Obituary
David Marvin Green, 1932–2022

David Marvin Green died on July 14, 2022. He served as president of the Acoustical Society of America (ASA), was awarded the ASA Gold and Silver Medals, and was elected to the National Academy of Sciences, among other awards.

Dave first earned an undergraduate degree from the University of Chicago (Illinois; 1952) and then earned BA (1954), MA (1955), and PhD (1958) degrees in psychology from the University of Michigan (Ann Arbor).

While an undergraduate at Michigan, Dave began collaborating with Wilson Tanner and John Swets, and together they (TSG) were responsible for a true paradigm shift in the conceptualization of how sensory systems work and in the methods used to measure the capabilities of the senses. For a century, experimental psychologists had mistakenly viewed sensory systems as possessing "thresholds," categorical barriers that had to be surpassed if a stimulus or a stimulus difference was to be perceived. Also, the methods used to study sensory capacity had been flawed.

TSG argued that there are no thresholds. Rather, repeated presentations of the same weak stimulus (or small stimulus difference) give rise to perceptual experiences of varying magnitude (a stimulus distribution); an observer's task is to decide whether an individual presentation is a sample from that distribution or from the distribution of neural activity associated with no stimulus (or no stimulus difference). This conceptualization was known as signal-detection theory, and Dave became its primary promulgator; his textbook (Green and Swets, 1966) still is widely cited.

An important methodological innovation introduced by TSG was to use well-defined trials, each of which either did or did not contain the stimulus (or stimulus difference), and have the observer respond yes or no on every trial. Thus, every response can be scored as correct or incorrect. Sensory experience became objective, not just subjective.

Another methodological innovation was to plot observers' hit rates (proportion of yes responses on stimulus trials) against their false-alarm rates (proportion of yes responses on no-stimulus trials), plots called receiver-operating characteristics (ROCs). One feature of a ROC is a distinctive shape if the observer has a threshold. After decades of research on dozens of different sensory tasks, no ROC ever has exhibited a threshold like those historically assumed to exist.

A third innovation was to develop ideal observers operating on various aspects of the stimulus and to compare human performance with the ideal.

The impact of these innovations was profound and cannot be exaggerated. Numerous areas of acoustics, experimental psychology, and neuroscience adopted versions of the methods, permitting advances not previously possible. Dave and his collaborators used these methods to study various topics in hearing: masking, intensity discrimination, frequency uncertainty, and binaural processing. For details, see Yost et al. (2021).

Green (2020) believed that one "remarkable" discovery was underappreciated; the area under the ROC curve is equal to the percent correct decisions in a two-interval, forced-choice task using the same stimulus values.

Dave and his wife Marian had close personal relationships with the many students and postdoctoral fellows who studied with him; both were beloved by that group, and both regularly attended ASA meetings. Dave's first wife, Clara, died young; they had four children.

Some adjectives used by past colleagues to describe Dave are creative, insightful, tenacious, disciplined, efficient, principled, respectful, upbeat, and wry.

Selected Publications by David Marvin Green

Green, D. M. (1976). *An Introduction to Hearing*. Erlbaum, Hillsdale, NJ.

Green, D. M. (2020). A homily on signal-detection theory. *The Journal of the Acoustical Society of America*, 148, 222.

Green, D. M., and Swets, J. A. (1966). *Signal Detection Theory and Psychophysics*. John Wiley and Sons, Inc., New York, NY.

Yost, W. A., Patterson, R. D., and Feth, L. L. (2021). David M. Green and psychoacoustics. *Acoustics Today* 17(3), 51-59. https://doi.org/10.1121/AT.2021.17.3.51.

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