ATTENTION AND PERCEPTION, MEMORY,
AND JUDGMENT OF LINE LENGTH

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Summary.— The literature reports that focused attention alters perceived length of lines. Some tests of this attentional effect require that subjects compare line lengths. This note shows that conceptual confusions inherent in this comparison make the tests invalid.

Tsal, Shalev, & Zakay (2005) have found that focused attention decreases the perceived length of lines. On the other hand, many investigators have found that perceived line length remains constant (Klein, Wylie, & Briand, 1996; Masin, 1998) or increases with attention (Fraisse, Ehrlich, & Vurpillot, 1956; Piaget, Vinh-Bang, & Matalon, 1958; Coren & Girgus, 1972; Jordan & English, 1989; Reuter-Lorenz, Kinsbourne, & Moscovitch, 1990; Masin & Agostini, 1991; Prinzmetal & Wilson, 1997; Masin, 2003; Fukusima, Dias, & Cava, 2004; Dias & Fukusima, 2004, 2005).

Tsal, et al. (2005) presented a standard line while subjects’ attention was either focused on or diverted from this line. An array of simultaneous variable lines appeared after a short delay from the offset of the standard line. On each trial, subjects selected the variable line that matched the standard line. The mean length of the selected variable lines is the point of subjective equality (PSE). Tsal, et al. (2005) found that the PSE was less than the length of the standard line when attention was focused on the standard line. They inferred that focused attention decreased perceived line length.

However, to select a variable line as a match to the standard line, subjects had to compare explicitly or implicitly the standard line with at least some of the variable lines that were not selected as a match. These comparative judgments involve possible non-perceptual effects of attention that could explain Tsal, et al.’s (2005) finding.

Comparative judgments confuse the effect of attention on perceived length with the effect of attention on remembered length. Memory could affect comparative judgments of successive stimuli (Köhler, 1923; Guilford, 1954; Pratt, 1933; Hebb & Foord, 1945). Since the array of variable lines appeared after a delay from the offset of the standard line, this array appeared after the initiation of the memorization of the standard line. It is unknown whether subjects compared the length of the variable lines with the perceived length, the remembered length, or both of these lengths of the standard line.

Comparative judgments confuse the effect of attention on perceived length with the effect of attention on comparative responses. Masin & Agostini (1991) had subjects compare the lengths of two simultaneous lines presented for about 0.1 sec, one on the left and one on the right or one above and one below of a fixation point. One line was the standard and the other the variable. On each trial, subjects rated numerically the length either of the standard line or of the variable line before they compared the lengths of these lines. Since each rating occurred before the comparative response, subjects directed their attention first to the line that was rated with the consequence that this line received more attention than the non-rated line in the short time when these two lines were visible. Thus the attention directed to the stan-
standard line was either focused or reduced. In Fig. 1 the ordinates show the PSE. Different lengths were used for the standard line. The abscissas of the diagrams marked “left,” “right,” “above,” and “below” show these lengths when the standard line was on the left, on the right, above, or below of the fixation point, respectively. The solid and open dots indicate the PSE when the attention directed to the standard line was focused or reduced, respectively. Solid dots show that focused attention caused the judged length of the standard line to increase when this line was relatively long and to decrease when this line was relatively short. In each diagram in Fig. 1 the alleged effect of attention on perceived length predicts that graphs do not intersect—each perceived length of the standard line is either shortened or lengthened by attention. Since graphs do intersect, the effect of attention on the PSE was a non-perceptual effect. It may all depend on how one chooses the lengths for the variable lines. For example, consider the left diagram in Fig. 1. If the length of all variable lines is shorter than 86 mm then each PSE could be interpreted as showing a decrease in perceived length due to focused attention. If the length of all variable lines is longer than 86 mm then each PSE could be interpreted as showing an increase in perceived length due to focused attention. These interpretations would ignore that attention could have influenced only the comparative responses.

Comparative judgments confuse the influence of attention on perceived length with the influence of attention on contextual effects. In Tsai, et al.’s (2005) study each line in the array of variable lines was a context line for each of the other lines in the array. The following results show that context lines have a non-perceptual effect on comparative judgment. On each trial, Masin (1995) had subjects compare the lengths of two successive lines with the first line being the standard and the second the variable. A context line was presented on one side of these lines. The context line, called “short” or “long,” was identical to the shortest or longest standard line, respectively. The duration of all lines was 0.05 sec. The context line appeared after 0.2 to 3 sec and the variable line after 3 sec from the offset of the standard line. Subjects had to ignore the context line. Fig. 2 shows the PSE as a function of the delay of the context line. Solid and open dots indicate the PSE for the “long” and “short” context lines, respectively. For delays less than 3 sec the results confirm that interpolated stimuli influence comparative judgments (Guilford & Park, 1931; McKenna, 1984). For these delays, the context line affected comparative judgments non-perceptually since it ended before the onset of the variable line. In Fig. 2 the distance between the two graphs is roughly the same for delays from 0.5 to 2.8 sec and increases only slightly at 3 sec. Thus the non-perceptual effect of the context line occurred also when the context line and the variable line were simultaneous. In Tsai, et al.’s (2005) study it was unknown whether attention influenced the perceived length of the standard line or the mean effect exerted by context lines on comparative judgment.

REFERENCES


FIG. 1. Mean length (PSE) of a variable line, exposed briefly on one side of the fixation point, that was judged to match the length of a simultaneous standard line exposed briefly on the opposite side of the fixation point. The attention of subjects was focused either on the standard (filled dots) or on the variable line (open dots). The PSE is represented as a function of the length of the standard line when this line was on the left, on the right, above, or below of the fixation point. Modified after data from Masin & Agostini (1991).

FIG. 2. Mean length (PSE) of a variable line presented in the same location of the standard line after 3 sec from the offset of the standard line. On one side of these lines, a relatively long (filled dots) or relatively short (open dots) context line was presented. The PSE is shown as a function of the delay of the context line from the standard line. Modified after data from Masin (1995).