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The Overview Effect: Awe and Self-Transcendent Experience in Space Flight

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Viewing the Earth from space has often prompted astronauts to report overwhelming emotion and feelings of identification with humankind and the planet as a whole. In this article, we explore this experience, known as the "overview effect." We examine astronaut accounts of the overview effect and suggest existing psychological constructs, such as awe and self-transcendent experience, that might contribute to a psychological understanding of this experience. We argue that the overview effect suggests directions for future research on altered states of consciousness in new contexts, with potential implications for better understanding well-being in isolated, confined, extreme (ICE) environments such as space flight.

Keywords: self-transcendent experience, awe, altered states of consciousness, space flight, well-being

> From this distant vantage point, the Earth might not seem of any particular interest. But for us, it's different. Consider again that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives. . . . There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known.
>
> —Carl Sagan (Sagan & Druyan, 2011)

"Earthrise," a now universally recognized photograph of Earth taken in 1968 by National Aeronautics and Space Administration (NASA) astronaut William Anders, provides an awe-inspiring view of our world from the moon (see Figure 1). For the first time, concepts of humanity and "the world" appeared in plain sight not just for astronauts, but for all of civilization. Humans have long understood that the Earth is not the center of the solar system, let alone the universe, but images like Earthrise make that understanding immediate and visceral, elevating it from something believed abstractly to something felt. The simultaneous complexity and fragility of our lives on Earth is no longer a mere concept, but a reality that can be understood personally. Decades before the rise of

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This article is written in honor of the late Edgar Mitchell, NASA astronaut, whose exploratory writings on the topic inspired our interest in the overview effect.

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Figure 1. An image of Earth taken from the moon by National Aeronautics and Space Administration (NASA) astronaut William Anders is among the world's most well-known images. Astronauts who witness Earth from this perspective first-hand often report an intense state of self-transcendent awe and wonder called the "overview effect." See the online article for the color version of this figure.

space travel, British astronomer Fred Hoyle predicted that "once a photograph of the Earth, taken from the outside, is available . . . a new idea as powerful as any in history will be let loose" (Kelley, 1988, p. 430).

If a single photograph could so influence a society's cultural awareness, how much more tremendous must be the effect of an in-person experience. The *overview effect,* as the experience is called, refers to a profound reaction to viewing the earth from outside its atmosphere White (1987). A number of astronauts have attributed deep feelings of awe and even self-transcendence to this experience (e.g., Linenger, 2000; Mitchell & Williams, 1996; White, 1987). Astronaut Edgar Mitchell described it as an "explosion of awareness" (White, 1987, p. 38) and an "overwhelming sense of oneness and connectedness . . . accompanied by an ecstasy . . . an epiphany" (Hunt, 2015, p. 73). White contends that the overview effect refers more generally to the experience of viewing common landscapes from far above, such as from a mountaintop, though the view of Earth from space provides the quintessential version of this experience (White, 1987, p. 1).

Astronauts attribute short- and long-term emotional benefits to these experiences (White, 1987; Stuster, 2010), but the scientific community has only recently begun to take a serious interest in these effects. Understandably, most literature on the effects of space flight describes potential dangers, as psychological problems and conflicts among crewmembers have been serious enough in the past to cut missions short (Holland, 2000). The Committee on Space Biology and Medicine, NASA Research Council (1987, 1998), has emphasized the need to study ways of responding to interpersonal problems between crewmembers, as well as personal ailments such as reduced energy, mood, and memory capacity. Despite rare exceptions (i.e., Human Research Roadmap, 2015; Robinson et al., 2013; Stuster, 2010), there are few mentions of positive psychological aspects of space flight in such reports.

