Putting noise in its place

Roland Wittje's informative article "Noise: From nuisance to research subject" (PHYSICS TODAY, February 2020, page 42) shows how the concept of noise in physical systems has evolved and proliferated, from its origins in 19th-century studies of acoustics, to a general notion of unwanted fluctuations across a swath of disciplines extending well beyond the borders of physics. The proverb "one person's noise may be someone else's signal" suggests a concise, general, and likewise proverbial definition: Noise is information out of place.

That formulation, of course, paraphrases a celebrated observation by William James,[1] about certain "elements of the universe" being "irrelevance and accident—so much 'dirt,' as it were, and matter out of place," which was explored in depth by Mary Douglas.[2]

References

1. W. James, *The Varieties of Religious Experience: A Study in Human Nature*, Longmans, Green (1902), p. 133.
2. M. Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*, Routledge (1966).

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In his article on the evolution and history of noise (PHYSICS TODAY, February 2020, page 42), Roland Wittje mentions in passing physicists, including Nobel laureates, involved in acoustics during World War I. What he did not mention was the essential work of James Lighthill (1924–98) during the 1950s. After Lord Rayleigh's monumental contributions in his two-volume work *The Theory of Sound*, Lighthill's development of aeroacoustics[1] is considered some of the most important work in the field; he defined the source of sound and especially illuminated the issue of noise reduction. (See Lighthill's obituary in PHYSICS TODAY, March 1999, page 104.)

Reference

1. M. J. Lighthill, *Proc. R. Soc. London A* **211**, 564 (1952); M. J. Lighthill, *Proc. R. Soc. London A* **222**, 1 (1954).

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Enchanted by a tiny swimmer

Rachel Berkowitz's Search and Discovery story "A tiny swimmer generates rapid, far-reaching signals in water" (PHYSICS TODAY, September 2019, page 22) was fascinating—that such rich physics and biology could be found in a little creature in a pond in Palo Alto, California. It started, as Berkowitz writes, with Manu Prakash noticing a funny little swimmer that could contract so quickly it seemed to disappear, and it ended with hydrodynamic modeling of trigger waves.[1]

This is the kind of investigation I think young scientists, myself included, dream about: We notice something in our environment and then seek to understand it. Our beautiful odyssey brings together ideas that range from spaghettification of black hole explorers to "the fractal nature of cellular connectivity near the critical point"[1] and demonstrates how interdisciplinary nature can be. It shows the richness of the world around us and reminds us that mysteries lie in the most unexpected places.

As I look out my window at the birds that will disappear with the advent of winter, I wonder how a Baltimore oriole can fly thousands of miles at night and find its way to the exact spot it was at a year ago. With my interest in quantum physics, I wonder, for example, if nature has developed an organism that uses quantum correlations akin to those characterizing entanglement for communication. With hundreds of millions of years of evolution, nature has many surprises. If it is possible and useful, nature has done it. It is up to us to explore.

Reference

1. A. J. T. M. Mathijssen et al., *Nature* **571**, 560 (2019).

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Careers beyond the ivory tower

Thank you for the initial PHYSICS TODAY Annual Careers Issue in October 2019. As someone who earned a PhD in oceanography more than 20 years ago but chose to pursue a career outside the traditional academic track, I've long been an advocate of educating students at all levels about the myriad career options available to them other than professorships.

The issue features a range of professional opportunities such as those Elizabeth Frank mentions in her commentary (page 10) and physicists working at Boeing. I especially enjoyed the article "The road taken" (page 32), by Anne Marie Porter and Susan White and found its figure 4, showing movement between first and current job sectors, particularly interesting.

It's worth noting, though, that of 43 job postings in that issue, 31 were for tenure-track academic positions. Only eight were for the industrial sector: seven in a single large project (the Thirty Meter Telescope) and one at the American Institute of Physics itself, which publishes PHYSICS TODAY. The others were for government or graduate-student fellowships.

In a special issue devoted to careers in the physical sciences, perhaps AIP could have solicited more nontraditional job postings. It would be a great encouragement and help to those seeking nonacademic opportunities. Other than that, this was the most practical and useful issue of PHYSICS TODAY that I've read in quite some time.

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