Attention, Perception, & Psychophysics (2018) 80:1030–1034
https://doi.org/10.3758/s13414-018-1532-9

IN MEMORIAM

Charles "Erik" Eriksen (1923-2018)

Joseph S. Lappin[1] · Gordon D. Logan[1] · Lisa R. Fournier[2] · James E. Hoffman[3]

Published online: 4 June 2018

Abstract
A towering figure in experimental psychology, Charles W. Eriksen, passed away in February this year. "Erik" made extensive original and lasting contributions to both research methods and theories in several areas of psychology, especially involving visual information processing. His research exhibited consistent concerns with experimental methods for distinguishing among alternative explanations and distinguishing perception from behavior. Erik pioneered many research methods now in common use—including converging operations, visual search, rapid serial presentations, the stop-signal paradigm, temporal integration in form perception, spatial cues for guiding selective attention, and the flankers task. He also introduced and tested many theories of selective attention. Erik was the founding editor of *Perception & Psychophysics*, and served for 23 years as its principal editor. An impressive and unforgettable person, Erik was a compelling personification of "the greatest generation."

Keywords Charles W. Eriksen · Perception · Visual attention · Converging operations · Awareness

The scientific community has lost one of its giants. Charles "Erik" Eriksen (1923–2018) passed away on February 16 at his farm in Oakland, Illinois, in the company of his wife Barbara and daughter Kathy. He was 95. Words cannot capture the scope, quality, insight, originality, and impact of Erik's scientific research, nor reveal the outsized vitality of his character. His ideas, discoveries, and methods are alive and will continue to impact the science of visual perception and cognition for years to come. He was a unique force and an unforgettable person.

After graduating from the University of Omaha in 1943, Erik enlisted in the U.S. Army. He volunteered specifically to serve in active combat against the rising threats to democracy and America—in Tom Brokaw's (1998) words, because it was "the right thing to do." Erik declined opportunities for officer training and stateside service, choosing instead to serve in the combat infantry. He landed at Normandy a month after D-Day, fought in active combat across Europe, and received multiple medals for bravery. Like other World War II veterans, however, Erik would not talk about his military experiences or awards. He was nonetheless a compelling example of what Brokaw called "the greatest generation."

Before his discharge from the Army, he was stationed briefly at Fort Bragg, North Carolina. On a hot afternoon in the nearby town, Erik refused to obey the sign above a drinking fountain designating it "Colored Only." Ignoring the gaze of a nearby policeman, Erik could not honor racist restrictions that he had just risked his life to fight in Germany. He spent the night in jail, but was promptly released the next morning by his commanding officer. Countless such incidents are well known to Erik's friends. Throughout his life, Erik's thoughts

✉ Joseph S. Lappin
joe.lappin@vanderbilt.edu

[1] Vanderbilt University, Nashville, TN, USA
[2] Washington State University, Pullman, WA, USA
[3] University of Delaware, Newark, DE, USA

and actions were undeterred by superficial conventions, proprieties, and preconceptions. He did what he saw as the right thing to do.

Supported by the G.I. Bill, Erik enrolled in 1946 at Stanford University for graduate study in psychology. He seriously considered graduate study in physics, but the enrollment line for physics was longer. He trained as a research-oriented clinical psychologist with Maud Merrill James (1888–1978). His 1950 doctoral thesis, "Perceptual Defense as a Function of Unacceptable Needs," was published as a journal article in 1951 (*Journal of Abnormal and Social Psychology*, *46*, 557–564). Those familiar only with Erik's later work on visual attention and information processing may be surprised by the Freudian aspects of his doctoral thesis, but his focus on methodology and the clarity of his thought and writing are quickly recognizable. Nevertheless, Erik later described his first experiments on unconscious processes in perception as "extremely naïve."