These observations come at an important moment. Although federal funding for NASA programs has been on the decline, other nations (i.e., China, India) and the private sector (i.e., SpaceX and Virgin Galactic) have taken an interest in pioneering new technology for space flight and intend to dramatically reduce the cost of flights to low Earth orbit, in which the International Space Station (ISS), the Hubble Space telescope and most communication satellites reside. At this point, a limited number of humans have had the chance to witness Earth from orbit (Smith, 2006), but expanding governmental and private-sector efforts promise to make the experience of space travel far more available in the coming decades (Brennan, 2015).

The intense and singular states of awareness triggered by viewing the Earth from space provide a new context in which to explore awe-inspiring stimuli, their psychological effects, and individual differences in sensitivity to such potentially transformative experiences. Examining these and related aspects of space exploration might also strengthen our understanding of human functioning in isolated, confined, extreme (ICE) environments (Vanhove, Herian, Harms, Luthans, & DeSimone, 2014), perhaps with useful applications for astronauts and others who operate in such conditions.

In this article, we offer a broad conceptual approach to the overview effect. We begin by reviewing astronauts' accounts of viewing Earth from orbit and discuss some core aspects

of their experiences. We then suggest psychological constructs that might be useful in helping to understand the subjective qualities associated with the overview effect, specifically awe, self-transcendent experience, and alterations to the individual's self-schema (deep-seated beliefs about the relationship between one's self, other people, and the world). Finally, we raise cross-cultural considerations and discuss how further study of the overview effect could play a role in continuing efforts within the space flight community to better understand and enhance astronaut well-being.

Characterizing the Overview Effect

The overview effect was first identified by Frank White, who, while interviewing numerous astronauts, found that many of them had undergone "truly transformative experiences involving senses of wonder and awe, unity with nature, transcendence and universal brotherhood" (Vakoch, 2012, p. 29). As a result of White's work, it is now recognized within the space community that some who observe Earth from space report that they have felt overcome with emotion, have come to see themselves and their world differently, and have returned to Earth with a renewed sense of purpose. These experiences are highly meaningful for their subjects; Gene Cernan asserts that it was "one of the deepest, most emotional experiences I have ever had" (White, 1987, p. 39). Astronauts specify that it is not merely being in space that makes their time there so meaningful—there is something unique and profound about viewing and contemplating Earth from a distance.

The only data available so far on the overview effect are public statements made by astronauts. Even so, a few noticeable commonalities seem to emerge from the astronauts' accounts. The following excerpts provide a broad characterization of the most prominent aspects of the astronauts' reported experiences, namely: (a) appreciation and perception of beauty, (b) unexpected (even overwhelming) emotion, and (c) an increased sense of connection to other people and the Earth as a whole:[1]

> It's hard to explain how amazing and magical this experience is. First of all, there's the astounding beauty and diversity of the planet itself, scrolling across your view at what appears to be a smooth, stately pace . . . I'm happy to report that no amount of prior study or training can fully prepare anybody for the awe and wonder this inspires. (NASA Astronaut Kathryn D., as cited in Robinson et al., 2013, p. 81)

> I had another feeling, that the earth is like a vibrant living thing. The vessels we've clearly seen on it looked like the blood and veins of human beings. I said to myself: this is the place we live, it's really magical. (Chinese Space Program Astronaut Yang Liu, as cited in Chen, 2012, p. 288)

> If somebody'd said before the flight, "Are you going to get carried away looking at the earth from the moon?" I would have say [sic], "No, no way." But yet when I first looked back at the earth, standing on the moon, I cried. (NASA Astronaut Alan Shepard, as cited in Nardo, 2014, p. 46)

> You . . . say to yourself, 'That's humanity, love, feeling, and thought.' You don't see the barriers of color and religion and politics that divide this world." (NASA Astronaut Gene Cernan, as cited in White, 1987, p. 37)

> You identify with Houston and then you identify with Los Angeles and Phoenix and New Orleans . . . and that whole process of what it is you identify with begins to shift when you go around the Earth . . . you look down and see the surface of that globe you've lived on all this time, and you know all those people down there and they are like you, they are you—and somehow you represent them. You are up there as the sensing element, that point out on the end . . . you recognize that you're a piece of this total life. (NASA Astronaut Rusty Schweikart, as cited in White, 1987, p. 12)

