Alan G. GROSS, *The Scientific Sublime. Popular Science Unravels the Mysteries of the Universe*. Oxford University Press, 2018, ISBN 9780190637774, 314 p.

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Alan G. Gross, professor of Communication Studies at the University of Minnesota-Twin Cities, transitioned from literary scholarship into the rhetoric of scientific communication, which explains the double ambition of this volume. Much the same way popular culture is usually reclaimed by sociologists, popular science is tackled in *The Scientific Sublime* with the distinct hope to endow it with a new-found dignity. Rather than seeing accounts of popular science as merely instructional texts, Gross is at pains to prove that their worth survives even when the science they intend to popularise becomes dated. Two claims are put forward: firstly, that what they describe, accurate or not, is a sublime vision; secondly, that the very descriptions can be said to have a touch of the sublime to them. We are first offered several historical definitions of the sublime, be it the literary, the natural or the technological, to suggest how awe has gradually become divorced from a religious feeling and may even accompany the scientific. This initial nuance gives way to exuberant proliferation, as each chapter aims to tackle sub-categories with ad-hoc definitions. First come the physicists, who are to guide us to the consensual sublime (Richard Feynman), the conjectural sublime (Steven Weinberg), the technological sublime (Lisa Randall), the speculative sublime (Brian Greene), the scientific sublime embodied (Stephen Hawking). Next come the evolutionary biologists, a term applied to figures as diverse as Rachel Carson (the ethical sublime), Stephen Jay Gould (the balanced sublime, experiencing the sublime), Richard Dawkins (the mathematical sublime), E. O. Wilson (the biophilic sublime), and, quite generously, to Steven Pinker (the polymath sublime).

We may take issue with what seems, at first glance, a reasonably sturdy taxonomy. Certain categories of the sublime could be swapped between some of the

authors discussed, if not made redundant by each other. While Feynman does speak on phenomena that are less controversial than those that make the subject of Lisa Randall's latest book on how the disappearance of the dinosaurs can be attributed, in part, to black holes, all popular science must, by its own pedagogical virtue, present the academic consensus in plainer (if occasionally seductive) prose. As such, the "consensual sublime", paradoxical as it may sound, is part and parcel of what popular science may entail. The "conjectural sublime" is tied to its physicist with no greater specificity. As the author reminds us time and time again, advanced physics operates with incomplete information, striving to calculate and make sense of what has not always been witnessed yet. The "conjectural" and the "speculative" sublime collide. What is more, since they invite new technology on the stage to either prove or disprove their theories, all physicists engage with the "technological sublime" and Weinberg is just as indebted to the Large Hadron Collider as Randall.

The chapters cover the main points of books that demand to be read rather than merely consulted. The overwhelming sense of scale is relayed again and again, while Gross's attempt to break their arguments into simpler units acts as a companion to the science behind the text rather than the text itself. There is a structural awkwardness to the abrupt end of the chapters, followed by conclusions which, occasionally, digress by introducing new information. The logic behind what is quoted rather than paraphrased is not always apparent. For instance, an unfavourable Amazon review of Randall is cited in full, with little comment. The analogies used by the authors are, for the most part, presented as self-evident. The strongest chapter in terms of engaging with the language of these authors awaits us in the next section, where he discusses Rachel Carson's rhetoric by contrasting it to a close reading of her role model, Henry Williamson. The more precise Gross becomes in pacing around these authors, the less exact the image of the intended target reader becomes. The book abounds in literary references to canonical figures but they do not always relate to the argument, as if pertaining to casual discussions rather than academic commentary. The author is more of a raconteur than a researcher in this chapter, which is immediately contrasted with his tendency to trace advanced theories and illustrate them with graphs or equations that a layman would find dry.

However, the book is dedicated to showing how these authors have attempted to challenge assumptions of how the answers to great questions should look like. They may be surprisingly simple or provocative. Just a hundred years ago, the universe was presumed to be infinite, eternal, and static, while now we speak of both expansion and contraction. The Milky Way is no longer presumed to be surrounded by empty space and Hawking showed that black holes are emanating heat. "Good theory" and "good evidence" are not treated as self-evident and the frequently strained dialogue between researchers is exposed to indicate how important is for a theory to be productive or even sensational rather than to demand absolute accuracy. Perfect predictions are no longer expected of physicists and indirect evidence is often all that can be expected in outer space, something laymen may not be aware of. Scientists, on the other hand, may not be aware of literary experiments relevant to making their field more comprehensible, such as Edward Abbott's *Flatland* (1884). It details the journey of Square, a two-dimensional creature, into both Lineland, where he fails to prove to the king the existence of more than one dimension. Such a story helps us contemplate Randall's proposal that there are four dimensions rather than three or even Greene's suggestion of nine dimensions curled into one another.

