A Neurophenomenology of Awe and Wonder
Gallagher, S., Reinerman-Jones, L., Janz, B., Bockelman, Trempler, J. (2015). New York: Palgrave Macmillan

Gallagher et. al. (2015) explore the concepts of “awe” and “wonder” in several related investigations. The first part of their project involved making hermeneutic analyses of journals that astronauts wrote describing their experience while in orbit. The goal of this investigation was to understand what the astronauts experienced during the flight and to understand how these experiences may have been associated with feelings of awe and wonder. They also examined the astronauts’ accounts through their reflections written after returning to earth and through interviews. What was of importance for the project was the identification of subjective first-person experiences during the flight, with particular interest in what was reported on the experiences that could be categorized as relating to awe and wonder

The second part of their investigation was to try to explore awe and wonder in an experimental setting where the third-person approach typical of traditional science could be employed. To do this, they had experts design an environment with objects and virtual reality that would allow the participants to

experience the views that the astronauts had observed from the spacecraft.

In another part of the experimental phase of the research, the participants were assessed for "personality traits and emotional intelligence, their tolerance for ambiguity, their openness to absorbing self-altering experiences across a number of scales, and their attitudes and practices relevant to religiosity/spirituality, as well as levels of individual and collective self-concepts" (15). These psychological measures were then associated with their reports of awe and wonder, with the above psychological measures, and with brain measures of EEG and Functional Near-Infrared Spectroscopy (fNIR).

A particularly impressive aspect of this research is its concern for the meaning of the words awe and wonder. The authors first developed working definitions of these terms and examined how they had been used by philosophers and psychologists in the past. Then they had one person read through all the astronauts in-flight journals (published on the NASA website) to determine whether the experiences of awe and wonder were actually reflected in the journal accounts, even if the astronauts didn't use these precise words but nevertheless expressed meanings consistent with them. Then two primary interpreters independently went through the journal texts to identify and categorize experiences that were consonant with the relevant terms. This exercise generated a consensus between the two interpreters consisting of 34

categories of the relevant experiences of the astronauts. Based on that, revisions were made to the working definitions of awe and wonder. This exercise also brought to the fore the relationship between the central terms of interest and related categories of curiosity and humility. Thus, research team was identifying the word web of which awe and wonder are members. This included the notion of "ineffability" – the inability to put one's experience into words.

The deep concern (and indeed respect) for the meaning of terms is also reflected in the authors' historical sketch of the notion of wonder. They trace its Greek lineage (thaumazein) and its Latin lineage (mirari, miraculum, admiratio), and Spinoza's Latin interpretation in which wonder reflects anything that captures an individual's focus without a causal relationship with its source. It may generate emotions, but it is not an emotion itself. The authors characterize the Greek notion of wonder as "ontological wonder" and Spinoza's as "cognitive wonder". These issues are relevant to operationalizing wonder in order to study it experimentally.

Nevertheless, the researchers undertook their examination of the phenomenological data (journals and interviews with astronauts) and the results of the experimental segment of the research with a deliberate effort to avoid imposing a priori categories on the data. They let the categories emerge from the documents of the experiences the astronauts had had. And the authors recognized that "the researchers' interpretations also stand as texts in the need of interpretation" (119). Therefore,

they had the text examined by 20 other readers who acted as secondary interpreters. The authors point out that allowing the subjects' experiences to define the categories of what have to be explained in the research was more productive than the typical psychological and neuroscience approaches which impose predefined categories. Without the phenomenological reports, aspects of the neurobiological experiments would not be explainable and would/could be misleading.

Gallagher et al.'s project was designed to be multidisciplinary, involving psychology, neuroscience, and phenomenology. The goal was to combine the first-person subjective understandings of the conscious experience of awe and wonder with a non-reductive methodology and to combine that with the traditional third person approach of experimental science. They essentially argue that science requires both phenomenological and experimental approaches in order to understand concepts such as awe and wonder. They report research carried out by Lutz et al. (2002) which combined the first-person accounts of attention and task readiness of subjects who had been trained in phenomenological techniques with the third person experimental subjects' reaction times and dynamic brain activity recorded by EEG. This approach showed that what might be considered mere "noise" in typical neuroscience research was actually relevant to the experience the subjects reported in the phenomenological interviews. The phenomenological approach allowed a broader picture of attentional processes.