> Before I flew I was already aware how small and vulnerable our planet is; but only when I saw it from space, in all its ineffable beauty and fragility, did I realize that humankind's most urgent task is to cherish and preserve it for future generations. (German Cosmonaut Sigmund Jahn, as cited in Hassard & Weisberg, 1999, p. 40)

> The feeling of unity is not simply an observation. With it comes a strong sense of compassion and concern for the state of our planet and the effect humans are having on it. It isn't important in which sea or lake you observe a slick of pollution or in the forests of which country a fire breaks out, or on which continent a hurricane arises. You are standing guard over the whole of our Earth. (Russian Cosmonaut Yuri Artyushkin, as cited in Jaffe, 2011, p. 9)

> From space I saw Earth—indescribably beautiful with the scars of national boundaries gone. (Syrian Astro-

[1] These excerpts come from astronauts who have offered personal accounts of their experiences of viewing the earth from space. We do not assume that these are exhaustive or comprehensive descriptions of the effect or of its impact on all astronauts who might have experienced it—only that they are informative and worthy of consideration.

> naut Muhammad Ahmad Faris, as cited in Hassard & Weisberg, 1999, p. 1)
>
> You've seen pictures and you've heard people talk about it. But nothing can prepare you for what it actually looks like. The Earth is dramatically beautiful when you see it from orbit, more beautiful than any picture you've ever seen. It's an emotional experience because you're removed from the Earth but at the same time you feel this incredible connection to the Earth like nothing I'd ever felt before. (NASA Astronaut Sam Durrance, as cited in Redfern, 1996, p. 1)

The overview effect might be, from the astronaut's perspective, one of the most positive aspects of space flight, raising new questions about the effect of powerful, transformative experiences on well-being in extreme conditions. Astronauts' descriptions of this experience suggest something deeper and more intense than a mere acknowledgment of beauty; their language reflects feelings of wonder, reverence, humility, and unity. Among other things, the feeling of viewing Earth from space might be identified as awe.

Experiencing Awe

Social psychologists characterize *awe* as an intense emotion resulting from the perception of something vast, as well as the subsequent need to accommodate the experience (Keltner & Haidt, 2003). It can occur in situations both natural (witnessing a fierce storm) and social (being in the presence of a powerful figure), and overlaps with a range of states that include wonder, fear, and curiosity. Awe also has physiological and behavioral correlates connected to wonder and the witnessing of power, including mimicking behaviors, submissiveness, and heightened attention (Frijda, 1986; Keltner, Gruenfeld, & Anderson, 2003). Vastness can be perceptual in nature, as in literally seeing something large such as the Grand Canyon, or conceptual, as in contemplating eternity, or, in this case, the fragility and complexity of life on a small planet in the vastness of space (Keltner & Haidt, 2003).

Awe is associated with a number of psychological benefits. Experiences of awe are associated with well-being (Rudd, Vohs, & Aaker, 2012; Van Cappellen, Saroglou, Iweins, Piovesana, & Fredrickson, 2013) as well as altruistic and other prosocial behavior, although in extreme cases they can also be associated with fear and anxiety (Piff, Dietze, Feinberg, Stancato, & Keltner, 2015). Awe is considered part of a larger class of positive emotions that influence mental processes beyond simply providing enjoyable feelings (Fredrickson, 1998; Haidt, 2000). The "broaden and build" model of positive emotions emphasizes how positive emotions can result in a *broadening* of attention and a *building* of psychological and social resources (Fredrickson, 2001). Positive emotions have been suggested to improve cardiovascular health (Fredrickson, Mancuso, Branigan, & Tugade, 2000), facilitate better collaboration in groups (Fredrickson, 2001), and even enhance creativity (Isen, Daubman, & Nowicki, 1987).