Wendell Garner recruited Erik in 1950 to the Psychology Department at The Johns Hopkins University. Erik was hired partly to run the Student Psychological Clinic there, but Garner also wanted someone who could contribute to research on perception and performance. Erik credited Garner for his training as an experimental psychologist. Erik continued his work on personality and perception, but with increasing focus on methodology and on more fundamental aspects of visual perception and attention.

Two themes of his research at Hopkins were (a) experimental analyses of perception without awareness, and demonstrations of the methodological and conceptual errors in such research, and (b) experimental analyses of the roles of stimulus and response uncertainty in human perception and performance. Both lines of work have had lasting impact. Three articles with Hake in 1955 (Eriksen & Hake, 1955a,b; Hake & Eriksen, 1955) were important early applications of information theory in psychology. Another article in 1955 (Eriksen & Wechsler, 1955) used information theory to show that anxiety did not affect perceptual discriminations, but instead acted on response variability. This was a novel contribution, since the current ideas about operational definitions did not allow for a distinction between perception and behavior. Erik's (1960) *Psychological Review* article on "Discrimination and Learning Without Awareness" exposed obvious artifacts in claimed demonstrations of unconscious processes. The clarity of this critical review effectively stopped research on unconscious perception and learning for the next 20 years. When he left Hopkins in 1956 for the University of Illinois, Erik had already published 32 articles, with more in press, submitted, and in preparation.

A major landmark in the history of research on perception and cognition is his 1956 *Psychological Review* article with Garner and Hake, on "Operationism and the Concept of Perception." He and Garner both had been frustrated by reviewers' failures to comprehend methodology that distinguished between perceptual and response processes. The article's crucial contributions were to illuminate the fundamental importance of distinguishing perception from behavior and to demonstrate how perception could be identified by "converging operations"—by the invariance of perceptual discriminations under variations in the responses from which the perceptions are inferred. By destroying the sterile ideas of operational definition that prevailed then in psychology, that article led the way from behaviorism to modern research on human perception and cognition.

Most of Erik's career, from 1956 to his retirement in 1993 (when mandatory retirement at age 70 was still legal) was at the University of Illinois at Urbana-Champaign. His research was supported continuously by the National Institutes of Mental Health from 1955 onward, and he received a Research Career Award from NIMH in 1964. When he retired, Erik had the longest continuously funded research grant in the NIH and was the federal government's last remaining recipient of a Research Career Award. He contributed more than 150 scientific articles over his career. His top 50 articles have been cited more than 20,000 times in the scientific literature. Forty-five articles have more than 100 citations, making them citation classics. Erik's productivity reflected salient characteristics: his rare intelligence, and his commitment to critical thinking in science. After receiving a "golden shovel award" at his retirement celebration, Erik pointed out that "Every theory should be equipped with a shovel, so you can bury it." Much of his research aimed at doing just that. But he also revealed many new phenomena through his original methods and ideas.

Erik is probably best known for his pioneering research on selective attention. He introduced many of the currently used research methods. His many methodological innovations included visual search (C. W. Eriksen, 1952, 1953, 1955), rapid serial visual presentation (C. W. Eriksen & Collins, 1969b; C. W. Eriksen & Spencer, 1968, 1969), the stop-signal method for evaluating response times (Lappin & Eriksen, 1966), demonstrations of temporal integration in form perception (C. W. Eriksen & Collins, 1967, 1968), response time analyses of the temporal processes underlying masking (C. W. Eriksen and Eriksen, 1972), psychophysiological responses as converging measures of perception (e.g., Colegate & Hoffman, 1974; Eriksen, Coles, Morris, & O'Hara, 1985; Coles et al., 1985), and the "flankers" task (e.g., B. A. Eriksen & Eriksen, 1974; C. W. Eriksen, 1995; C. W. Eriksen & Eriksen, 1979; Eriksen, Hamlin, & Daye, 1973; C. W. Eriksen & Hoffman, 1973). The flankers task has become a standard measure of attention in basic and applied research. Much of our current knowledge of the temporal process of selective attention derives from Erik's experiments with selective spatial cues (e.g., Colegate, Hoffman, & Eriksen, 1973; C. W. Eriksen & Colegate, 1971; C. W. Eriksen & Collins, 1969a; C. W. Eriksen &

Hoffman, 1972a,b; C. W. Eriksen & Lappin, 1967a), which substantially extended initial investigations by Averbach and Corriel (1961) and Sperling (1960). Comparing Erik's studies with later, sometimes better-known, studies is instructive and often yields fresh insights.

