/2014, p. 10)

Psychological work on the emotion awe has demonstrated that encounters with perceptually vast or powerful objects can exert salutary effects on cognition and behavior (Griskevicius, Shiota, & Neufeld, 2010; Rudd, Vohs & Aaker, 2012; Saroglou, Buxant & Tilquin, 2008; Piff, Dietze, Feinberg, Stancato & Keltner, 2015). However, there is very little work that explores what psychological factors either aid or inhibit individuals in experiencing it. In the current work, we explore one candidate – mindfulness – and test the proposal that mindfulness can be a gateway to the experience of awe, even towards the relatively ordinary.

Awe has been defined as comprising two factors: the experience of vast or great stimuli coupled with a felt need to accommodate the experience (Keltner & Haidt, 2003). The emotion has been associated with numerous positive outcomes to individual and social well-being. Individuals elicited to feel awe have been found to demonstrate more prosocial, helping behavior (Piff et al., 2015), greater spirituality (Saroglou et al., 2008), more willingness to offer time for a charitable cause (Rudd et al., 2012), decreased reliance on spurious cognitive strategies (Griskevicius et al., 2010) and decreased bias towards out-groups (Stell & Farsides, 2017a).

Whilst analysis of the elicitors of awe has focused on properties of the object, such as vastness, power or greatness (Keltner & Haidt, 2003), it is unknown what intrapersonal factors make such perceptions possible or alternatively limit them.

Anecdotally, objects that can elicit tremendous awe in some can be perceived as relatively unimpressive to others. After a visit to the Grand Canyon, one disappointed TripAdvisor user described the sight as no more than "a hole in the ground" (Andrews, 2017). Conversely, objects or events usually considered mundane may, in other circumstances, elicit awe.

Very little work has explored which factors determine a capacity for awe. Nevertheless, what work exists points to curiosity and open-mindedness as possible candidates. In one study exploring the relationships between discrete positive emotions, personality traits and attachment styles, awe was associated with extraversion and openness to experience personality traits (Shiota, Keltner & John, 2006). In another, awe was linked with a low need for cognitive closure, compared to another positive emotion: pride (Shiota, Keltner & Mossman, 2007). Nevertheless, such cross-sectional research does not permit an assessment of whether openness leads to awe, the reverse, or both. Moreover, exploring comparatively stable factors such as personality traits does not help answer the question of how individuals may increase awe in their day-to-day lives.

One possibility is that contemplative practices such as mindfulness, which train practitioners in an open and accepting attitude towards incoming stimuli, may support perceptions necessary for awe. Maslow (1964/2014) noticed that a diverse number of contemplative traditions recognize that ordinary day-to-day experience can sometimes be experienced as special, sacred, even miraculous. Such traditions have developed approaches – for example, the "beginner's mind" of Zen – that are aimed at breaking the practitioner's, habitual, schematic way of relating to the world and replacing it with one in which a renewed freshness and immediacy is felt towards even ordinary experiences such as gazing at a flower (Suzuki, 2011). It is possible that certain forms

of contemplative training could allow even ordinary events to be perceived as awe-inspiring.

Mindfulness has been conceptualized as comprising two components: A regulation of attentional control, and an open, accepting non-elaborative approach to incoming stimuli (Bishop et al., 2004). Awe may associate with either or both of these. Mindfulness training has been found to enhance attentional (Jha, Krompinger & Baime, 2007) and perceptual (Kozhevnikov, Louchakova, Josipovic, & Motes, 2009) processes. For example, long-term mindfulness meditation practice was found to reduce attentional blink in older adults when compared to age-matched and younger adults (van Leeuwen, Müller, & Melloni, 2009). Even a brief (4-day) mindfulness intervention significantly improved aspects of attention including visuo-spatial processing and executive functioning (Zeidan, Johnson, Diamond, David & Goolkasian, 2010). Thus, one way mindfulness may prove conducive to experiencing awe is by enhancing attention to and the perception of potential awe-elicitors.

Another (non-exclusive) possibility is that, once the awe-eliciting object is perceived, mindfulness' focus on an open and receptive attitude may further aid the appraisal of vastness or greatness necessary for awe. Lewicki (2005) found that individuals tend towards either an internal or external encoding style. Internal encoders more readily apply pre-existing beliefs and expectations while interpreting incoming perceptual data whereas external encoders will only apply such expectations when they receive a greater amount of confirming information from the external environment. In general, internal encoders are prone to more cognitive errors and illusions when identifying objects in the environment than their external encoding counterparts, especially when a situation is marked by novelty (Lewicki, 2005). Herndon (2008) found that trait mindfulness was associated with an external encoding style and

predicted less self-reported cognitive failures. If mindfulness activates a more open, receptive style of perception and decreases the reliance on pre-existing schemas in appraising objects, it may be more likely that an object will be perceived to be beyond those schemas. If an object is perceived of as extra-schematic, it is more likely to be perceived as awe-inspiring (Keltner & Haidt, 2003).

Finally, curiosity may be a common factor linking mindfulness and awe. Curiosity concerns an embrace of novelty and openness to new experiences (Kashdan, Rose, & Fincham, 2004). Izard (1977) placed curiosity as central to states such as awe and wonder and argued that these emotions may be evolutionarily significant in motivating explorative behavior. Indeed, recent empirical work revealed awe and curiosity to be strongly correlated, and curiosity was found to be a significant mediator of the relationship between dispositional awe and non-conformity (Stell & Farsides, 2017b). In fact, Stell & Farsides (2017b) found that awe and non-conformity had an 'indirect-only' relationship through curiosity; that is, only when the dispositionally awe prone were more curious was there an association with non-conformity.

Mindfulness is also associated with curiosity. Practitioners are taught to adopt an open, curious orientation towards incoming thoughts, feelings and sensations (Bishop et al., 2004; Williams, 2008). This is especially important when experiences are painful or difficult; an attitude of curiosity is seen as a healthier alternative to the attempt to avoid or alter painful thoughts or feelings (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Curiosity has been found to activate the role of mindfulness in reducing defensive responses to existential threat (Kashdan, Afram, Brown, Birnbeck & Drvoshanov, 2011).

As far as we can tell, no published research has explored the associations between awe, mindfulness and curiosity. Given that awe may enhance multiple aspects

of individual and social well-being, there is a need to identify practical methods that may be used to elicit it. Mindfulness is an established technique that can be practiced for as little as a few minutes a day and as such, represents a promising method to this end.

The goals of the present research are two-fold: first, to established empirically whether there is an association between awe, mindfulness and curiosity at the dispositional level, and second, to test a specific causal claim that experimentally-elicited mindfulness will increase awe.

Overview of Studies

In two studies, we investigated the relationship between awe, mindfulness and curiosity. In Study 1 we examined to what extent the disposition to experience seven discrete positive emotions was associated with mindfulness and whether curiosity mediated any relationships found. In Study 2 we investigated whether experimentally-elicited mindfulness, compared to active and passive controls, increased awe felt in the context of a virtual river walk.

Study 1

Study 1 was designed to test two related hypotheses: 1) Awe is positively associated with mindfulness, even when controlling for other positive emotions; 2) The association between awe and mindfulness is mediated by curiosity. Alongside awe, the six other emotions considered were joy, contentment, pride, love, compassion, and amusement.