It might be tempting to attempt to explain the awe of the overview effect strictly as a response to perceptual vastness, and to equate the experience to that of viewing a natural feature on Earth. But where natural features on Earth suggest enormity, a distant view of Earth also suggests totality. Unlike the Grand Canyon, for example, the planet has an incredibly rich and broad context of meanings when viewed from above. The wholeness of the Earth makes it a symbol of almost all that is meaningful in human life; it has tremendous, perhaps absolute, conceptual vastness. Seeing it from a distance, when one is disconnected physically yet connected emotionally, conjures thoughts of home, of the entirety of one's world, and of mankind as a whole (Vaillant, 2008). We suggest that the tendency is, quite literally, to think in global terms, and that the ability to behold all at once the entire domain in which these human themes reside contributes to the overwhelming sense of awe.

Two particular features of the astronauts' views seem to contribute to feelings of awe. First, the juxtaposition of Earth's features against the black vacuum of space might be sufficient to emphasize themes both perceptual (beauty, activity, visible signatures of human civilization) and conceptual (vitality, interconnectedness, preciousness). Second, the difference in visual orientation toward familiar landmarks might be sufficient to elicit conceptual awe, creating a surreal effect by presenting well-known natural and human features from a radically different perspective.

Self-Transcendence

Awe alone might not be sufficient to explain some of the longer-lasting changes astronauts report in connection with the overview effect. For example, Cohen, Gruber, and Keltner (2010) found that aesthetic beauty by itself does not exert the same kind of long-term changes found in more meaningful experiences such as spiritual transformations. The overview effect may trigger more powerful subjective states, most notably "self-transcendent" experiences (STEs). STEs are temporary feelings of unity characterized by reduced self-salience and increased feelings of connection (Yaden, Haidt, Hood, Vago, & Newberg, under review). In a study that asked subjects to write about intense spiritual experiences, those who indicated that their experiences had a self-transcendent (or "mystical") aspect described them using more *socially* and *spatially* inclusive language (Yaden et al., 2015). In other words, during these kinds of experiences, people can feel a sense of connection with other individuals, humankind, and even the entirety of existence (Newberg & d′Aquili, 2000; Yaden et al., 2015). STEs are generally positive and can even be transformative, with some subjects reporting them to be among the most important experiences in their lives (Griffiths, Richards, Johnson, McCann, & Jesse, 2008; Griffiths, Richards, McCann, & Jesse, 2006; Hood, Hill, & Spilka, 2009; Miller & C'de Baca, 2001). Such experiences, though temporary, arouse visceral feelings of compassion and personal connection with others; in the case of the overview effect, that sense of connection may encompass the entirety of Earth and its inhabitants. The overview effect might best be understood as a state of awe with self-transcendent qualities, precipitated by a particularly striking visual stimulus.

Such intensely self-transcendent experiences have historically been associated with practices such as prayer, meditation, and religious rituals as well as the use of psychedelic drugs (Griffiths et al., 2006; Yaden, Iwry, Smith, Pawelski, in press). They are particularly well documented in conjunction with religious and spiritual settings, in which subjects' purported experiences are accompanied by highly altered states of consciousness (James, 1902; Maslow, 1964). Space flight casts these experiences in a historically novel context to which some psychological guidelines traditionally associated with these experiences might still apply.

Neuroscience has begun assembling a model of brain activity that appears to be associated with self-transcendence (Newberg et al., 2001; Urgesi, Aglioti, Skrap, & Fabbro, 2010; Yaden, Iwry, & Newberg, in press). Feelings of unity with other people, existence, and even conceptions of the divine, for instance, seem to include temporary reduction in activity in regions associated with spatial awareness (the posterior superior and inferior parietal lobes), perhaps contributing to reduced awareness of one's physical self and of their separation from objects in their environment (Newberg et al., 2001; Urgesi et al., 2010). Future research would be required to expand this model further, perhaps determining whether the overview effect draws on these or related neurobiological pathways.