Erik also introduced and tested many fundamental theories of attention. Some of these theories include spotlight and zoom-lens theories of attention (e.g., C. W. Eriksen & Colegate, 1971; C. W. Eriksen & Collins, 1969a; C. W. Eriksen & Hoffman, 1972a; C. W. Eriksen & Murphy, 1987; C. W. Eriksen & St. James, 1986; C. W. Eriksen & Webb, 1989; C. W. Eriksen & Yeh, 1985; Murphy & Eriksen, 1987), the continuous-flow theory of processing (e.g., C. W. Eriksen & Schultz, 1979; Coles et al., 1985), identification of automatic and focal attention systems (Eriksen, Webb, & Fournier, 1990), independent-channels models for the perception of object forms and features (e.g., C. W. Eriksen, 1966b; C. W. Eriksen & Hake, 1955b; C. W. Eriksen & Lappin, 1967b; C. W. Eriksen & Spencer, 1969; Fournier, Eriksen, & Bowd, 1998; Lappin, 1967), response competition in selective attention (B. A. Eriksen & Eriksen, 1974, C. W. Eriksen & Eriksen, 1979; Yeh & Eriksen, 1984), the "fast same effect" explained by response competition and continuous flow (C. W. Eriksen & O'Hara, 1982; C. W. Eriksen, O'Hara, & Eriksen, 1982; St. James & Eriksen, 1991), temporal integration as a determinant of forward and backward masking (e.g., C. W. Eriksen, 1966a, 1980; C. W. Eriksen, Becker, & Hoffman, 1970; C. W. Eriksen & Collins, 1965; C. W. Eriksen & Eriksen, 1971; C. W. Eriksen & Lappin, 1964; C. W. Eriksen & Steffy, 1964; Schultz & Eriksen, 1977; Schurman, Eriksen, & Rohrbaugh, 1968), and competing attention as a cause of sensory detection failures (C. W. Eriksen & Johnson, 1964).

Comprehending the scope of Erik's research is challenging indeed. The preceding selective survey of Erik's research on (only) attention should be regarded as suggestive rather than complete. Whole areas of his investigation and discovery, as well as his major contributions to clinical psychology, have scarcely been mentioned. Examining only selected parts of Erik's work, however, is inspiring, and it reveals openings rather than closures. As one of us (Gordon Logan) put it, "A strange thing happens when I read the things Erik wrote: I want to call him and talk with him about it."

Erik's commitments to science extended well beyond his own research. His contributions included large amounts of time and service as an editor and reviewer. Of particular importance were his 23 years of service as the Founding Principal Editor of the journal *Perception & Psychophysics*, from 1971–1993. Erik's reflections on his editorship of the journal are a good read—"Reflections on the Early History of *Perception & Psychophysics*," 2010, *Attention, Perception, & Psychophysics*, *72*(4), 863–866, doi:10.3758/APP.72.4.863.

Much more could, and perhaps should, be said about Erik's compelling vitality; his love of farming, horses, and cows; his quick intellect, incisive critical insights, and persuasive and memorable verbal skills; and his pranks, jokes, and limericks. Erik enjoyed life—as a scientist, a farmer, and a friend. He was an impressive and unforgettable person. As a mentor to graduate students and colleagues, Erik was an ideal role model. His commitments to science, to critical evaluations of evidence and interpretations, and to the fun of discovery were clear and consistent. He treated his students as equal partners in productive research and writing. In the words of one of us, Lisa Fournier: "As a scientist, he taught me to be critical and rigorous. He helped build my confidence and stamina as an academic. But most of all, he taught me to keep my humor, and to enjoy life both inside and outside of the lab."