Method

Participants

Two hundred eighty-one users of Amazon's Mechanical Turk (mTurk) subject pool (139 women, median age = 29, 75.4% White/Caucasian) participated for $1.50.

Procedure

After providing informed consent, participants were asked to respond online to three sets of questionnaire items. The first was the 38-item Dispositional Positive Emotions Scale (DPES; Shiota et al., 2006), which measures the extent to which seven discrete positive emotions are experienced in day-to-day life. Emotions measured were joy (e.g. "I often feel bursts of joy"; $\alpha = .92$), contentment (e.g. "I am generally a contented person"; $\alpha = .95$), pride (e.g. "I am proud of myself and my accomplishments."; $\alpha = .91$), love (e.g. "I develop strong feelings of closeness to people easily."; $\alpha = .91$), compassion (e.g. "When I see someone hurt or in need, I feel a powerful urge to take care of them"; $\alpha = .93$), amusement (e.g. "I find humor in almost everything"; $\alpha = .87$) and awe (e.g. "I often feel awe"; $\alpha = .90$; 1= *strongly disagree*, 7 = *strongly agree*). The second measure presented was the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003), a 15-item measure assessing individuals' ability to respond mindfully in everyday contexts (e.g. "It seems I am "running on automatic" without much awareness of what I'm doing"; $\alpha = .93$; 1 = *almost always*, 6 = *almost never)*. Finally, participants were directed to the 7-item Curiosity and Exploration Inventory (CEI; Kashdan et al., 2004). This includes two sub-scales. The exploration sub-scale (4 items) measures individuals' disposition to pursue novelty and opportunities for growth (e.g. "everywhere I go, I am looking for new things or experiences"; $\alpha = .79$) while the absorption sub-scale measures individuals' capacity to become absorbed in in activity (e.g. "When I am participating in an activity, I tend to get so involved that I lose track of time."; $\alpha = .70$).

Results

Mindfulness. To test the hypothesis that awe is, compared to other positive emotions, associated with greater mindfulness, we conducted a multiple regression.

First, we inspected the zero-order correlations. Whilst in the expected direction, awe did not significantly correlate with mindfulness ($r = .10$, $p = .09$). Significant positive correlations did however emerge for contentment ($r = .33$, $p < .001$), pride ($r = .35$, $p < .001$), and love ($r = .13$, $p = .03$). We then conducted a multiple regression in which all seven emotions were entered simultaneously into Block 1 and regressed onto the mindfulness score. Once again, awe showed no significant association with mindfulness ($\beta = .04$, $SE = .05$, $p = .57$). Contentment ($\beta = .32$, $SE = .07$, $p = .003$) and pride ($\beta = .35$, $SE = .07$, $p < .001$) again emerged as a strong positive predictors of mindfulness, while joy ($\beta = .31$, $SE = .05$, $p < .001$) and amusement ($\beta = .18$, $SE = .07$, $p = .03$) were both associated with less mindfulness.

Curiosity. To test the hypothesis that awe is associated with mindfulness via curiosity, we conducted a mediation analysis. Despite not finding a direct relationship between awe and mindfulness in the multiple regression, we proceeded with the intended mediation analysis as it is possible awe's relationship with mindfulness is indirect-only (Zhao, Lynch & Chen, 2010). In other words, it could be that awe is associated with mindfulness *only* to the extent it relates to curiosity. To test this proposal, we conducted a mediated multiple regression with all seven positive emotions entered as predictor variables, the exploration and absorption subscales as mediators (together constituting curiosity) and mindfulness as dependent variable. We utilized a bias-corrected and accelerated bootstrapping procedure with 95% confidence intervals and 5,000 resamples as this provides a robust (and more conservative) estimate of significance in smaller sample sizes (Preacher & Hayes, 2008). In line with guidelines on using multiple mediators (Preacher & Hayes, 2008), the error terms of exploration and absorption were permitted to covary. Supporting part of our hypothesis, a significant direct effect was found between awe and both exploration ($\beta = .38$, $SE = .08$,

CIs = [.24, .52]) and absorption (β = .19, *SE* = .09, CIs = [.02, .38]). Additionally, a direct positive effect emerged between exploration and mindfulness (β = .23, *SE* = .07, CIs = [.09, .36]) but not between absorption and mindfulness (β = -.08, *SE* = .06, CIs = [-.20, .05]). Supporting our mediational hypothesis, a significant indirect effect was found between awe and mindfulness via curiosity (β = .07, *SE* = .03, CIs = [.02, .14]). Nevertheless, since the direct effect between absorption and conformity was non significant, we must conclude that it was the exploration aspect of curiosity that drove the mediated effect. In addition, a positive indirect effect also emerged for pride (β = .07, *SE* = .04, CIs = [.02, .15]) and a negative indirect effect was observed for amusement (β = -.03, *SE* = .02, CIs = [-.08, -.002]).

Discussion

Study 1 found that mindfulness is associated with awe via a shared association with curiosity. Thus, when participants were high in both mindfulness and curiosity, they also self-reported experiencing more awe in their day-to-day lives. These findings are noteworthy as they indicate that curiosity may function as an activator of the relationship between mindfulness and awe; a proposal also suggested by the absence of a significant direct relationship between them. In this manner, our findings resemble Kashdan et al.'s (2011) study in which mindfulness reduced defensive reactions to perceived existential threat only in individuals with high curiosity.

One explanation for this indirect-only relationship is that, despite curiosity being central to psychological conceptualizations of mindfulness, some items of the MAAS scale focus on mindfulness' more attentional components. As stated previously, mindfulness may function by altering first-order attentional processes (e.g. regulation of awareness) but also second-order interpretive processes (e.g. accepting, non-elaborative

attitudes). It is possible that the latter of these is more readily associated with curiosity, and, in turn awe. One possibility for future research on dispositional mindfulness is to use scales that permit the discernment of attentional and more interpretive/attitudinal aspects of mindfulness.

The results of Study 1 are also noteworthy as they help distinguish awe's relationship to mindfulness from that of other positive emotions. Specifically, our findings indicated that contentment and pride evidenced a direct positive relationship with mindfulness and that joy and amusement evidenced a direct negative one. Alongside a direct relationship, amusement also showed a negative indirect association where a lack of curiosity mediated lower mindfulness. Only one other emotion – pride – shared awe's indirect relationship with mindfulness via curiosity. Whilst it is tempting to theorize as to why two very different positive emotions – pride concerns a positive self-evaluation while awe has been associated with a 'small self' – exhibit a similar profile in regards to mindfulness, there may be a more prosaic explanation. As noticed in previous work (Stell & Farsides, 2017b), and in keeping with pride's suggested function of facilitating displays of status (Gilbert, 2001; Hrdy, 1999), prideful individuals often self-report high scores on scales that measure traits perceived to be socially desirable. This would account for the strength of pride's direct and indirect associations with mindfulness.

Whilst the findings from Study 1 are suggestive of a link between mindfulness and awe, even when controlling for the effect of other positive emotions, and within a diverse sample broadly representative of the internet using population (Paolacci & Chandler, 2014), operationalizing mindfulness using a single scale somewhat constrains their interpretability. Additionally, the cross-sectional design employed does not permit

consideration of causality. Thus, in Study 2, we sought to test a directional causal claim by conducting a randomized control trial.

