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A microscopic dot on a microscopic dot: Self-esteem buffers the negative effects of exposure to the enormity of the universe

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ABSTRACT

Although our planet feels indescribably large, in the context of the universe it is infinitesimally small. For some, the feeling of smallness associated with being reminded of the vastness of the universe might represent a psychological threat. For others, it could be a self-transcendent experience, helping them rise above self-focused concerns and to feel a sense of oneness with others. In two studies (*N*s = 294 and 409) we exposed people to videos that did or did not depict the enormity of the universe. Compared to a control condition, low self-esteem people exposed to the vastness of the universe reported more negative affect, less identification with others, less empathy to victims of a humanitarian disaster, and lower egalitarianism. This effect was not found for high self-esteem respondents. Results are discussed with reference to research on awe and the small self.

"*… if life is going to exist in a Universe of this size, then the one thing it cannot afford to have is a sense of proportion*".

Douglas Adams, *The Restaurant at the End of the Universe*

"*… uplifted into infinite space, all mean egotism vanishes. I become a transparent eyeball; I am nothing; I see all; the currents of the Universal Being circulate through me*".

Ralph Waldo Emerson, *Nature*

In his book *The Restaurant at the End of the Universe*, Douglas Adams envisaged a box called the Total Perspective Vortex: "When you are put into the Vortex you are given just one momentary glimpse of the entire unimaginable infinity of creation, and somewhere in it a tiny little mark, a microscopic dot on a microscopic dot, which says, *You are here*". Adams described this box as a torture chamber, one that drives people into an existentially depressed, catatonic state.

Yet, as the second quote by Emerson indicates, the sense of smallness and insignificance associated with having "total perspective" can be an opportunity as much as a threat. If the vastness of the Universe has the power to make us feel small, then presumably it also has the power to make our anxieties and concerns seem small. The subsequent sense of self-transcendence can be liberating, helping us rise above self-focused concerns and embracing our sense of oneness with others.

The examples quoted above share the premise that being exposed to the enormity of the Universe will make us feel small (we subsequently refer to this experience as a *cosmic perspective induction*). But they differ in terms of the presumed consequences of this feeling: feelings of threat in the first case, and a feeling of liberating self-transcendence in the latter. In this paper, we conduct two experiments to referee between these two intuitions. Specifically, we examine whether exposure to the vastness of the universe will influence our sense of oneness with others, operationalized as identification with others, support for egalitarianism, and prosocial responses to a humanitarian disaster.

1. Cosmic perspective inductions: the case for positive effects

The rationale for the notion that cosmic perspective inductions will increase our sense of oneness with other people can be made from the literature on awe. The notion of awe has for a long time been a topic of discussion within the fields of philosophy, sociology and religion, but until recently lay outside the auspices of experimental social psychology. This changed with the publication of a seminal paper by Keltner and Haidt (2003), who attempted to lend construct specificity to the notion. Keltner and Haidt identified two defining themes central to awe: vastness and accommodation. Vastness is interpreted broadly, including physical size, temporal enormity, fame, authority and/or prestige. Accommodation refers to the outcome of feeling challenged by this vastness, in the sense that it lies outside of (or overwhelms) people's existing cognitive schemas. Accommodation is the process by which people try to comprehend what they are experiencing by expanding or reimagining their existing cognitive schemas.

There is a convergence of research showing that awe inductions have the power to change how people construe themselves and their relationship to others. People exposed to awe-inducing natural states –

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or who are asked to reflect on a time they felt awe – are more likely to report an altruistic social value orientation (Joye & Bolderdijk, 2015), to want to volunteer their time to help others (Rudd, Vohs, & Aaker, 2012), and to show prosocial tendencies in hypothetical scenarios, economic decision tasks, and real-time helping situations (Piff, Dietze, Feinberg, Stancato, & Keltner, 2015; Prade & Saroglou, 2016). Furthermore, people exposed to awe-inspiring stimuli are more likely to feel small or insignificant, and simultaneously more likely to describe themselves through universal categories that imply connection with others (e.g., as an "inhabitant of the earth"; Shiota, Keltner, & Mossman, 2007). This feeling of self-transcendence and universality has previously been implicated in prosocial orientations (Boer & Fischer, 2013; Campbell, Bonacci, Shelton, Exline, & Bushman, 2004; Caprara, Alessandri, & Eisenberg, 2012; McCullough, Emmons, & Tsang, 2002), and Piff et al. (2015) confirmed that it was indeed the feeling of self-diminishment that mediated the effects of awe on prosocial intentions.

This experimental work is complemented also by qualitative work on interviews with astronauts who have had the rare experience of observing Earth from space. A common theme in these interviews is the enormous emotional effect of this experience, typically expressed as a combination of awe and self-transcendence (the *overview effect*; White, 1987; Yaden et al., 2016). In turn, these emotions are associated with increased feelings of identification with others, and a spiritual connection with the planet as a whole. Although this research is anecdotal, it dovetails with the experimental work to make the case that awe can induce self-transcendence, which in turn fosters a sense of universality and connection with others.

2. Cosmic perspective inductions: the case for mixed or negative effects

When Keltner and Haidt (2003) theorized about awe, they frequently made reference to the notion that it is an emotion bordering on fear. For them, awe is an ambiguously valenced experience, and the subjective experience of awe will depend largely on the extent to which accommodation - comprehension via reimagined cognitive schemas – is feasible. If one can successfully transition through the process of accommodation, it can be enlightening and joyful. If, however, the process of accommodation fails, it can be disorienting.

