

David Brewster's observations on perception when touch and vision conflict:

An historical note

WILLIAM EPSTEIN

University of Wisconsin, Madison, Wisconsin 53706

The thesis that touch educates vision had prominent advocates in the classical literature on perception. Despite this eminence, the thesis has not been supported by contemporary investigations. Recent studies that have pitted touch against vision in a conflict situation have reported that vision wins out (e.g., Rock & Victor, 1964; Rock & Harris, 1967). And studies of infant perception have appeared, showing the developmental precedence of visual integration (e.g., Bower et al, 1970).

In view of these contemporary developments, it is interesting to note a much earlier demonstration of the dominance of vision reported in an intriguing volume titled *Letters on Natural Magic*, published by Sir David

Brewster in 1839. The aim of the volume, which was dedicated to Sir Walter Scott, was "to draw up a popular account of those prodigies of the material world which have received the appellation of Natural Magic [Brewster, 1839, p. 13]." These "prodigies" were events or phenomena that seem amazing and inexplicable but, in fact, can be attributed to the operation of natural principles, i.e., principles of science. Among the most impressive and mystifying of these phenomena are those involving optical stimulation and the visual system. Accordingly, much of the volume is devoted to an analysis of visual phenomena, ranging from the illusory effects of mirrors to reports of spectral apparitions.

The experiment that concerns us is recorded in a section dealing with the "conversion of cameos into intaglios, or elevations into depressions, and the reverse."

"The best method of observing this deception is to view the engraved seal of a watch with the eyepiece of an achromatic telescope, or with a compound microscope, or any combination of lenses, which inverts the objects that are viewed through it. The depression in the seal will immediately appear an elevation, like the wax impression which is taken from it; and though we know it to be hollow, and feel its concavity with the point of our finger, the illusion is so strong that it continues to appear a protuberance. The cause of this will be understood from Fig. 14, where S is the window of the apartment, or the light which illuminates the hollow seal LR, whose shaded side is of course on the same side L with the light. If we now invert the seal with one or more lenses so that it may look in the opposite direction, it will appear to the eye as in Fig. 15 with the shaded side L farthest from the window. But as we know that the window is still on our left-hand, and that the light falls in the direction RL, and as every body with its shaded side farthest from the light must necessarily be convex or protuberant, we immediately believe that the hollow seal is now a cameo or bas-relief. The proof which the eye thus receives of the seal being raised overcomes the evidence of its being hollow derived from our actual knowledge, and from the sense of touch [Brewster, 1839, pp. 98-99, italics not in original]."

Thus Brewster's informal study foreshadowed the contemporary findings concerning the dominance of vision over touch.

REFERENCES

- BOWER, T. G. R., BROUGHTON, J. J., & MOORE, M. K. The coordination of visual and tactual inputs in infants. *Perception & Psychophysics*, 1970, 8, 51-53.
- BREWSTER, D. *Letters on natural magic*. New York: Harper, 1839.
- ROCK, I., & HARRIS, C. S. Vision and touch. *Scientific American*, 1967, 216, 96-104.
- ROCK, I., & VICTOR, J. Vision and touch: An experimentally created conflict between the two senses. *Science*, 1964, 143, 594-596.

Fig. 1. Figures 14 and 15 from Brewster's *Natural Magic*. See text for explanation.

(Accepted for publication February 7, 1971.)