Study 2

In Study 2, we investigated whether experimentally-elicited mindfulness increased feelings of awe in the context of a virtual river walk. Therefore, in contrast to Study 1's focus on dispositional awe, as operationalized by the MAAS, Study 2 offered on opportunity to explore the effects on awe of a controlled mindfulness intervention in which curiosity and exploration are made salient. We predicted that those who received a brief mindfulness intervention shortly before a video depicting a walk down a river bank would exhibit greater awe than those played an excerpt from a natural history text or those given no manipulation.

Method

Participants

Two hundred thirty-three participants were recruited from mTurk as well as from a degree level psychology course in the UK (132 women, median age = 29, 78% White/Caucasian). MTurk participants were paid $1.50 and were required to be based in the US, hold above a 97% approval rating with at least 1,000 previous tasks completed with the service. Undergraduates received course credit.

Procedure

Participants were randomly assigned to either a Mindfulness condition or one of two control conditions. Participants in the Mindfulness condition received ten minutes of guided mindfulness instructions in which they were directed to become mindfully aware of their breathing as well as of sensations in different parts of their body. In the first control condition (History), participants heard a 10-minute audio recording of a text on natural history. Both of these conditions were replicated from Cropley, Ussher and

Charitou (2007). In the second control condition (No Manipulation), participants received no manipulation and proceeded to the next section of the experiment.

Participants in all three conditions were then presented with a two minute video depicting a walk down a river bank, filmed from a first-person perspective. We chose this video as although the walk depicted is pleasant, we predicted that there would be some variance to the extent participants found it awe-inspiring. During the walk, the camera turns occasionally towards features of the bank, including a white-flowered weed, which it pauses on for a moment before continuing. Such aspects of the video were predicted to provide an opportunity for explorative, curious modes of attention, or alternatively, more schema-based reactions. For example, some individuals may view the weed as 'just a weed' while others may look at it afresh and, for example, notice its simple, quiet beauty.

After the video, participants navigated to a 7-item item scale designed to measure levels of awe experienced while watching the video ("I felt awe", "I felt small or insignificant", "I felt wonder", "I felt alive and aware", "My attention and awareness was focused on my experience", "I felt calm and excited at the same time", "I felt a connection to something larger than myself" ; α = .86; 1= *strongly disagree*, 7 = *strongly agree*).

Finally, as a manipulation check, participants were asked to respond to items from the State Mindfulness Scale (SMS; Tanay & Bernstein, 2013) which measures mindful awareness during a discrete event (e.g. "I felt aware of what was happening inside of me; α = .94; 1 = *strongly disagree*, 7 = *strongly agree*). The Mindfulness and History groups were asked to what extent they felt mindful while listening to the audio instructions while the No Manipulation group were asked to report on how they felt on entering the study.

Results

Manipulation checks. Independent *t*-tests confirmed that participants in the Mindfulness condition ($M = 3.99$) experienced stronger feelings of mindfulness than both those in the History ($M = 2.89$), $t(143) = 7.44$, $p < .001$, $d = 1.23$, and the No Manipulation ($M = 2.99$) control conditions, $t(163) = 7.67$, $p < .001$, $d = 1.20$. There were no significant self-reported differences in mindfulness between the History and No Manipulation conditions, $t(154) = -0.75$, $p = .46$, $d = -0.12$.

Preliminary analysis. Preliminary analysis showed that neither gender, $F(1, 231) = 2.45$, $p = .12$, $\eta_p^2 = .01$, ethnicity, $F(6, 226) = 0.55$, $p = .77$, $\eta_p^2 = .01$, nor age, $B = .01$, $t(231) = 1.31$, $p = .19$ significantly affected self-reported awe so data analysis was collapsed across these categories. Additionally, there were found to be no significant differences in awe between the mTurk and university samples, $F(1, 231) = 2.45$, $p = .12$, $\eta_p^2 = .01$.

Awe. To test whether the three treatment groups differed to the extent they felt awe during the river walk, we conduct a 1-way ANOVA on self-reported awe with omnibus tests followed by two sets of planned orthogonal contrasts. The first of these compared the mindfulness condition to the two control conditions ("mindfulness contrast"; coded as Mindfulness = 2, History = -1, No Manipulation = -1). The second ("control contrast"; coded as Mindfulness = 0, History = 1, No Manipulation = -1) tested the residual difference between the two control conditions. This process enabled us to test both whether the Mindfulness differed from the controls and that the control conditions did not significantly differ.

The omnibus effect of treatment condition was significant, $F(2, 230) = 5.14$, $p = .01$, $\eta_p^2 = .04$. Planned contrasts revealed that, supporting our hypothesis, that those in

the Mindfulness condition (M = 4.86) self-reported more awe during the river walk video than those in the History (M = 4.28) and No Manipulation conditions (M = 4.38), $t(230) = 3.20$, $p = .002$, $d = 0.45$. The second control contrast revealed that there were no significant differences in awe between those in the History and No Manipulation conditions, $t(230) = -0.09$, $p = .63$, $d = -0.07$.

Mediation Analysis. To further explore the effect of elicited mindfulness on awe, we conducted a mediation analysis using assignment (or not) to the mindfulness condition as a dichotomous independent variable, changes in self-reported mindfulness as mediator and awe as dependent variable. A bias-corrected and accelerated bootstrapping procedure with 5,000 resamples indicated that the effect of condition on awe through self-reported mindfulness featured 95% confidence intervals that did not include zero, indicating a significant mediation (B = .71, SE = .12, [.50, .94]).

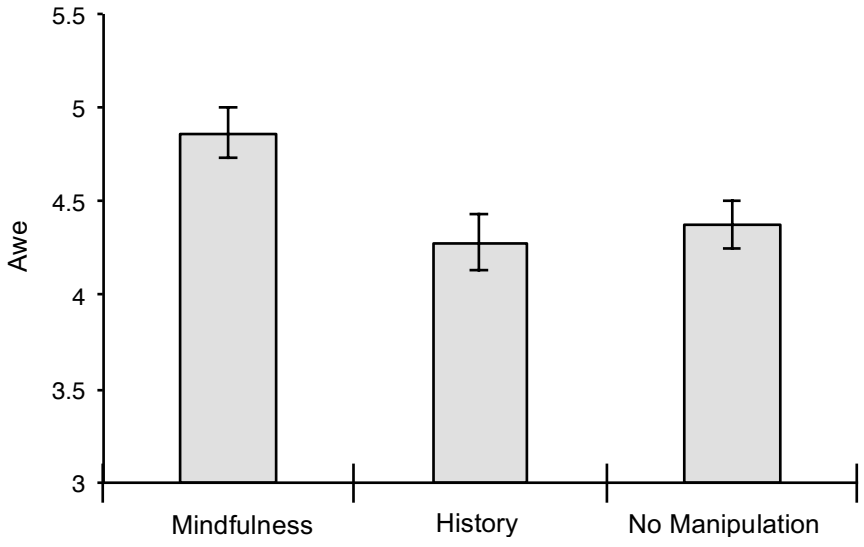

Figure 1: The effects of brief mindfulness training on awe experienced in the context of a virtual river walk (measured on a 6-point scale). Error bars represent one standard error of the mean.

Discussion

Study 2 found that those instructed with ten minutes of mindfulness experienced greater awe while watching the river walk video, compared to those who heard a passage from a natural history text or those who received no manipulation. Furthermore, the degree of self-reported mindfulness elicited mediated the effect of the manipulation on awe.