Even as Gross carefully untangles the web of connections between researchers, he makes sure to emphasize how solitary research is. This level of sympathy, visible especially in the chapter dedicated to Carson where he keeps a keen eye on the crucial supportive relationship she had with Dorothy Freeman, dries up unexpectedly when it comes to the gender politics at play in the chapter covering Pinker. An observation of an unnamed male colleague of Hawking, taken up in a half-celebratory tone by the author, shows how much more productive one can be when not expected to fulfil the average amount of social obligations. This would matter less had he not so urgently agreed with Pinker's dismissal of female excellence in research and performance. The surprisingly disingenuous implication is made by pointing out how badly represented women are when it comes to achieving high status in physics and chess without considering social pressure in such circles. Gross ostensibly presents us with cold hard facts when he contrasts Clara Schumann, a "good" composer, with her husband, Robert, who was "great", with not a word on how much time each could afford to devote to practice and

writing or how much was wasted shouldering invisible domestic and emotional labour. We are just as quickly reminded that Lee Krasner was outshone by her husband, Jackson Pollock, as if their artistic lives were spent in a vacuum. Such a blind spot is all the more puzzling given that just pages before he agreed with Pinker's war on the blank slate hypothesis.

While he does mention that women tend to steer clear from 80-hour work weeks, he hardly seems to entertain the possibility of quantifying the work performed behind the scenes in a family which leaves no time for such an active professional life. Instead, he immediately calls the feminist reaction "wrong-headed" and "vitriolic" but does not cite any actual feminist argument beyond their claim that Pinker was prejudiced. Despite eagerly poking holes into some of Pinker's arguments, his credibility is hurt by this chapter. Pinker's claim that in every single society men are the ones given more prominence in the public life is left unnoticed, glossing over the existence of the Palawan society in the Philippines, the Mosuo women in southwestern China or the Khasi society in northeast India. When easily verifiable false claims are perpetuated with such unflinching certitude, what happens calls into question the author's methodology. Reading back, there is a certain reluctance to pull his heroes too low.

Regardless, not every author is (re)created equally for popular memory. Feynman is penned as "a fox, not a hedgehog" (25), humanised by his passion for fixing radios and *Surely You're Joking, Mr. Feynman!* while framed as a genius when recounting a 1949 meeting of the American Physics Society, where he figures out overnight what his competitors had struggled with for years. Weinberg was too fiercely private to inspire such a striking portrait and Randall's words replace the need to sketch her life. Greene's interest in string theory and disinterest in God as an insufficiently productive hypothesis also leave little room for Greene the man. Hawking's chapter opens with a mention of his daughter's double luck of both being related to him and of having been a teenager before he became famous, a statement that does not age well mere pages later when Gross admits that Hawking did not raise his children. He is presented as larger than life, sharing oracle-like messages by virtue of the material limits to his speech imposed by his physical disability. To his credit, Gross cites Hélène Mialet. She exposes the audience's overeagerness to interpret any laconic answer as yet another proof that

brevity is the soul of wit. However, his insistence on a perceived lack of emotional colour reads too much into the technological mediation of his speech while disregarding evidence of sarcasm as seen in his 2014 interview with John Oliver on *Last Week Tonight*. Carson is admired for her writing, both to Dorothy Freeman and on the forces of nature, while also tracing her own comments to her editor at Houghton Mifflin. All things considered, it remains unclear why he decides to dub this the "ethical sublime" when his emphasis is on how she writes in her own noticeably anthropomorphic voice rather than those of the creatures whose eyes she chooses to borrow for the sake of her account or why Jay Gould would show the rather oxymoronic "balanced sublime". Presumably a play on words because of his interest in punctuated equilibrium and *The Mismeasure of Man* (1981), the image does not stick to his works in general. It is Carson who argues more convincingly on the need for balance in *Silent Spring* (1962). His opposition to biodeterminism is paired with genuine interest rather than an impulse to criticize and label, especially when he opposes outdated and politically dangerous ideas of inherited intelligence. The point seems to be that he is arguing for balance in nature but it is left unsaid how that might inspire awe if not through the vividness of a tug-of-war between natural and unnatural forces. Perhaps it is to be read as energised by the the barely concealed secularised apocalyptic vision behind the scenes. Two chapters are reserved to Gould, unlike all the others: one for his books and another for his articles, an option never explained. Moreover, the conclusion intended for the section dedicated to his books refers to his articles, as well. He is introduced as a double figure, both scientist and involved father, trying to make sense of the logic behind what his autistic son says, a friendly figure to make the sublime palatable. Pinker's portrait is nothing less than a glamour shot, anchoring him both into pop culture as a would-be rockstar lecturer and into the canon. The opening line is another example of a rather dubious correspondence: Josef Haydn is mentioned merely because both him and Pinker came to prominence at the age of 40. Trite metaphors soon crowd the page and tire the ear. Within the same paragraph, we are told that he is "a **star**, much sought-after, much honored, destined to **shine brightly** but not to **dazzle**. Accordingly, he chose another **firmament**, science popularization, anxious to become its **North Star**" (196, bold mine).