Perspective and Identity

Although feelings of awe and self-transcendence associated with the overview effect are episodic, astronauts' experiences may sometimes settle into long-term changes in personal outlook and attitude involving the individual's relationship to Earth and its inhabitants. These changes seem primarily to entail greater affiliation with humanity as a whole, as well as, in Mitchell's words, an "abiding concern and passion for the well-being of Earth" (White, 1987, p. 39). According to Schweikart, "When you go around the Earth in an hour and a half, you begin to recognize that your identity is with that whole thing" (White, 1987, p. 11). Similarly, Mitchell asserts "in outer space, you develop an instant global consciousness, a people orientation, an intense dissatisfaction with the state of the world, and a compulsion to do something about it" (quoted in Mitchell's online bio for the New Mexico Museum of Space History, 2015).

Reports such as these suggest that extreme subjective experiences—and the altered states of awareness that they evoke—can shape the ways in which individuals understand and approach new concepts, and even affect the salience of familiar concepts. Schweikart's "recognition" of his unity with Earth as a whole was not just a visceral reaction, but also full-fledged realization. These changes are conscious and propositional, and seem to be able to influence

individuals' broader beliefs and values. Due to the human tendency to find symbolic value in personal experiences, particularly intense experiences call forth a motivated attempt to make sense of how the experience fits into one's life narrative (Vaillant, 2008).

One way to understand this powerful influence might be in terms of changes to a schema—an organized conceptual framework through which individuals approach new information and make sense of old experiences. Each of an individual's schemas entails a set of memories, beliefs, and attitudes that create a general cognitive orientation, guiding individuals' interpretation of and response to incoming stimuli (Piaget, 1952; McVee, Dunsmore, & Gavelek, 2005). When individuals encounter something that cannot be reduced to preexisting elements in a given schema, they must "accommodate," expanding that framework to take new information into account. To the extent that profound alterations in self-awareness and identification can settle into differences in personal identity, those particular differences might be thought of as changes to the observer's "self-schema"—the particular framework through which they imagine themselves in relation to the world (Markus, 1977). Thus, even after the experience ends, a self-transcendent experience would be personally meaningful to the individual and influential in shaping his or her sense of self.

It seems as though the difference in visual orientation, in addition to eliciting feelings of awe, is enough to prompt changes in conscious reflection and understanding. The view of Earth from space presents well-known natural and human features from a distant vantage point, providing an all-encompassing view of Earth and obscuring demographic differences and national boundaries. Taken together, these features may dispose the viewer to an enhanced sense of international unity and perhaps even humanitarian attitudes. In some cases, this change in personal outlook simply entails an expanded sense of perspective on one's own life, with potentially positive results for psychological health. Ed Gibson asserts that when one is able to view Earth from space,

> You see how diminutive your life and concerns are compared to other things in the universe. Your life and concerns are important to you, of course. But you can see that a lot of the things you worry about do not make much difference in an overall sense. The result is that you enjoy the life that is before you . . . it allows you to have inner peace. (White, 1987, p. 41)

Interpretations and Cross-Cultural Considerations

Interpretations of the overview effect appear to vary both individually and culturally. Religious observers might echo astronaut James Irwin, a Christian, who contended that "seeing this [Earth] has to change a man, has to make a man appreciate the creation of God and the love of God" (Gaither & Cavazos-Gaither, 2003, p. 262), or Gene Cernan, who, upon walking the moon in 1972, claimed that "there was too much logic, too much purpose—it was just too beautiful to have happened by accident. It doesn't matter how you choose to worship God . . . He has to exist to have created what I was privileged to see" (White, 1987, p. 38). Secular people, on the other hand, would be less likely to rely on religious terminology, and would more likely describe their experiences in naturalistic, or perhaps still vaguely spiritual terms. For instance, Boris Volynov (as cited in Fox, 1999) makes no mention of the supernatural in his interpretation:

> During a space flight, the psyche of each astronaut is re-shaped; having seen the sun, the stars and our planet, you become more full of life, softer. You begin to look at all living things with greater trepidation and you begin to be more kind and patient with the people around you. (p. 61)

These differences likely extend to cultural perspectives on selfhood as well. Events with profound inspirational significance, in which individuals discover a sense of calling for example, can be interpreted along a spectrum of different perspectives (Yaden, McCall, & Ellens, 2015). These include cross-cultural differences. For example, Chinese participants in research on "calling" experiences have been found to be far more likely to interpret their experiences in terms of social and cultural duty, whereas American participants are more likely to offer supernatural interpretations (Peng & Zhao, 2015). Given the important role that culture can play in how such experiences are interpreted, it should come as no surprise that similar subjective effects would reflect social and ideological differences in diverse and complex ways.

Space Exploration and Well-Being

The psychological study of space flight is considered part of "bioastronautics"- the study of human beings in space. Historically, behavioral and psychological research was underutilized by NASA's space program (Helmreich, 1983) and psychology's role in space exploration was originally limited to screening astronauts for mental fitness and assessing psychological disturbances associated with space flight (Grether, 1962; Newberg, 1994).[2] It is now widely acknowledged that psychological insight into astronaut health can play an instrumental part in mission planning and success, and astronaut psychology continues to develop into a substantial subfield of research (Cox, Schmidt, Slack, & Foster, 2013; Suedfeld, 2005). In keeping with Flight Director Gene Kranz's (2009) "failure is not an option" philosophy, NASA's human research plan has oriented itself thus far toward risk reduction (National Academy of Sciences, 2006). To the extent that psychology is incorporated into mission planning, the Human Research Program's Behavioral Health and Performance Element at NASA is focused on minimizing risks of psychiatric disorders associated with space flight (Slack, Schneiderman, Leveton, Whitmire, & Picano, 2015).

Indeed, social isolation, cramped quarters, long lists of daily tasks, physiological responses to zero gravity, and obvious dangers of life and travel in space can produce a wide variety of negative psychological reactions (Committee on Space Biology and Medicine, NASA Research Council, 1987; Human Research Roadmap, 2015; Newberg, 1994). To mitigate risks associated with behavioral health and performance, numerous countermeasures (ranging from eye masks for sleeping to care packages) have been put into place (Sipes & Vander Ark, 2005). Greater emphasis on longer missions, such as stays on the ISS and prospective voyages to Mars, has catalyzed changes to astronaut selection and training. Psychological research in analog ICE environments simulating aspects of space flight, along with reports of astronaut experiences, has and continues to prompt tangible changes in astronaut procedure (Flynn-Evans, Gregory, Arsintescu, Whitmire, & Leveton, 2015; Harrison, Clearwater, & McKay, 1989; Sandal, Vaernes, Bergan, Warncke, & Ursin, 1996). Behavioral health initiatives have also made headway in designing astronauts' schedules with proactive measures (Ball & Evans, 2001), such as minimizing interruptions to sleep; astronauts now have regular remote meetings with NASA Behavioral Health and Performance psychologists and psychiatrists, use software to assess cognitive functioning, use e-mail and Internet protocol phones to keep in touch with family and friends, and are treated to encouraging calls from heads of state and celebrities (Harrison, 2005; Slack et al., 2015).

Positive aspects of space flight have recently begun to receive greater acknowledgment for their potential influence. Researchers have suggested that space flight itself can result in psychological growth (Myasnikov & Zamaletdinov, 1996; Suedfeld, 2005). Psychologists interested in well-being assert that both enjoyable and difficult experiences can result in psychological growth (Cornum, Matthews, & Seligman, 2011; Roepke, 2013, 2015), and that such growth should even be possible in extreme environments (Suedfeld, 2001), including during space flight (Suedfeld & Weiszbeck, 2004). Efforts to study such aspects of well-being reflect an increasingly "salutogenic" approach to astronaut safety—one that integrates health, stress, outlook, and disease into a holistic model of well-being (Antonovsky, 1979).