We also found no difference in awe, or mindfulness, between the two control conditions, suggesting that it was changes in the mindfulness treatment group that accounted for the variance between conditions.

In Study 2 we were able to compare results drawn from two different sample populations: university undergraduates located in the UK, and mTurk workers located across the US. That there were no significant differences between the two groups increases the plausibility that our findings will generalize across diverse populations.

Thus, Study 2's findings provide support for our primary hypothesis: that mindfulness can function as a catalyst for awe in situations where exploration and curiosity are made salient.

General Discussion

Traditional sources maintain that, by training in mindfulness, it is possible to lessen the reliance on habitual and schematic reactions to the world, and experience it with more vividness, immediacy and freshness (Suzuki, 2011). Partially supporting these accounts, there is empirical support for the proposal that mindfulness enhances attentional control (Jha et al., 2007), perceptual accuracy (Kozhevnikov et al., 2009) and fosters a more curious, open attitude toward incoming data (Niemiec et al., 2010). However, up until now there has been no direct evidence that mindfulness can function to increase awe.

In two studies, we predicted and found support for the proposal that both dispositional and state varieties of mindfulness are associated with awe and, as such, our findings hold implications for theory and practice, both within the literature on the effects of mindfulness as well as that on the elicitors of awe.

In Study 1, the relationship between mindfulness and awe was found to be contingent on self-reported curiosity while in Study 2, the context in which awe was measured was one that made salient aspects of curiosity, in particular, exploration. Thus, our findings indicate that curiosity may be an important determinant of the relationship between mindfulness and awe. This contingency is reminiscent of other work in which curiosity either enhances or makes possible (activates) an effect of mindfulness on another aspect of behavior (Kashdan et al., 2011). Nevertheless, we found further granularity in the nature of this relationship. In Study 1, we found that it was the exploration sub-scale that accounted for the significant mediation; whilst the absorption sub-scale correlated with awe, it showed no significant relationship with mindfulness. Absorption is associated with the state of flow, in which one is totally immersed in a specific task, with little attention given to objects outside that task (Csikszentmihalyi, 1991; Nakamura & Csikszentmihalyi, 2002). Whilst mindfulness and flow share the status of being considered beneficial experiences, the former involves maintaining an open awareness during a particular activity while flow involves a loss of self-awareness (Sheldon, Prentice & Halusic, 2015). One study found that mindfulness training can reduce flow experienced in a subsequent computer game, although the effect was only present for the "absorption" aspect of flow and not the "sense of control" aspect (Sheldon et al., 2015). Thus our results cohere with other work suggesting that, despite mindfulness and flow both being beneficial states, they may exert their effects through opposing means. Our findings also point to an important

difference in the two sub-factors of curiosity in regards to their relationship to mindfulness.

Past theory and research has indicated that awe can be considered a discrete positive emotion; that it may differ from other positive states in terms of its elicitors and effects on behavior and cognition. In our treatment of dispositional awe, we aimed to disentangle the relationship between awe and mindfulness from that of other positive emotions. With the emotion of pride notwithstanding, awe was the only emotion to indirectly associate with mindfulness through curiosity. Of particular interest is the contrast with emotions such as joy and amusement which were found to have negative associations with mindfulness. These findings cohere with accounts that in certain circumstances, some positive emotions are linked with a degree of *mindlessness*. Specifically, some positive emotions are thought to associate with more cursory, and error prone modes of cognition (Bless, Bohner, Schwarz & Strack, 1990; Forgas, 1998; Griskevicius et al., 2010). Awe, on the other hand, has been linked with a deeper, more systematic processing style (Griskevicius et al., 2010). Such differences are often interpreted as the function of specific evolutionary pressures on the adaptation of each emotion in humans and our ancestral species (Griskevicius et al., 2010). Some have used this line of reasoning to argue that awe may be an information-rich emotion that motivates attention to and accommodation of novel information in the environment (Shiota, 2014a). In contrast, joy is a state that signals the achievement of a socially relevant goal (Shiota, 2014b). Such accounts may offer one answer as to why awe, amongst positive emotions, may be particularly related to mindfulness.

Whilst the findings of Study 1 support the idea that different positive emotions will interact differently with mindfulness, future work would be well-served by employing experimental manipulations of mindfulness and measuring the effect on

other discrete positive emotions. This could also be combined with techniques that rely less on self-report, such as autonomic nervous system responding (e.g. Shiota, Neufeld, Yeung, Moser & Perea, 2011) or brain imaging.

Finally, it is worth noting that, although Study 2 explored the causal claim that mindfulness can increase awe, it is likely that the reverse direction may also hold. Those that experience more moments of awe in their day-to-day lives may experience a concomitant increase in sensitivity towards further opportunities for awe. This, in turn, may result in elevated attention towards possible awe-elicitors and as such, certain objects may be perceived with an accuracy, attention and openness reminiscent of mindfulness. It will be important for further research to establish support for other causal directions not covered here.

To conclude, the present work suggests that there is positive link between dispositional mindfulness and awe to the extent they are associated with curiosity. We have also found support for the idea that a brief mindfulness intervention can increase feelings of awe towards an ordinary – albeit pleasant – experience. As such, we have identified mindfulness as a promising technique that can allow the ordinary to be experienced as awe-inspiring.

Chapter 6

Conclusions

The present work has explored some implications of investigating awe as a self-transcending emotion. Although we have mostly grounded our hypotheses with theories concerning the evolutionary function of emotions, we have also considered the rich body of work conducted on awe within humanistic psychology, which aims to articulate the significance of the experience when situated in the social practices and cultural norms of the present day. Although each chapter has contained a specific discussion of its implications, we will now consider general issues that come into focus by looking at the work as a whole.

Differentiation of awe from other positive emotions

Whilst earlier adaptive approaches to emotions found grounds to differentiate negative emotions into discrete affective, cognitive, physiological and motivational packages, positive emotions were generally subsumed into a single state (e.g. Ekman et al., 1987; Levenson, Ekman, Heider, & Friesen, 1992; Scherer, 1997). Despite advancements in the study of discrete positive emotions, this legacy has not yet been outgrown completely. Theories such as the broaden-and-build model (Fredrickson, 1998, 2001) continue to carry the flame of Psychology's historic concern with comparisons of global positive and negative affect. Nevertheless, despite the veracity of such generalizations, a growing research tradition indicates that the differences between positive emotions are many and significant (Griskevicius, Shiota, & Neufeld, 2010; Griskevicius, Shiota & Nowlis, 2010; Keltner & Haidt, 1999; Shiota, Keltner, & John, 2006). The present work builds on previous research that indicates this is also true for awe. Across our 12 studies, valence has frequently been held as a constant by employing control conditions that are judged to be similar in hedonic content to the

main comparison condition. In regression-type studies, we employed comparisons between awe and six other positive emotions. Within the experimental studies featured in Chapter 1 & 2, manipulation checks established that participants rated the awe videos as similar in valence to conditions that elicited either amusement or joy. Such findings support the contention that our detected effects are not attributable to valence.

