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I hereby state that this essay is my original work.

Moved By Wonder

In an extant fragment of Aristotle's lost dialogue *De Philosophia*, the Philosopher asks us to imagine a humanoid species, inhabiting subterranean dwellings adorned with all thinkable art and technology. If they were to emerge from their cavernous realms and witness the "seas and sky", "the vast clouds and mighty winds", "the whole sky spangled and adorned with stars", "the changing phases of the moon's light, now waxing, now waning", would they doubt this were anything other than divine handiwork?¹

Aristotle, following his mentor Plato, writes that wonder (*thaumazein*) is the origin (*arche*) of all enquiries.² The thought-experiment above illustrates this idea: it is the Aristotelian troglodytes' experience of wonder, when confronted with the voluptuous beauty of the natural world, which prompts them to ask questions. On the one hand, Aristotle refers to philosophical, existential dilemmas (what we would call the "why-questions"): *why are we here? Was the world created?* But the Stagirite also hints strongly at a second kind of enquiry, when he mentions his characters' fascination with particular facets of creation; their existential questioning is preceded by their appreciation and understanding of the particular sciences of oceanography, cirrology, aerology, and astronomy.

We can recognize the cave-dwellers' wonder in our own experience. The more science develops, the more cause for wonder we find: the deep symmetries of theoretical physics, the luminous splendours of astronomy, the stratified treasures of geology, the intricacies of biochemistry... Whenever scientists are pressed to explain why they actually engage science, they will, in the overwhelming majority of cases, provide an aesthetic explanation, based on the beauty of their field of study, or the feeling of wonder that their enquiry evokes.

Albert Einstein, for example, in a column in the *New York Times*, expressed how the experience of awe and wonder "is the strongest and noblest driver of scientific research", writing that "the most important function of art and of science is to arouse and keep alive this feeling".³ In Einstein's wake, the militantly atheistic cosmologist Lawrence Krauss published an opinion piece in the same periodical, aptly titled "Finding Beauty in the Darkness". There he lauds how "[s]cience has the capability to amaze and excite, dazzle and bewilder," claiming this is by far its most important facet.⁴

¹ Quoted in Marcus Tullius Cicero, and Brooks, F. (trans.), (1896). *De Natura Deorum (On the Nature of the Gods)*, (London: Methuen). Book II, Chapter XXXVII

² Aristotle, and Tredennick, H. (Trans.), (1956). *Metaphysics*. London: Loeb Classical Library.

³ Einstein, A. (1930). "Religion and Science", in *The New York Times* (November 9, 1930).

⁴ Krauss, L. M. (2016). "Finding Beauty in the Darkness", in *The New York Times* (November 2, 2016).

Today, however, the status of wonder is more precarious than it was in the days of the Lyceum. There is an increasing pressure to view Science as the only begetter of objective truth. Science, on this view, is entirely independent of our personal and cultural contexts; the origin of science in such a subjective experience as wonder, therefore, sits uncomfortably with the ideal of Science as something impersonal, objective, which apprehends the world in a God's-eye-view from nowhere. That is not to say there is anything contradictory, or even pernicious, about this Baconian view of science. It simply squares awkwardly with empirical reality. Logically, we *could* have science as an anaemic horde of facts. Existentially, we *would not* have science if it were not for the experience of wonder.

On the other hand, the scientific view of science also follows hand in hand with reductive naturalism: the conviction that every phenomenon, such as beauty, love, or wonder, can be explained exhaustively with reference to purely natural causes. Various reductivist attempts to explain away the phenomenon of wonder have been proposed: as an epiphenomenon of neurons swarming in the medial orbitofrontal cortex,⁵ as a dormant proficiency for scouting fecund environments, developed in our nomadic evolutionary past,⁶ or, as Darwin himself posited, simply as a misdirected sexual appetite.⁷

The final reason wonder must be exorcised by naturalism is that it opens the possibility of philosophical and existential questions – *why*-questions. For a reductive naturalist, these questions are at best meaningless; the only valid questions are scientific questions – *how*-questions.

For these reasons, the experience of wonder is not one that can survive within a naturalistic framework. But in fact, all reductive attempts to explain away wonder fail. Wonder is destructive to any naturalist system, blowing it apart from within. The naturalist must locate wonder's origin in the evolutionary continuum and thereby reduce it to one of the two categories of *adaptation* and *by-product*: wonder either provides an evolutionary advantage to individuals who experience wonder, or is a by-product of certain other advantageous trait, which happens to bring along wonder as a "spandrel". This would, however, put the scientific enterprise in a very awkward position indeed. If its *arche* is a belief and experience that is nothing more than an extant fossil of an advantageous trait, what vouches for the coherence of science? If science is still to be taken seriously, it must exist as a *felix culpa*, a happy mistake: a correct apparatus churned up for some occult reason by a misguided evolutionary drive.

An even stronger argument can be formulated. Since scientific and aesthetic cognition seem to be so fundamentally linked, it is to say the least questionable

⁵ Ishizu, T., & Zeki, S. (2011). "Toward A Brain-Based Theory of Beauty", *PLoS ONE*, 6(7), e21852. <http://doi.org/10.1371/journal.pone.0021852>

⁶ Dutton, D. (2003), "Aesthetics and Evolutionary Psychology", in *The Oxford Handbook for Aesthetics*, Levinson, J. (ed.), Oxford University Press.

⁷ Darwin, C. R. (1871), *The Descent of Man, and Selection in Relation to Sex*, (1st edition), 63, London: John Murray.

that a scientific approach claims infallibility for one of these aspects while arbitrarily suppressing the other. One could, with the same degree of legitimacy, apply a reductionist evolutionary argumentation to the scientific enterprise itself, tracing back its survival value through the temporal continuum. This would, of course, destroy any appeal to truth in science, as veridicality would be replaced by evolutionary advantage, and thus undermines the argument itself.

In conclusion, Science would not subsist without our experience of wonder about creation. The experience of wonder itself cannot be explained away by Science, as committed naturalists must try to do. This is because of Science's prior, cognitive and existential dependence on our experience of wonder. Erwin Schrödinger once remarked: "Science cannot tell us a word about why music delights us, of *why* and *how* an old song can move us to tears." We can go one step further. Science cannot even tell us, in a reductive sense, why and how wonder can *move us* at all, since it is itself borne by wonder, *moved* and nurtured by wonder.

Words: 992