Between enthusiasm and admiration, the balance has been lost. To single him out as the polymath sublime comes across as excessive after having proven for about a couple hundreds of pages that the others, too, had far-ranging ambitions. Some have also demonstrated a higher standard in other fields, such as Greene trying his hand at science fiction for children, a doubly niche genre. Gould also dips his toes into literary language, using Cordelia's silence from *King Lear* to suggest that the absence of evidence does not always indicate an evidence of absence. This is a point soon to be discarded in the next section of the book, dedicated to the God question, a section bearing a title which breaks continuity in tone with the previous ones.

Pinker remains underwhelming and undeserving of the praise consistently lavished on him. While in most chapters religious imagery pops up unexpectedly, Pinker is outright declared an Aelfric of linguistics. He brings up the gap between pronunciation and spelling, confidently claiming that such symmetry (which exists in other languages) would do us no good, when in an earlier evolutionary stage before the great vowel shift English was more or less a phonetic language. One of the undeclared goals of the volume, discussed only in the third section, is contemplating the diffused religiousness of present day saints of the public life. Once again, the choice of references can be bizarre. Gross makes an aside about Lenin seen by a contemporary opponent as a religious figure but refuses to look at the political implications of Pinker's and Dawkin's impact on their audience. The closest he comes to acknowledging real life impact is limited to the academia or to popular culture, such as when he details Dawkins's portrayal on *The Simpsons* without mentioning that Hawking showed up both on *The Simpsons* and on *The Big Bang Theory*. When reflecting on how Dawkins's memes (in the original sociological sense) have contributed to cultural evolution, he fails to mention the popular culture of internet memes where Pinker and Dawkins are the bedfellows of rather unsavoury political leanings. Indeed, Gross demonstrates naivety when he claims that Wilson lacked any political agenda whatsoever and that to assume one is simply a "Marxist fantasy" (248). Ideology, much like the devil, is at its most insidious when it becomes invisible. That Wilson is shown to have been at the receiving end of criticism regarding nefarious uses to which his theories could be put does not invalidate the political impact of scientific consensus.

What frustrates about the volume is its inconsistency in tone and judgement. Gross exposes the limits of sociobiology, delighted to present Wilson's comments on the chemic vocabulary of ants. This was strangely unacknowledged in the previous chapter, where the performative role of gender was dismissed in favour of a quickly assembled argument in favour of gender as innate. The lines of consent are deliberately blurred but he doubles down by not looking into why Pinker quotes Camille Paglia, known defender of conservative gender roles, who makes the same tired argument about rape being similar to robbery, further contributing to the objectification of the victim by framing the sexual assault as a transaction not agreed on but actively invited. Rather curiously, in all this discussion on the "confluence of science and common sense" (210) there is no mention of the fact that most rape is not the result of fabled stranger danger but of current or former partners feeling entitled to the bodies of the victim. Such an omission is intellectually dishonest at best and morally abhorrent at worst. Pinker rushes to other "common sense" observations, such as the natural predilection for stories with a happy ending, wilfully ignoring the occasional fascination an absolute train wreck can produce, a definition of the pleasurable that leaves little space for the sublime itself. Alan Gross partially makes up for letting him get away with such rhetoric firstly by exposing the double standard at play when he disparages Judith Butler as speaking to fellow experts in too convoluted a manner. Secondly, he gives a nod to the criticism he attracts for his rather confused dismissal of modern and postmodern art, failing to notice exactly how art pushes norms to evolve, which is quite strange for someone championing evolutionary psychology. His quantitative analysis of violence suffers not only from a skewed choice of data but also from a poorly defined idea of "violence". While Gross sees it as an oversight and offers to add deaths by car crash, I would add that it is a political choice to discard what Philippe Bourgois terms structural and symbolic violence.

More readily at home when interpreting graphs and diagrams, Gross provides us with little commentary on the social and political spheres influenced by these authors and his discourse lacks a self-conscious awareness of the permeation of ideology into scientific writing. This contrasts with Stephen Jay Gould, whose polemics directly confronted and acknowledged the political relationship between science and society. If anything, other fields seem to exist in a bubble and only function by correspondence.

When speaking of the ways in which Carson's style matured, it is compared to household names of artists rather than people in the same field. There is a distinct sense that he aims at a wider scope but fails in securing this impression. The book hesitatingly straddles the line between the awe-inspiring and the awful by insufficiently sanctioning his heroes when overreaching with their claims. Ultimately, while the volume is meant to be part instructive, part entertaining, it can serve as an introduction to a wealth of challenging ideas. However, Gross himself could be more challenging by following Gould's example when he uses the Burgess fossils to show that there are dead ends in evolution, dispelling the myth of a direction to be revealed by further fossils to be discovered while challenging the idea that every trait is adaptive. If anything, Gould exposes the lack of balance in nature and the partisanship of public writing, the relentless exploration of possibilities that may or may not pay off, a lesson Gross could apply on the very texts he covers. Gould showed how nature permits the existence of complexity for complexity's sake. Good popular science as well as good commentary on scientific rhetoric should avoid it.