Throughout the thesis, we have detected a range of divergences between awe and other positive emotions. Although we will look at some of these in more detail later in this chapter, here we will provide a brief overview of ways awe appears to differ from the other positive emotions measured in the thesis. In Chapter 1, compared to amusement, experimentally-elicited awe was found to predict both less implicit bias and greater identification with all humanity (IWAH). On a dispositional level, the mediated relationship between awe, IWAH, and bias differed from that of joy, contentment, pride, love and amusement. Our findings, alongside other research indicating the ineffectiveness of general positive affect in decreasing bias (e.g. Lai et al., 2014), suggest that awe's effect on bias may be rare amongst positive emotions. In Chapter 2, Study 1 found that dispositional awe diverged from joy, contentment, love, compassion and amusement by predicting less conformity and from joy, contentment, love and compassion in predicting greater agency. In Chapter 4, dispositional awe differed from joy, contentment, love, compassion and amusement by displaying a significant association with mindfulness via curiosity. Taken as a whole, our results build the case that awe can be differentiated from other positive emotions by the effects it exerts on human behavior.

In order to provide a general framework to understand the nature of awe's unique effect on cognition and behavior, we proposed that awe fundamentally relates to

a transcendence of the self and social. We will now consider how the results from each chapter provide support for this general approach.

Transcendence from inter-group attitudes

In Chapter 1, we explored whether awe is associated with a transcendence from inter-group stereotypes towards a more universal identity. A meta-analysis of the four experimental studies supported this hypothesis by finding that experimentally-elicited awe was robustly associated with lower implicit bias as measured by the implicit association task (IAT). Furthermore, we found that identification with all humanity constituted a mechanism of this effect. The results of Chapter 1 build on previous work (e.g. Saroglou, Buxant, & Tilquin, 2008) by suggesting that awe not only promotes a transcendence from self, but also from the judgments and biases of the group. We also found that a reduction of prejudice occurred within two domains of bias: gender and ethnicity. In this fashion, awe appears to differ from elevation: the only other positive emotion that has shown promise for bias reduction. Whilst elevation was found in one study to reduce prejudice directed towards gay males, it failed to reduce ethnic bias (Lai, Haidt, & Nosek, 2013). The results of Chapter 1 imply that awe may be particularly efficacious in reducing a relatively diverse set of biases and that this may be due to the promotion of a more transcendent identity, in which sharp contrasts and boundaries that exist at the group level become deemphasized and the focus is on more universal aspects of humanness. Thus, such a picture indicates that further research on awe may be relevant for those investigating the common in-group identity model (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993; Gaertner & Dovidio, 2014). Our work suggests that emotions such as awe, in some situations, can exert shifts in social identity and cause downstream effects on implicit bias. Nevertheless, in future work it would be fruitful to clarify whether awe makes more salient a ‘common in-

group' that includes both ingroup and outgroup (e.g., all humanity), or alternatively, activates processes that reduce bias and prejudice by obviating identity (and/or identity concerns) altogether.

Our results may also be helpful for those looking to design interventions to combat prejudice. As awe is an emotion that is often experienced as rewarding and pleasurable, it would no doubt be considered an acceptable intervention. On related note, music concerts, raves and festivals are perceived to be associated with elevated social connectedness amongst strangers (Mount, 2004; Weber, 1999). As music is a commonly cited elicitor of awe (Konečni, Brown & Wanic, 2008; Zentner, Grandjean & Scherer, 2008), awe may prove to be a mediating variable that helps shed light on this effect. Nevertheless, as our work only considered short-term effects of awe on bias, more research would be advised that incorporated longer-term measures of efficacy and indeed, used different measures of prejudice.

Transcendence from conforming behavior

In Chapter 2, we explored the idea that, by promoting a transcendence from social judgments, awe might be associated with less conformity and greater agency. In part, this hypothesis was inspired by the work of Maslow (2010/1962), who argued that, rather than being a negation of autonomy, moments of self-transcendence involve a heightened sense of idiosyncrasy in which one experiences the self to be less swayed by the judgments of others. It also follows research suggesting that individuals are motivated to take part in solitary, rather than social activities, after an experience of awe (Shiota, Keltner & Mossman, 2007). In Study 1, we found that, when controlling for other positive emotions, dispositional awe was indeed associated with less conformity and greater agency. This indicates that, compared to other positive emotions, awe may influence more creative behavior that is less dictated by social norms. In contrast,

canonical positive emotions such as joy are thought to signal to the organism "proceed along trusted paths" (Shiota, 2014a, p. 47) and have been linked to a preference for maintaining the status quo (Yen & Chuang, 2008). Such a difference may relate to awe often being activated in situations in which current schemas have failed to account for novel information in the environment and prompts a motivation to update these mental maps. This may lead to a greater determination to see beyond accepted wisdom and develop creative, idiosyncratic responses. Thus, Chapter 2's findings provide some support for Maslow's (2010/1968) contention that peak experiences involve a heightened agency and provide an account of how this position is consistent with a functional analysis of awe. We feel this perspective provides a necessary counterpoint to other work in social psychology that highlights awe's capacity to enhance communal behavior (e.g. Piff, Dietze, Feinberg, Stancato, & Keltner, 2015; Bai et al., 2017). On the surface, it may even seem to be somewhat at odds with the idea that awe might serve to maintain the status-quo when it is leveraged by, for instance, powerful regimes (Keltner & Haidt, 2003). We believe that this is a fruitful area for sustained research and debate. It is possible that, depending on the context, awe can both elicit greater agency and/or communality. It is also possible that the type of awe-eliciting object modulates which traits are influenced and in what way. For instance, awe felt for a totalitarian dictator may increase conformity whilst awe felt towards an artist or musician may inspire creativity and idiosyncrasy. Teasing out what the effects of different awe-eliciting objects on behavior will be an important task for continuing scholarship.

Despite promising patterns of data, Chapter 2's findings were nevertheless complicated by our experimental study (Study 3), which, although finding that amusement was associated with more conforming responses, failed to show that awe was associated with responses that are less confirming. One possible interpretation of

this result is that while awe is relatively resistant to an affect-based increase in conformity – both emotions were judged to be similar in valence – it does not *reduce* conformity per se. Another interpretation is that, while awe does not impact the conformity captured by our particular manipulation, it might affect other operationalizations. Future research may do well to work with a manipulation that employed responses made by other participants (real or would-be) as this would constitute a more socially contingent measure of conformity. Nevertheless, the results of Chapter 2 help build the case that the dispositionally awe-prone appear to be relatively agentic and non-conforming.

Transcending the need for social inclusion

In Chapter 3, we remained focused on the implications of transcending the social by predicting that those elicited to feel awe would experience less negative effects of social exclusion. Previous work has indicated that, although experiences of awe include a sense of connection, it is often towards that which is beyond the immediate social realm (Bonner & Friedman, 2011). Such a connection may help buffer a perceived lack in the quantity or quality of social connections. Despite not finding an effect size large enough to confirm our predicted interaction effect, we found some promising patterns of data consistent with our general approach. Amongst individuals playing CyberBall, a game that simulates either social exclusion or inclusion, those who were elicited to feel awe exhibited a greater sense of belonging and overall mood compared to those induced with amusement or a neutral state. As such, this preliminary study offers a hint that awe may have a part to play in the mitigation of pernicious states such as loneliness.