Additional helpful accounts of experiences with Erik were offered some years ago: "Charles Eriksen: Past, Present, and Future," by A. Kramer, M. Coles, B. Eriksen, W. Garner, J. Hoffman, & J. Lappin, 1994, *Perception & Psychophysics*, *55*(1), 1–8. Readers may also wish to consult the volume of research on visual attention that was inspired by and devoted to Erik: *Converging Operations in the Study of Visual Selective Attention*, edited by A. F. Kramer, M. G. H. Coles, & G. D. Logan, 1996, Washington DC: American Psychological Association.

References

Averbach, E., & Coriell, A. S. (1961). Short-term memory in vision. *Bell Systems Technical Journal, 40*, 309–328.

Brokaw, T. (1998). *The greatest generation*. New York: Random House.

Colegate, R. L., Hoffman, J. E., & Eriksen, C. W. (1973). Selective encoding from multielement displays. *Perception & Psychophysics, 14*(2), 217–224.

Colegate, R. L., & Hoffman, J. E. (1974). Monitoring small eye movements with averaged EOG. *Bulletin of the Psychonomic Society, 4*, 149–151.

Coles, M. G. H., Gratton, G., Bashore, T. R., Eriksen, C. W., & Donchin, E. (1985). A psychophysiological investigation of the continuous flow of human information processing. *Journal of Experimental Psychology: Human Perception and Performance, 11*, 529–553. https://doi.org/10.1037/0096-1523.11.5.529.

Eriksen, B. A., & Eriksen, C. W. (1974). Effects of noise letters upon the identification of a target letter in a nonsearch task. *Perception & Psychophysics, 16*(1), 143–149. https://doi.org/10.3758/BF03203267.

Eriksen, C. W. (1951). Perceptual defense as a function of unacceptable needs. *Journal of Abnormal and Social Psychology, 46*, 557–564.

Eriksen, C. W. (1952). Location of objects in a visual display as a function of the number of dimensions on which the objects differ. *Journal of Experimental Psychology, 44*, 55–61.

Eriksen, C. W. (1953). Object location in a complex visual field. *Journal of Experimental Psychology, 45*, 126–132.

Eriksen, C. W. (1955). Partitioning and saturation of visual displays and efficiency of visual search. *Journal of Applied Psychology, 39*(2), 73–77.