The authors don't take their areas of concern as givens. For example, they raise the following questions about wonder. "Is wonder inconceivable?… Is it impossible to put into concepts?… Is a wonder absolutely unique to each person who experiences it?… Do concepts undermine wonder as wonder, turning it into something else that might be researchable, but is no longer the original experience?" (150). They also note that these types of questions apply more generally to all of the social sciences because "human experience is always continuous, not discrete; embedded, not isolated; temporal, not eternal" (115).

The authors consider whether wonder is a universal experience or whether it is a range of experiences that are generated sui generis. They ask whether the experience of wonder is the same or different for everybody and whether for some people it may be ineffable. They speculate that wonder may occur with any experience which is novel and apparently unexplainable. They question the categories of wonder, i.e. they don't reify them; they entertain the idea that they may be approximations of the experience of wonder.

The authors discuss the reductionism that characterizes traditional experimental science and explore the notion of the non-reductionist science. Reductionists attempt to find the ultimate physical substrate that would underlie any mental phenomenon, and usually this would require an explanation at the level of the brain. Eliminative reductionism would maintain that the lower level of explanation eliminates the need for concepts at a higher level. It denies the reality of the thing that

has been reduced. Conservative reductionists recognize the ultimate material substrate, but they also accept that the reduced phenomenon is real, and that a phenomenon can be explained with both physical and mental vocabularies.

But the authors also argue that current views of the mind include components beyond the brain. These extended perspectives recognize that our mental lives involve the body, the natural, social, cultural environments and their affordances (nature and technology), and our activity in the world. A reductionist third-person focus on the brain thus misses much of what is integral to our existence. The authors note that radical eliminative reductionism or conservative explanatory reductionism does not recognize this extended view of the mind. Thus, in their experiments, cognitive neuroscientists who want to explain everything in terms of brain states also want to control for everything else to eliminate its influence. The authors note that phenomena in the social sciences often don't yield causal explanations. These fields deal with dynamic relationships among variables that often don't have the explicit causal sequence that science demands. In this way, important influences on brain activity may not be considered, and it is those influences that are of interest to psychology, anthropology, sociology, economics, the arts, and the humanities.

Gallagher et al report there are two criticisms of a neuro-phenomenological approaches. The first is that "explanations of consciousness and cognition ought to be reduced to purely physiological explanations if they are to be scientific… From the reductionist vantage point, we need to understand experience as a purely neurological phenomenon elicited by (but separate from) the stimulus. The correct response to the reductionist challenge is to point out that there is a responsibility for science to "explain what there is" (Gallagher 2007, p. 311). "The boundaries of experience are not necessarily drawn by neural connections; extra neural factors also belong to the cognitive system" (66-67).

The second critique of phenomenological approaches is that there is an explanatory gap between neural events in our brains and our conscious experiences. "The challenge is to close the distance between physiological events and their counterparts in consciousness, thereby explaining (ideally with a tidy causal connection) how the chemical and electrical events within the brain bring about consciousness (67)."

Gallagher et al.'s project was designed as a step toward closing that gap. The research did indeed find interesting and suggestive associations among the phenomenological reports, the psychological measures, and the neurobiological assessments. These results provide useful directions for future research. From my perspective, the research is also very valuable in showing what might be some of the limits to experimental third-person objective science. This is important

because experimental research is considered the scientific gold standard. The project suggests that traditional science has difficulty with the individual and with influences on mental life from outside the brain and the body. The authors point out that a person's past history, current social, cultural, and material/technical environment, and their activity in that environment cannot be examined by experimentally controlling for the effects of these influences. Additionally, it cannot account for interactions among these influences and the possible emergent properties that the interactions generate.

Taking a somewhat more radical view, we might want to ask what the domain of science is. The area where it has been most successful has been the physical world. I question whether nonphysical abstract symbolic concepts such as emotion, motivation, democracy, identity, acculturation, patriotism, love are part of the scientific domain. I would include awe and wonder among such nonphysical entities.

Of course, there will be brain and bodily reactions to these phenomena because our biology responds to all relevant stimuli (but with a good deal of individual variation). These biological responses don't make the concepts physical, but without being physical, they often have measurable effects on our human biology. Now the main question I have is whether such nonmaterial symbolic conceptual phenomena can ever yield a final proven understanding or will they, like art and literature, always be subject to varying interpretations,

imputations, assertions, and explanations, with no teleology, no final formulation, and no ultimate truth.

Reference

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