Whilst positive emotions have been shown to increase a sense of social connection (Hutcherson, Seppala & Gross, 2008; Kok & Fredrickson, 2010; Kok et al., 2013), people who lack supportive networks are at a disadvantage as social activity is a

commonly cited source of positive emotions (McIntyre, Watson, Clark, & Cross, 1991; Vittengl & Holt, 2000). Awe, on the other hand is commonly elicited in situations not characterized by social interaction yet awe experiences often include a sense of deep connection (Bonner & Friedman, 2011). Compared to those recalling other positive states, individuals recalling an awe experience report that they are motivated to take part in solitary activities such as walking in nature and creative pursuits (Shiota et al., 2007). This research indicates the possibility that awe is elicited by, and has the capacity to prompt participation in enjoyable, yet non-social activities. Future research should seek to further explore what salutary benefits to wellbeing awe may offer individuals who are lonely or socially excluded.

Techniques to elicit self-transcendence

In Chapter 4, we turned our attention to intra-personal factors that modulate the awe experience. In keeping with our focus, we explored whether another state associated with self-transcendence, mindfulness, was a) dispositionally associated with awe and b) functions to increase the perception of awe towards relatively ordinary stimuli. We found strong support for both of these hypotheses. Our findings are notable as, although a growing body of research documents the effects of awe, very little explores psychological factors underpinning the experience. As such, the results found in Chapter 4 offer a rare answer to the question "what facilitates awe?" and provides support for our central narrative that awe involves self-transcendence.

Contemplative traditions such as the "Beginners Mind" of Zen (Suzuki, 2011) hold that awe is facilitated through the development of non-judgmental awareness in which the world is perceived beyond habitual thought patterns. Such approaches suggest that meditation techniques such as mindfulness may achieve, albeit through different means, similar effects to awe, such as a move away from schematic perception

towards openness and curiosity. Although for awe this process prototypically involves encounters with novel objects in the world perceived as vast, mindfulness more usually involves objects that are noteworthy only to the degree they are taken for granted: the movement of breathing, sensation within parts of the body or the act of the walking. Mindfulness and other contemplative teachings invite us to look again at the commonplace and find that, through a shift in perspective, the everyday can be awe-inspiring. As Maslow remarked "The great lesson from the true mystics [is that] the sacred is in the ordinary, that it is to be found in one's daily life, in one's neighbors, friends, and family, in one's backyard" (p., 10, 1964/2014). Although the stimuli in Study 2 was chosen for its ordinariness – the depicted river-side walk, although pleasant, was not neither novel nor vast – it was perceived as more awe-inspiring after a brief mindfulness training. As the salutary effects of awe begin to be understood, it is important to explore ways in which individuals can increase awe in their day-to-day lives. Mindfulness has the advantage of being a practicable technique with many additional benefits. In short, Chapter 4 represents the first attempt at exploring a possible awe 'intervention' and indicates that mindfulness may have the capacity to make the ordinary awe-inspiring.

Schneider (2008) warned against an accelerating depletion of awe in contemporary life. An intra-personal approach to facilitating awe may be now especially relevant given that any lack of awe at this particular time in history is probably not due to the lack of availability of awe-eliciting stimuli. One only needs to browse the content posted to most social media feeds to find an avalanche of potentially awe-inspiring material – virtuosic musical performances, ingenious inventions, inspiring talks – all clamoring for our attention. In fact, one possibility is that it is *because* of the extent to which this material is conveniently accessible within our

increasingly online lives that we are awe-depleted. Just as steady increases of processed sugar in our diet have created a new baseline where food without it can seem unappealing (Elliot, 2010), a continuous slideshow of media carefully curated for its virality has perhaps rendered us numb to the awesomeness of more everyday experiences. Research on promising methods that can reawaken us to an awe for the ordinary – Maslow's "sacred in one's back yard" – should be pursued seriously by scholars interested in improving the well-being of society.

Centrality of Curiosity

Chapters 2 and 4 both included cross-sectional studies that highlighted the importance of a disposition towards curiosity in the awe-inspired. Specifically, in separate mediation analyses, we found that only when a trait for awe is accompanied by a trait for curiosity do individuals tend towards both non-conformity (Chapter 2) and mindfulness (Chapter 4). Such findings provide empirical support for the significance of curiosity in a theory of awe. One possibility is that curiosity is, like awe, motivated by an adaptive need for competence and mastery. Whilst awe may be the affective cue that an object has violated current working schemas, curiosity may be the cognitive stance that seeks to revise them. Therefore, awe and curiosity may be thought of as two parts of an adaptive 'growth package'. As such, our results appear to support the suspicions of earlier theorists, such as McDougal (1910), who believed that states such as wonder and awe may be inherently tied to an instinct towards curiosity, and Izard (1977) who viewed awe as an intense variety of interest. Nevertheless, as our work is the first to explore the relationship between awe and curiosity, and because we used cross-sectional analyses, it is difficult to determine exactly the nature of causality. Although it is likely that moments of awe can inspire curiosity towards the elicitor and, indeed, more widely, it is also likely that the more individuals become curious, the more possible awe

elicitors become available to perception. This dynamic may be reminiscent of the 'positive spiral' thought to characterize the relationship between other positive emotions and other beneficial outcomes. Although awe and curiosity seem to both be part of the same suite of evolved needs and associated action-tendencies, more research is needed to determine the direction of causality, and the possible functions the working dynamic of curiosity and awe represented for our ancestors, and indeed, how they function in the present day.

Prospective extensions

Throughout this thesis, we have made use of both cross-sectional and experimental methods to investigate awe's capacity to promote self-transcendent cognitions and behavior. Following conventions, we have utilized controlled manipulations and measured responses in the immediate aftermath of the experience. Nevertheless, in the way Maslow, Schneider and other humanists have conceived of it, awe's effects on behavior may only be fully observed across many years, if not the life-span. In other words, awe's significance may only be understood within a *developmental* context. Although Maslow saw peak experiences as essentially ephemeral, he believed that the effects of such states contribute towards the gradual maturation of the self. For Maslow, self-transcendence, for example, can be a state but it is also a stage of development; a life-world in which numerous, longer lasting traits and capacities are manifested. Whilst cross-sectional surveys, compared to brief experimental manipulations, can capture more enduring associations, we feel that that this work may be fruitfully approached by complementing existing research with longitudinal research in which the trajectory of awe's effect on personal growth can be charted across multiple years. Such a focus is rare within emotion research which, perhaps due to emotions themselves being relatively short-lived, focuses on more

immediate effects. It may prove helpful, for example, to explore how awe and other specific positive emotions come into greater or lesser focus and orient development during different life stages.

Although in Chapter 1, we utilized reaction time behavioral tests, in much of the work contained herein, self-reports were obtained and constituted the main source of data used in analysis. As such, our data may be subject to the usual limitations of such methods such as social desirability bias and over-reliance on memory. Although there is interest in beginning to map physiological profiles associated with the awe experience (e.g. Shiota, Neufeld, Yeung, Moser, & Perea, 2011), there is very little hypothesis-driven work that uses more objective measurements to complement the usual self-report measures. We feel future work could benefit from employing such methods. One possibility is the online measurement of piloerection or 'goose bumps', a physical reaction that has been linked with awe felt towards music (Benedek & Kaernbach, 2011). Another is changes in pre-ejection-period (PEP), a type of cardiac activity that has been found to be significantly higher during awe than during other positive emotions (Shiota et al., 2011). We have suggested these two methods as both are cheap, non-invasive techniques that help physiologically differentiate awe from other positive emotions. Adding one or both of these to a battery of other measures may attenuate some of the issues inherent in using self-report methods exclusively.