The overview effect might be counted as one such aspect of space flight. Astronauts consider viewing the earth so valuable, in fact, that members of the Skylab IV mission who were denied time to do so (among other mission grievances) responded by refusing to work, asserting, in the flight director's words, "their needs to reflect, to observe, to find their place amid these baffling, fascinating, unprecedented experiences" (Weick, 1977, p. 33; Connors, Harrison, & Akins, 1985). Giving astronauts cameras with which to photograph the earth, though originally intended for research purposes, has also turned out to be an effective form of positive interven-

[2] Historically, rather than view psychologists as fellow scientists or assets for successful missions, NASA administrators, other government officials invested in the space race, and even astronauts have variously expressed concern that reports of psychological vulnerabilities in astronauts would undermine the cultural prestige of the American space program (Santy, 1994; Shepanek, 2005; Wolfe, 1979).

tion (Robinson et al., 2013); during the first eight expeditions on the ISS, almost 200,000 photographic images were taken, of which 84.5% were crew-initiated.[3] Recent empirical work suggests that altered perceptions of Earth's beauty and existential value are among the most salient psychological effects of space flight (Ihle, Ritsher, & Kanas, 2006; Stuster, 2010).

Studying positive psychological qualities of space flight may yield new insights for promoting optimal human functioning in space. Future research might examine the extent to which benefits from awe and self-transcendent experiences can affect other mental and physical health factors in ICE environments. Could subjective experiences like the overview effect improve mental health, perhaps boosting motivation and morale? Could the potential effect of positive emotions on immune health help to buffer against the harmful psychological and physiological effects of life in space? Current research suggests that certain aspects of space flight could be harnessed to improve group cohesion (even among highly diverse crews) and creative problem solving (Kelly & Kanas, 1992; Landon, Vessey, & Barrett, 2015). Biomarkers are also being explored as potential predictors of successful adaptation to space conditions (Slack et al., 2015). Future studies, perhaps utilizing modern linguistic analysis, momentary ecological assessment devices, and neuroimaging techniques, might examine the more specific psychological and neurophysiological correlates of the beneficial and detrimental experiences associated with space flight (Newberg & Alavi, 1998). Given the broader psychological significance of the overview effect, further research might even use simulated views of Earth from orbit to artificially induce and study the effect in normal populations.

Conclusion

Astronaut psychology, including its more subjective aspects, is an important consideration in manned space flight, especially at a time when space flight promises to become increasingly accessible. The overview effect may be among the most meaningful aspects of space flight and may form an important buffer against some of the psychological risks of space missions. We propose that the overview effect might usefully be understood in terms of awe and self-transcendent experience, with concomitant changes to the observer's self-schema and value system, which in some cases could be considered transformative. There are likely a variety of cross-cultural differences regarding the ways in which the overview effect is experienced and interpreted, including differences in religious and social identity. Nonetheless, space flight seems to be one of the few endeavors that can be a true source of collective inspiration. Awe and self-transcendence are among the deepest and most powerful aspects of the human experience; it should come as no surprise that they emerge as we gaze upon our home planet and our whole world comes into view.

[3] NASA has made many of these images available to the public at http://eol.jsc.nasa.gov.

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Correction to Yaden et al. (2016)

In the article "The Overview Effect: Awe and Self-Transcendent Experience in Space Flight" by David B. Yaden, Jonathan Iwry, Kelley J. Slack, Johannes C. Eichstaedt, Yukun Zhao, George E. Vaillant, and Andrew B. Newberg (*Psychology of Consciousness: Theory, Research, and Practice*, 2016, Vol. 3, No. 1, pp. 1–11. http://dx.doi.org/10.1037/cns0000086), the name of author Johannes C. Eichstaedt was misspelled as Johannes C. Eiechstaedt. All versions of this article have been corrected.

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