sion of chemistry (that of the American Institute of Chemists) reference can be made to *The Chemist* [**35**, No. 4, 125 (April 1958)].

And last, a professional person will have pride in his profession and its accomplishments and live by the code of ethics of his profession. A true professional would never attempt to step into such fields as Webb suggests for the chemist or biologist in his letter, certification or no. But if the professional has the ability to teach, he will and can do a better job teaching his field than can a person with one or (in some cases) no course in that subject. A prime requisite for teaching is a great deal more knowledge of the subject matter than will ever be needed for the class. The teaching profession needs more instruction in the subjects to be taught rather than in how to teach. Certification does not make one a professional; one's viewpoint and training do.

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Shutoff Pulse Illusion

The "shutoff pulse illusion" described by R. L. Ives in the 30 January issue of *Science* [**129**, 272 (1959)] is clearly the temporal analog of the well-known Mach spatial gradient ("Mach ring") effect [E. Mach, *Sitzber. Akad. Wiss. Wien, Math. Naturw. Kl. Abt. IIa* **52**, 303 (1865)]. Ives has drawn two-dimensional spatial patterns to illustrate diagrammatically the time-intensity course of the pulsed signals he used.

The direct comparability of Ives' temporal gradients with Mach's spatial gradients is borne out by the fact that if one actually stimulates the eye with two-dimensional spatial patterns of precisely the forms diagrammed by Ives, one perceives spatial brightness variations of the same kind as the perceived temporal variations described by Ives as the "shutoff pulse illusion." Similar stimulus patterns of many degrees of complexity were, as a matter of fact, designed and used by Mach to establish the empirical relations between perceived brightness and the derivative functions of the spatial distributions of light intensity. The spatial distributions used by Mach in his experiments are illustrated in his article and are reproduced in some of his other papers [*Sitzber. Akad. Wiss. Wien, Math. Naturw. Kl. Abt. IIa* **54**, 131 (1866); *Vierteljahr. Psych.* **2**, 38 (1868)]. In the same connection, it is also of interest to note that Ives' diagrammatic representation of his time stimuli and their associated perceptual effects are remarkably similar to Vivian O'Brien's analogous representations of spatial patterns that give rise to Mach rings. See Fig. 9 of O'Brien's paper on contour perception [*J. Opt. Soc. Am.* **48**, 112 (1958)].

Mach's analysis of perceptual effects of this type led to his brilliant deduction that the phenomena could be explained only by assuming mutual interactions among adjacent retinal positions —a concept which has in recent years received direct confirmation from electrophysiological studies of neural activity. See, for example, papers by Hartline [*Harvey Lectures* **37**, 39 (1941–42)] and Hartline, Wagner and Ratliff [*J. Gen. Physiol.* **39**, 651 (1956)]. These interaction effects actually serve to enhance brightness and color differences between adjacent stimuli, whether the proximity is spatial or temporal (as in Ives' example). Because of this differential enhancement these effects are basic to the fineness of visual discriminations, and hence, as Hering emphasized, are basic to veridical visual perception of both contours and temporal sequences in the everyday discriminations of boundary changes in the visual field.

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