In many parts of this thesis, we have attempted to utilize subject pools that are relatively more representative of national demographics than the ubiquitous psychology students serving as 67% of subjects in US-based studies (Heinrich, Heine & Norenzayan, 2010). In our studies using mTurk, we found that our participants were relatively more representative of the internet-using population than our student samples. Nevertheless, our data comes exclusively from those currently living in the UK or the

US. As such, we cannot explore empirically whether the conclusions we have made concern relatively universal aspects of the awe experience or alternatively, whether they are culturally specific to those who live in WEIRD (western, educated people from industrialized, rich democracies; Heinrich et al., 2010) contexts. Although cross-cultural work on awe is in its infancy, some scholars have already noted differences in the magnitude and content of the awe experience when comparing individuals located in either the US or China (Bai et al., 2017). More large-scale projects involving the cooperation of research groups located around the world will be required before important questions of universality can be approached.

Beliefs, habits and social customs operate as a kind of center of gravity, drawing idiosyncratic actors towards a shared cultural understanding. Human civilization would be unthinkable without these sources of 'old' wisdom. Nevertheless, it appears to be in our nature to challenge the status quo, push the boundaries and update our mental maps of the world and perhaps most importantly, ourselves. Awe is an emotion that appears to flavor this often difficult struggle for growth with a sense of joy and sacredness. As such, what Einstein poetically termed "holy curiosity" may very well be important, if not central, to transcending the limits of self.

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Appendices

Brief NFC

(Roets & Van Hiel, 2011)

Read each of the following statements and decide how much you agree with each according to your beliefs and experiences.

9). I don't like situations that are uncertain.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

10). I dislike questions which could be answered in many different ways.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

11). I find that a well ordered life with regular hours suits my temperament.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

12). I feel uncomfortable when I don't understand the reason why an event occurred in my life.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

13). I feel irritated when one person disagrees with what everyone else in a group believes.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

Read each of the following statements and decide how much you agree with each according to your beliefs and experiences.

14). I don't like to go into a situation without knowing what I can expect from it.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

15). When I have made a decision, I feel relieved.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

16). When I am confronted with a problem, I'm dying to reach a solution very quickly.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

17). I would quickly become impatient and irritated if I would not find a solution to a problem immediately.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

18). I don't like to be with people who are capable of unexpected actions.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

Read each of the following statements and decide how much you agree with each according to your beliefs and experiences.

19). I dislike it when a person's statement could mean many different things.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

20). I find that establishing a consistent routine enables me to enjoy life more.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

21). I enjoy having a clear and structured mode of life.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

22). I do not usually consult many different opinions before forming my own view.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

23). I dislike unpredictable situations.

strongly disagree | moderately disagree | slightly disagree | slightly agree | moderately agree | strongly agree

Counter-stereotypical Imagery

This is Sandrine Dirac, an applied physicist.

Born in France, she graduated from Ecole polytechnique. Since 2002, Sandrine has worked at Max Planck Institute where she studies the extragalactic background light, which reveals information about the star-formation rates and the structure formation of the universe.

This is Catherine Fisher, an investment broker.

She was born and raised in New York, and came to the Washington, D.C. area to attend the University of Maryland, where she received a B.A. in Accounting. In 2004, she began her career in real estate investment. In 2010, formed her own investment company, Fisher Investments where she remains.

This is Diya Gopal, a human rights lawyer.

She was born in the UK and studied law at Oxford. In May 2014 Gopal met with the British Foreign Secretary William Hague "to discuss how to drive forward international action to protect children in conflict zones from rape and sexual violence". She currently works for British law firm Leigh Day.

This is Anette Bergson, a neurosurgeon.

Born in Scotland, and after graduating with Honours in Medicine from the Royal Free Medical School, Bergson began working for the National Hospital for Neurology and Neurosurgery. She is currently the senior consultant neurosurgeon at St George's Hospital, one of the country's largest specialist brain surgery units.

Questions

"This is a photo of [NAME], whose biography you read earlier. Please answer a few questions about her. Please write in the boxes below."

"What was her second name?"
"What was her profession?"
"Where was she born?"
"Which university did she study at?"

IWAH

Two Factor Identification with All Humanity Scale (IWAH)

(McFarland, Webb, & Brown, 2012)

(Three factor version includes "People living in my country" as a possible response series)

How close do you feel to each of the following groups? Please mark the letter on the scantron that best represents your feelings on the following scale:

A = not at all close
B = not very close
C = just a little or somewhat close
D = pretty close
E = very close

People in my community
People all over the world

How often do you use the word "we" to refer to the following groups of people?

A = almost never
B = rarely
C = occasionally
D = often
E = very often

People in my community
People all over the world

How much would you say you have in common with the following groups?
A = almost nothing in common
B = little in common
C = some in common
D = quite a bit in common
E = very much in common

People in my community
People all over the world

Please answer the following questions using the following choices:
A = not at all
B = just a little
C = somewhat
D = quite a bit
E = very much

Sometimes people think of those who are not a part of their immediate family as

"family." To what degree do you think of the following groups of people as "family?"

People in my community
All humans everywhere

How much do you identify with (that is, feel a part of, feel love toward, have concern for) each of the following?

People in my community
All humans everywhere

How much would you say you care (feel upset, want to help) when bad things happens to

People in my community.
People anywhere in the world.

How much do you want to be:

a responsible citizen of your community.
a responsible citizen of the world.

How much do you believe in:

Being loyal to my community.
being loyal to all mankind.

When they are in need, how much do you want to help:

people in my community.
people all over the world.

Dispositional Positive Emotion Scale (DPES)

(Shiota, Keltner, & John, 2006)

The dispositional positive emotion scale. (38 Items)

Shiota, M. N., Keltner, D., & John O. P. (2006). Positive emotion dispositions differenti ally
associated with Big Five personality and attachment style. Journal of Positive Psycholo gy, 1, 61-71.

Respondents report their level of agreement with each item on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree).

1 - strongly disagree
2 - moderately disagree
3 - slightly disagree
4 - neither agree nor disagree
5 - slightly agree
6 - moderately agree
7 - strongly agree

Joy

I often feel bursts of joy.
I am an intensely cheerful person.
I am often completely overjoyed when something good happens.
On a typical day, many events make me happy.
Good things happen to me all the time.
My life is always improving.

Contentment

I am generally a contented person.
I am at peace with my life.
When I think about my life I experience a deep feeling of contentment.
I feel satisfied more often than most people.
My life is very fulfilling.

Pride

I feel good about myself.
I am proud of myself and my accomplishments.
Many people respect me.
I always stand up for what I believe.
People usually recognize my authority.

Love

Other people are generally trustworthy.
I develop strong feelings of closeness to people easily.
I find it easy to trust others.
I can depend on people when I need help.
People are usually considerate of my needs and feelings.
I love many people.

Compassion

It's important to take care of people who are vulnerable.
When I see someone hurt or in need, I feel a powerful urge to take care of them.
Taking care of others gives me a warm feeling inside.
I often notice people who need help.
I am a very compassionate person.