Eriksen, C. W. (1960). Discrimination and learning without awareness: A methodological survey and evaluation. *Psychological Review, 67*, 279–300.
Eriksen, C. W. (1966a). Temporal luminance summation effects in backward and forward masking. *Perception & Psychophysics, 1*(2), 87–92.
Eriksen, C. W. (1966b). Independence of successive inputs and uncorrelated error in visual form perception. *Journal of Experimental Psychology, 72*(1), 26–35.
Eriksen, C. W. (1980). The use of a visual mask may seriously confound your experiment. *Perception & Psychophysics, 28*(1), 89–92.
Eriksen, C. W. (1995). The flankers task and response competition: A useful tool for investigating a variety of cognitive problems. *Visual Cognition, 2*(2–3), 101–118. https://doi.org/10.1080/13506289508401726.
Eriksen, C. W., Becker, B. A., & Hoffman, J. E. (1970). Safari to masking land: A hunt for the elusive U. *Perception & Psychophysics, 8*(4), 245–250.
Eriksen, C. W., & Colegate, R. L. (1971). Selective attention and serial processing in briefly presented visual displays. *Perception & Psychophysics, 10*(5), 321–326.
Eriksen, C. W., Coles, M. G. H., Morris, L. R., & O'Hara, W. P. (1985). An electromyographic examination of response competition. *Bulletin of the Psychonomic Society, 23*, 165–168.
Eriksen, C. W., & Collins, J. F. (1965). Reinterpretation of one form of backward and forward masking. *Journal of Experimental Psychology, 70*(4), 343–351.
Eriksen, C. W., & Collins, J. F. (1967). Some temporal characteristics of visual pattern perception. *Journal of Experimental Psychology, 74*(4), 476–484.
Eriksen, C. W., & Collins, J. F. (1968). Sensory traces versus the psychological moment in the temporal organization of form. *Journal of Experimental Psychology, 77*(3, Pt. 1), 376–382.
Eriksen, C. W., & Collins, J. F. (1969a). Temporal course of selective attention. *Journal of Experimental Psychology, 80*, 254–261. https://doi.org/10.1037/h0027268.
Eriksen, C. W., & Collins, J. F. (1969b). Visual perceptual rate under two conditions of search. *Journal of Experimental Psychology, 80*(3), 489–492.
Eriksen, C. W., & Eriksen, B. A. (1971). Visual perceptual processing rates and backward and forward masking. *Journal of Experimental Psychology, 89*(2), 306–313.
Eriksen, C. W., & Eriksen, B. A. (1972). Visual backward masking as measured by voice reaction time. *Perception & Psychophysics, 12*(1A), 5–8.
Eriksen, C. W., & Eriksen, B. A. (1979). Target redundancy in visual search: Do repetitions of the target within the display impair processing? *Perception & Psychophysics, 26*(3), 195–205.
Eriksen, C. W., & Hake, H. W. (1955a). Absolute judgments as a function of stimulus range and number of stimulus and response categories. *Journal of Experimental Psychology, 49*, 323–332. https://doi.org/10.1037/h0044211.
Eriksen, C. W., & Hake, H. W. (1955b). Multidimensional stimulus differences and accuracy of discrimination. *Journal of Experimental Psychology, 50*(3), 153–160.
Eriksen, C. W., Hamlin, R. M., & Daye, C. (1973). The effect of flanking letters and digits on speed of identifying a letter. *Bulletin of the Psychonomic Society, 2*(6a), 400–402.
Eriksen, C. W., & Hoffman, J. E. (1972a). Some characteristics of selective attention in visual perception determined by vocal reaction time. *Perception & Psychophysics, 11*(2), 169–171.
Eriksen, C. W., & Hoffman, J. E. (1972b). Temporal and spatial characteristics of selective encoding from visual displays. *Perception & Psychophysics, 12*(2B), 201–204.
Eriksen, C. W., & Hoffman, J. E. (1973). The extent of processing of noise elements during selective encoding from visual displays. *Perception & Psychophysics, 14*, 155–160. https://doi.org/10.3758/BF03198630.
Eriksen, C. W., & Johnson, H. J. (1964). Storage and decay characteristics of nonattended auditory stimuli. *Journal of Experimental Psychology, 68*(1), 28–36.
Eriksen, C. W. & Lappin, J. S. (1964). Luminance summation-contrast reduction as a basis for certain forward and backward masking effects. *Psychonomic Science, 1*, 313-314.
Eriksen, C. W., & Lappin, J. S. (1967a). Selective attention and very short-term recognition memory for nonsense forms. *Journal of Experimental Psychology, 73*(3), 358–364.
