

Word and Color Asymmetries: A Tachistoscopic Study

An Honors Thesis (ID 499)

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Muncie, Indiana

May, 1984

Spring, 1985



might insure that both hemispheres of the brain would be primed or actively participating. Simultaneous presentation may reduce the attentional bias of the hemispheres. This experiment was an examination of the asymmetry of the brain function as it pertains to verbal and nonverbal stimuli presented simultaneously to the subject.

II. Subjects: Nineteen right-handed subjects were used altogether and each was given ninety-six trials excluding the practice trials. Nine male and ten female subjects participated. All subjects read and signed a statement of informed consent before participating in the experiment. It might be noted here that the number of available subjects was limited.

III. Stimulus and Apparatus: The verbal stimulus consisted of four letter words, twelve words of high imagery, that is concrete nouns, and twelve words of low imagery, or abstract nouns. The nonverbal stimulus was a rectangular field of color somewhat larger than the word that was placed in that field.

The colors used were from a collection of standard hues available in five tints or saturations of each hue. The colors, marketed under the name Color-aid, were chosen because of the degree of difficulty in distinguishing one saturation of a hue from another of the same hue. It was not remarkably easy or difficult to make the correct choice between saturations. This quality made the product suitable for use in the experiment.

In the experiment, each different word appeared once on

one side of the point of fixation and again on the opposite side. Each different word appeared on the same hue and saturation of that hue on both the left and the right in the unilateral condition. Each of twenty-four hues was used only once with a different word. The same applied for the bilateral condition, only different word-color pairs were chosen.

The apparatus was a tachistoscope, a device which allows material or information to be presented to a subject for any specified length of time. The device allowed for presentation times that could be measured in milliseconds.

IV. Procedure: Each subject was told that he would see a series of white cards through the viewer of the tachistoscope. In the center of each card, at the point of fixation, would be an arrow pointing either to the left or to the right. In the unilateral condition only one word in a field of color would be on the side of the card to which the arrow pointed. In the bilateral condition there would be a word in a field of color on each side of the arrow, but only the word to which the arrow pointed was to be reported, and only that color behind the word was to be compared to the colors on the answer sheet.

Each subject was given fifteen practice trials before the first forty-eight actual trials, and five practice trials before the second forty-eight actual trials. The first and second sets of actual trials alternated between the bilateral and unilateral condition to demonstrate that there was no advantage to receiving the unilateral set first or the bilateral set first. Practice trials served to acquaint the subjects with

the task at hand and to allow the experimenter to adjust the presentation time for each individual subject. Presentation times averaged eighty-five milliseconds for each card.

Responses from the subjects were to be as follows. The word that the arrow pointed to was to be said aloud by the subject, and the color was to be chosen from among the saturations of the hue arranged vertically from lightest to darkest and numbered one to five accordingly on the answer sheet. The number of the color was said aloud by the subject and was recorded by the experimenter. The words were marked correct or incorrect as they were reported for each trial.

#### V. Results:

TABLE I

	LEFT	RIGHT
Unilateral total # correct	67/152	85/152
Percent correct	(.44)	(.56)
Mean # correct per subject	3.5/24	4.5/24
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Bilateral total # correct	70/175	105/175
Percent correct	(.40)	(.60)
Mean # correct per subject	3.7/24	5.5/24

TABLE II

	LEFT	RIGHT
Unilateral total # correct	148/279	131/279
percent correct	(.53)	(.47)
Mean # correct per subject	7.8/24	6.9/24
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Bilateral total # correct	147/278	131/278
percent correct	(.53)	(.47)
Mean # correct per subject	7.7/24	6.9/24

The verbal portion of the experiment showed a right visual field advantage, but it was found not to be statistically significant . It was, however, in the direction predicted. The lack of a greater right field advantage may be due to one subject who scored twelve and eleven correct in the left-visual field and one and zero correct in the right visual field. This is very atypical, and with only nineteen subjects, this highly unusual event affected the significance of the results.

In the nonverbal portion of the experiment, a distinct left visual field superiority was found. This is also as predicted. Color data was analyzed for degree of error. If a subject chose the correct saturation of the hue, then he was

given a score of zero. If he missed the correct answer by four saturations, then he was given a score of four. The higher the score, the greater the error. It was found that there was a greater error in the right visual field. It could also be seen by recording the subject's responses that they were not haphazardly guessing among the five saturations of each hue.

Data was also analyzed with respect to concrete nouns and abstract nouns. It was found that words of high imagery, concrete nouns, were reported correctly much more often than words with low imagery or abstract nouns.

VI. The Conclusion: The prediction that the left hemisphere would show superiority for the verbal task was supported, as well as the prediction that the right hemisphere would show superiority for color saturation discrimination.

It is difficult to explain the lack of a greater right visual field advantage for the verbal portion of this experiment. It could be speculated that because the word was inserted into a field of color, that it was no longer a simple verbal task, but some other kind of task (Hines, 1984). The lack of a greater right visual field superiority could also be a statistical phenomenon attributable to the one unconventional subject.

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