Amusement

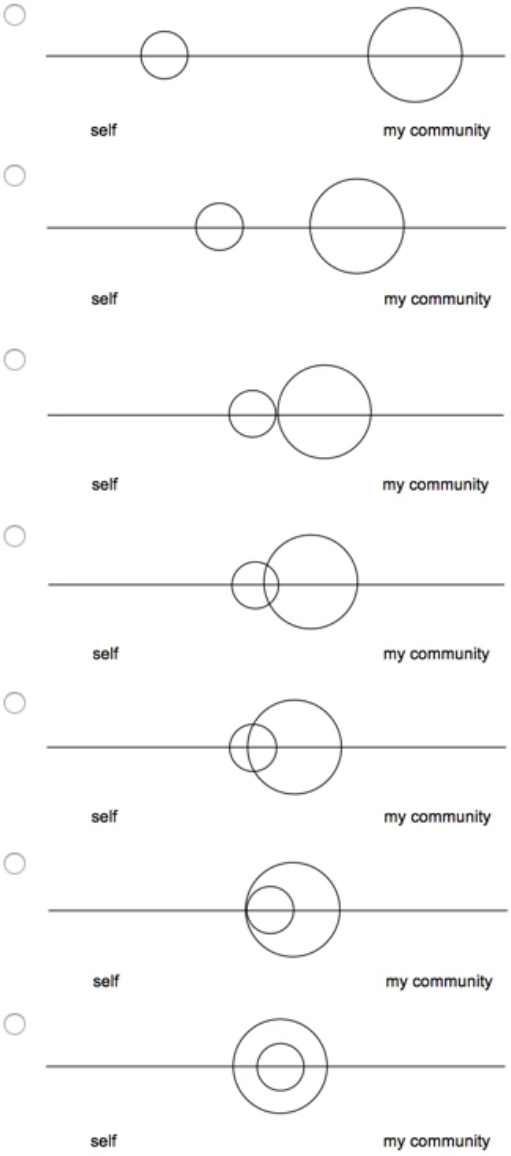
I find humor in almost everything.
I really enjoy teasing people I care about.
I am very easily amused.
The people around me make a lot of jokes.
I make jokes about everything.

Awe

I often feel awe.
I see beauty all around me.
I feel wonder almost every day.
I often look for patterns in the objects around me.
I have many opportunities to see the beauty of nature.
I seek out experiences that challenge my understanding of the world.

Pictorial 2-factor IWAH

Please indicate the picture that best describes your closeness to your community.



This question lets you record and manage how long a participant spends on this page. This question will not be displayed to the participant.

Conformity Scale

(Mehrabian & Stefl, 1995)

1. I often rely on, and act upon, the advice of others.

2. I would be the last one to change my opinion in a heated argument on a controversial topic.

3. Generally, I'd rather give in and go along for the sake of peace than struggle to have my way.

4. I tend to follow family tradition in making political decisions.

5. Basically, my friends are the ones who decide what we do together.

6. A charismatic and eloquent speaker can easily influence and change my ideas.

7. I am more independent than conforming in my ways.

8. If someone is very persuasive, I tend to change my opinion and go along with them.

9. I don't give in to others easily.

10. I tend to rely on others when I have to make an important decision quickly.

11. I prefer to make my own way in life rather than find a group I can follow.

Reverse scores are: 2, 7, 9, 11

Responses are:

1 - very strong disagreement
2 - strong disagreement
3 - moderate disagreement
4 - slight disagreement
5 - neither agreement nor disagreement
6 - slight agreement
7 - moderate agreement
8 - strong agreement
9 - very strong agreement

Big-Two Personality Scale

(Gebauer, Paulhus & Neberich, 2013)

‘‘How well does each of the following generally describe you?’’

1 = not at all, 7 = very much

Agentic

adventuresome
ambitious
bossy
clever
competitive
dominant
leader
out-going
rational
wise

Communal

affectionate
caring
compassionate
faithful
honest
kind
patient
sensitive
trusting
understanding

Curiosity and Exploration Inventory (CEI)

(Kashdan, Rose, & Fincham, 2004)

Exploration subscale (*3 is reversed*)

1. I would describe myself as someone who actively seeks as much information as I can in a new situation.

2. I frequently find myself looking for new opportunities to grow as a person (e.g., infor mation, people, resources).

3. I am *not* the type of person who probes deeply into new situations or things.

4. Everywhere I go, I am out looking for new things or experiences.

Absorption sub-scale

1. When I am participating in an activity, I tend to get so involved that I lose track of ti me.

2. When I am actively interested in something, it takes a great deal to interrupt me.

3. My friends would describe me as someone who is “extremely intense” when in the m iddle of doing something.

1 - strongly disagree
2 - disagree
3 - disagree somewhat
4 - neither agree nor disagree
5 - agree somewhat
6 - agree
7 - strongly agree

Need Threats

(Gonsalkorale & Williams, 2007)

Using five-point scales, participants completed 12 items assessing their perceived levels of belonging, self-esteem, control, and meaningful existence. These items were: 'I felt disconnected', 'I felt rejected', 'I felt like an outsider' (belonging); 'I felt good about myself', 'My self-esteem was high', 'I felt liked' (self-esteem); 'I felt powerful', 'I felt I had control over the course of the interaction', 'I felt superior' (control); 'I felt invisible', 'I felt meaningless', 'I felt non-existent' (meaningful existence). They also completed four bipolar items (good–bad, happy–sad, friendly–unfriendly, relaxed–tense) presented on seven-point scales to indicate their mood. These items have been used in previous studies,

On a 5-point scale:

Belonging

'I felt disconnected'
'I felt rejected'
'I felt like an outsider'

Self-esteem

'I felt good about myself'
'My self-esteem was high'
'I felt liked'

Control

'I felt powerful'
'I felt I had control over the course of the interaction'
'I felt superior'

Meaningful Existence

'I felt invisible'
'I felt meaningless'
'I felt non-existent'

Mindfulness Attention Awareness Scale (MAAS)

(Brown & Ryan, 2003)

Below is a collection of statements about your everyday experience. Using the 1–6 scale below, please indicate, in the box to the right of each statement, how frequently or infrequently you have had each experience in the last week (or other agreed time period). Please answer according to what really reflects your experience rather than what you think your experience should be.

almost always = 1
very frequently = 2
somewhat frequently = 3
somewhat infrequently = 4
very infrequently = 5
almost never = 6

1- I could be experiencing some emotion and not be conscious of it until some time later
2 - I break or spill things because of carelessness, not paying attention, or thinking of something else
3 - I find it difficult to stay focused on what's happening in the present
4 - I tend to walk quickly to get where I'm going without paying attention to what I experience along the way
5 - I tend not to notice feelings of physical tension or discomfort until they really grab my attention
6 - I forget a person's name almost as soon as I've been told it for the first time
7 - It seems I am "running on automatic" without much awareness of what I'm doing
8 - I rush through activities without being really attentive to them
9 - I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there
10 - I do jobs or tasks automatically, without being aware of what I'm doing
11 - I find myself listening to someone with one ear, while doing something else at the same time
12 - I drive places on "automatic pilot" and then wonder why I went there
13 - I find myself preoccupied with the future or the past
14 - I find myself doing things without paying attention
15 - I snack without being aware that I'm eating

Awe Scale

1 - strongly disagree
2 - moderately disagree
3 - slightly disagree
4 - neither agree nor disagree
5 - slightly agree
6 - moderately agree
7 - strongly agree

"While watching the video…"

I felt awe.
I felt small or insignificant
I felt wonder.
I felt alive and aware.
My attention and awareness was focused on my experience.
I felt calm and excited at the same time.
I felt a connection to something larger than myself