Eriksen, C. W., & Lappin, J. S. (1967b). Independence in the perception of simultaneously presented forms at brief durations. *Journal of Experimental Psychology, 73*(3), 468–472.
Eriksen, C. W., & Murphy, T. D. (1987). Movement of attentional focus across the visual field: A critical look at the evidence. *Perception & Psychophysics, 42*, 299–305.
Eriksen, C. W., & O'Hara, W. P. (1982). Are nominal same-different matches slower due to differences in level of processing or to response competition? *Perception & Psychophysics, 32*(4), 335–344.
Eriksen, C. W., O'Hara, W. P., & Eriksen, B. A. (1982). Response competition effects in same-different judgments. *Perception & Psychophysics, 32*(3), 261–270.
Eriksen, C. W., & Schultz, D. W. (1979). Information processing in visual search: A continuous flow conception and experimental results. *Perception & Psychophysics, 25*, 249–263. https://doi.org/10.3758/BF03198804.
Eriksen, C. W., & Spencer, T. W. (1968). Visual search under conditions of very rapid sequential input rates. *Perception & Psychophysics, 4*(4), 197–202.
Eriksen, C. W., & Spencer, T. W. (1969). Rate of information processing in visual perception: Some results and methodological considerations. *Journal of Experimental Psychology, Monograph, 79*(2, Pt. 2), 1–16. https://doi.org/10.1037/h0026873.
Eriksen, C. W., & St. James, J. D. (1986). Visual attention within and around the field of focal attention: A zoom lens model. *Perception & Psychophysics, 40*, 225–240. https://doi.org/10.3758/BF03211502.
Eriksen, C. W., & Steffy, R. A. (1964). Short-term memory and retroactive interference in visual perception. *Journal of Experimental Psychology, 68*(5), 423–434.
Eriksen, C. W., & Webb, J. M. (1989). Shifting of attentional focus within and about a visual display. *Perception & Psychophysics, 45*(2), 175–183.
Eriksen, C. W., Webb, J. M., & Fournier, L. R. (1990). How much processing do nonattended stimuli receive? Apparently very little, but …. *Perception & Psychophysics, 47*(5), 477–488.
Eriksen, C. W., & Wechsler, H. (1955). Some effects of experimentally induced anxiety upon discrimination behavior. *Journal of Abnormal and Social Psychology, 51*, 458–463.
Eriksen, C. W., & Yeh, Y.-Y. (1985). Allocation of attention in the visual field. *Journal of Experimental Psychology, 11*(5), 583–597.
Fournier, L. R., Eriksen, C. W., & Bowd, C. (1998). Multiple-feature discrimination faster than single-feature discrimination within the same object? *Perception & Psychophysics, 60*(8), 1384–1405.
Garner, W. R., Hake, H. W., & Eriksen, C. W. (1956). Operationism and the concept of perception. *Psychological Review, 63*(3), 149–159.
Hake, H. W., & Eriksen, C. W. (1955). Effect of number of permissible response categories on learning of a constant number of visual stimuli. *Journal of Experimental Psychology, 50*(3), 161–167.
Lappin, J. S. (1967). Attention in the identification of stimuli in complex visual displays. *Journal of Experimental Psychology, 75*(3), 321–328.
Lappin, J. S., & Eriksen, C. W. (1966). Use of a delayed signal to stop a visual reaction-time response. *Journal of Experimental Psychology, 72*(6), 805–811.
Murphy, T. D., & Eriksen, C. W. (1987). Temporal changes in the distribution of attention in the visual field in response to precues. *Perception & Psychophysics, 42*, 576–586.

Schultz, D. W., & Eriksen, C. W. (1977). Do noise masks terminate processing? *Memory and Cognition, 5*(1), 90–96.

Schurman, D. L., Eriksen, C. W., & Rohrbaugh, J. (1968). Masking phenomena and time intensity reciprocity for form. *Journal of Experimental Psychology, 78*(2, Pt.1), 310–317.

Sperling, G. (1960). The information available in brief visual presentation. *Psychological Monographs: General and Applied, 74*(11, Whole 498), 1–29.

St. James, J. D., & Eriksen, C. W. (1991). Response competition produces a "fast same effect" in same-different judgments. In G. R. Lockhead & J. H. Pomerantz (Eds.), *The perception of structure* (pp. 157–168). Washington, DC: American Psychological Association.

Yeh, Y.-Y., & Eriksen, C. W. (1984). Name codes and features in the discrimination of letter forms. *Perception & Psychophysics, 36*(3), 225–233.