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This Week's Citation Classic

Breitmeyer B G & Ganz L. Implications of sustained and transient channels for theories of visual pattern masking, saccadic suppression, and information processing. *Psychol. Rev.* **83**:1-36, 1976.
[Univ. Houston, TX and Stanford Univ., CA]

Response interactions within and between long-latency sustained and short-latency transient visual pathways provide a basis for theoretically integrating a host of neural and perceptual studies relevant to our understanding of forward or backward visual masking, visual response (iconic) persistence, motion and pattern perception, saccadic suppression, and the spatial guidance of visual selective attention. [The *Science Citation Index*® (*SCI*®) and the *Social Sciences Citation Index*® (*SSCI*®) indicate that this paper has been cited in over 190 publications since 1976.]

Bruno G. Breitmeyer
Department of Psychology
University of Houston
Houston, TX 77004

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"In 1971, two Stanford University graduate colleagues, Bruce Bridgeman and Sybille Sukale-Wolf, had separately completed dissertations on metacontrast which became part of the grist for a seminar on visual masking offered that year by Leo Ganz. Participation in this seminar was complemented by my concurrent dissertation work on motion perception.

"In this context, stroboscopic motion and metacontrast masking assumed prime importance. Literature reviews revealed that both phenomena can be generated when two stimuli are flashed in spatiotemporal proximity. In his classical study on stroboscopic motion, Wertheimer[1] noted the occasional loss of visibility of either stimulus at onset intervals yielding optimal stroboscopic motion, indicating that metacontrast masking might accompany stroboscopic motion and produce this loss of visibility.

"Subsequent work, in part conducted in my laboratory,[2,3] confirmed and quantified this limited yet clear relation between metacontrast and stroboscopic motion. This relation revealed a puzzle which, in my opinion, was not adequately explained by the then extant theories of visual masking. For perception of stroboscopic motion to occur, activity generated by the first stimulus somehow must span a temporal interval and *integrate* with the activity generated by the second stimulus. However, during metacontrast suppression, the pattern component of the first stimulus does not persist and integrate with that of the second; on the contrary, the first pattern seems to be actively suppressed by, i.e., temporally *segregated* from, the second stimulus.

"This existence of separate motion-integrative and pattern-segregative components in stroboscopic motion and metacontrast led me, in line with Saucer's[4] suggestion, to conjecture the existence of at least two types of visual channels: one responsive to rapid motion; the other, to a static or slowly moving pattern. This distinction seemed also to fit with accumulating studies of the spatiotemporal response properties of fast-conducting transient and slow-conducting sustained visual pathways. This evidence, in conjunction with Singer and Bedworth's[5] finding of their mutual inhibitory interactions, provided the basic elements for a theoretical approach to a wide variety of visual phenomena.

"Initially, the approach was to apply to an account of metacontrast, paracontrast, and other types of backward and forward masking. Spurred by helpful discussions with Naomi Weisstein and Ethel Matin, I sought the collaboration of Ganz in extending the approach to other visual phenomena. During the summer of 1975, we completed a manuscript describing the basically simple assumptive context of our theoretical approach and the broad range of phenomena to which it can apply, including a more recent extension to explanations of visual behavior in extralaboratory, natural settings.[6] In my opinion, besides extensively integrating neurophysiological and neuroanatomical results and concepts with perceptual ones, it is this combination of simplicity and especially the broad range of explanatory applicability appealing to a correspondingly wide range of vision research interests which is responsible for the article's numerous citations."

1. **Wertheimer M.** Experimentelle Studien über das Sehen von Bewegung. *Z. Psychol.* **61**:161-265, 1912.
2. **Breitmeyer B, Love R & Wepman B.** Contour masking during stroboscopic motion and metacontrast. *Vision Res.* **14**:1451-6, 1974.
3. **Breitmeyer B, Battaglia F & Weber C.** U-shaped backward contour masking during stroboscopic motion. *J. Exp. Psychol.—Hum. Percep. Perf.* **2**:167-73, 1976.
4. **Saucer R T.** Processes of motion perception. *Science* **120**:806-7, 1954.
5. **Singer W & Bedworth N.** Inhibitory interaction between X and Y units in cat lateral geniculate nucleus. *Brain Res.* **49**:291-307, 1973.
6. **Breitmeyer B G.** Unmasking visual masking: a look at the "why" behind the veil of the "how." *Psychol. Rev.* **87**:52-69, 1980.