Most inductions of awe in experimental social psychology occupy the former space. For example, studies showing a relationship between awe and prosocial orientations have done so by asking people to describe a time they saw a natural scene of beauty (Piff et al., 2015; Prade & Saroglou, 2016; Shiota et al., 2007; Van Cappellen & Saroglou, 2012), by showing people video clips of stunning scenes of natural beauty (Piff et al., 2015; Prade & Saroglou, 2016; Van Cappellen & Saroglou, 2012), or by simply asking people to reflect on a time they experienced awe (which for most respondents invoked memories of being in nature; Rudd et al., 2012). Other awe inductions have involved showing people video clips charting the course of a pregnancy (Van Cappellen & Saroglou, 2012), showing slow-motion footage of droplets of water colliding with a bowl of milk (Piff et al., 2015), situating people next to a life-size reconstruction of a dinosaur (Shiota et al., 2007), or asking participants to spend 1 min looking up at a grove of towering trees (Piff et al., 2015). These experiences are no doubt construed by participants as awe-inspiring – and manipulation checks confirm this – but it can be argued that they lie at the pleasant and non-threatening end of the spectrum of awe experiences. This is quite a different experience from a cosmic perspective induction: although some may find it positively valenced to see how small our planet is in the context of a dead, cold, and limitless universe, others may not.

Recently, there has been a growing trend to examine the dark side of awe, for example by exposing people to images of tornadoes or volcanoes (e.g., Gordon et al., 2017; Piff et al., 2015, Experiment 3). Gordon et al. (2017) demonstrated that these "negative awe" experiences differ from "positive awe" experiences in terms of their underlying appraisals, their physiological correlates, and their implications for well-being. As part of this emerging frontier, three recent studies have examined the consequences of being exposed to the vastness of the universe. Underscoring the complex and contradictory nature of a cosmic perspective induction, one of these manipulations was interpreted in a positive way (as a manipulation of self-transcendence; Johnson et al., 2017; Experiment 3), one was treated in a neutral way (Stellar et al., 2018, Experiment 3), and one was treated as a negative awe induction, overlaid with "ominous music" (Gordon et al., 2017, Experiment 3). Compared to a control condition, these cosmic perspective inductions increased willingness to vote for an environmental sustainability initiative (Johnson et al., 2017), lowered heart rate (Gordon et al., 2017) and reduced the number of strengths people wrote about before moving onto their weaknesses when describing themselves (Stellar et al., 2018). However, no studies have examined the effects of these cosmic perspective inductions on prosociality or feelings of oneness with others.

The rationale for why a cosmic perspective induction might have a negative effect on feelings of oneness with others is grounded in the notion that – perhaps more so than other awe-inducing experiences – exposure to the vastness of the universe has the potential to make us feel very small. In terms of vastness, the universe is a near-infinite multiplier of any other display of natural wonder. Rather than invoking a pleasant sense of humility and perspective, it is possible that a cosmic perspective induction will invoke an unpleasantly intense sensation of self-erasure; of being rendered irrelevant or invisible. If so, this feeling may trigger a need to restore one's individual relevance and visibility, for example by reasserting one's selfhood, by becoming more self-focused, and by emphasizing differences with others.

3. The case for moderation by self-esteem

Above, we make the case that exposure to the vastness of the universe could have either positive or negative impacts on people. Another possibility is that there might be moderation effects, such that some groups of people may experience relatively positive effects while others experience negative effects. In exploring potential moderators, we focus on self-esteem. Although previous research on awe has not examined self-esteem as a moderator, doing so presents interesting theoretical possibilities.

For many theorists and researchers, the active ingredient that explains the relationship between awe and prosocial orientation is the sense of self-diminishment, smallness or insignificance that awe invokes (Piff et al., 2015; Shiota et al., 2007). It is interesting to speculate about whether smallness or insignificance is easier to embrace depending on whether one is high or low in self-esteem. For people who are high in self-esteem, forfeiting one's sense of self-importance may not come naturally, and may be construed as forfeiting a positive asset. In contrast, low self-esteem people may welcome the chance to feel small, and embrace the opportunity to be relieved of the burden of being self-focused. From this somewhat utilitarian point of view, low self-esteem people are better equipped to respond to a cosmic perspective induction with self-transcendence, and the sense of interconnectedness and universality that flows on from self-transcendence.

However, if one is to construe exposure to the vastness of the universe as psychologically threatening, then an argument can be made for the opposite prediction. For example, both terror management theory (Greenberg & Arndt, 2012; Greenberg, Pyszczynski, & Solomon, 1986) and the meaning maintenance model (Heine, Proulx, & Vohs, 2006) argue that self-esteem is a resource that buffers against existential threats and helps restore meaning when one's sense of natural order is threatened. Outside the experimental existential psychology literature, there is a raft of related evidence for the so-called *buffer hypothesis*: that high self-esteem people are more resilient to threats to the self, and are better able to frame events as challenges or opportunities rather than threats (e.g., Arndt & Goldenberg, 2002; Bonanno, Field, Kovacevic, & Kaltman, 2002; Corning, 2002; DeLongis, Folkman, & Lazarus, 1988;