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Notes:

A gender- and sexual orientation-dependent spatial attentional effect of invisible images

Yi Jiang*, Patricia Costello†, Fang Fang*, Miner Huang‡, and Sheng He*§

*Department of Psychology, University of Minnesota, 75 East River Parkway, Minneapolis, MN 55455; †Department of Psychology, Gustavus Adolphus College, 800 West College Avenue, St. Peter, MN 56082; and ‡Department of Psychology, Sun Yat-Sen University, West Xingang Road, Guangzhou 510275, People's Republic of China

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Human observers are constantly bombarded with a vast amount of information. Selective attention helps us to quickly process what is important while ignoring the irrelevant. In this study, we demonstrate that information that has not entered observers' consciousness, such as interocularly suppressed (invisible) erotic pictures, can direct the distribution of spatial attention. Furthermore, invisible erotic information can either attract or repel observers' spatial attention depending on their gender and sexual orientation. While unaware of the suppressed pictures, heterosexual males' attention was attracted to invisible female nudes, heterosexual females' attention was attracted to invisible male nudes, gay males behaved similarly to heterosexual females, and gay/bisexual females performed in-between heterosexual males and females.

awareness | interocular suppression | attention

S

Methods

Methods

Results

Experiment 1: Invisible Erotic Images Influence Spatial Attention.

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$t =$ $P <$

Author contributions: Y.J., F.F., M.H., and S.H. designed research; Y.J. and P.C. performed research; Y.J. and S.H. analyzed data; and Y.J., P.C., and S.H. wrote the paper.

The authors declare no conflict of interest.

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Abbreviation: 2AFC, two-alternative forced choice.

§To whom correspondence should be addressed. E-mail: sheng@umn.edu.

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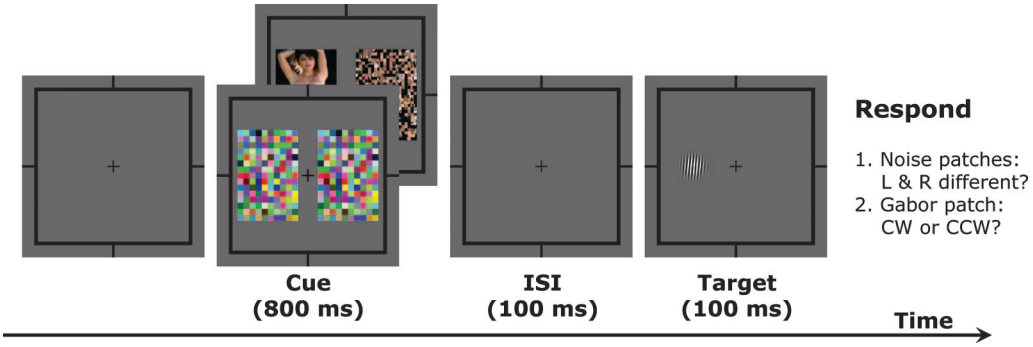

Fig. 1. Schematic representation of the experimental paradigm for the invisible condition. For the visible condition, the noise patches were replaced with the same pair of intact and scrambled pictures presented to the other eye. In each trial, observers pressed one of two buttons to indicate the perceived orientation (CW or CCW) of a Gabor patch briefly presented on either side of fixation. In the invisible condition, as shown, if observers detected any difference between the two sides of the fixation, they pressed another button to abort that trial.

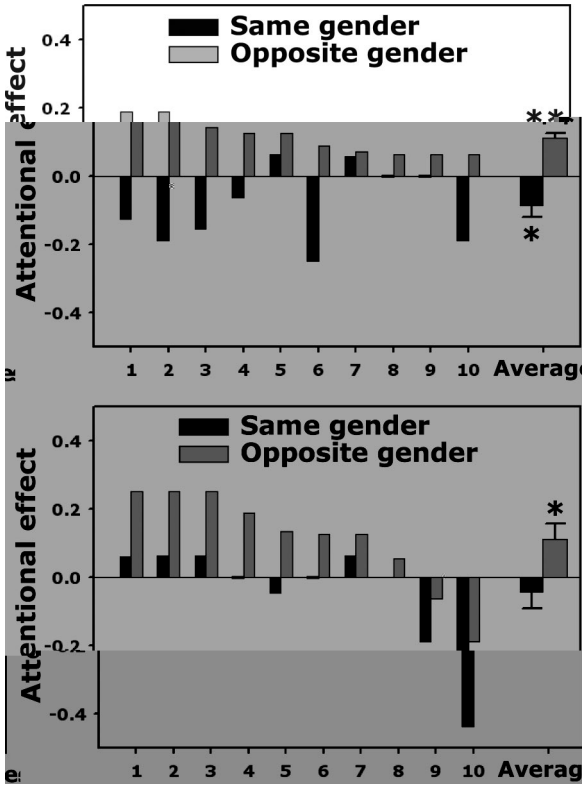

Fig. 2. Attentional benefits and costs of the invisible erotic images for heterosexual male (*Upper*) and heterosexual female (*Lower*) observers. Each plot shows "attentional effects" (defined as the difference in performance accuracy in the orientation discrimination task of the Gabor patches) of the invisible erotic images from 10 individual observers in that group as well as the averaged attentional effect (black bars, observer and images were of the same gender; gray bars, observer and images were of the opposite gender). A positive attentional effect implies that attention was attracted to that image side, whereas a negative attentional effect implies that attention was repelled from that image side. *, $P < 0.05$; **, $P < 0.0001$.

Experiment 2: Gender-Specific Attentional Effect Modified by Sexual Orientation.

Right

Center

PSYCHOLOGY

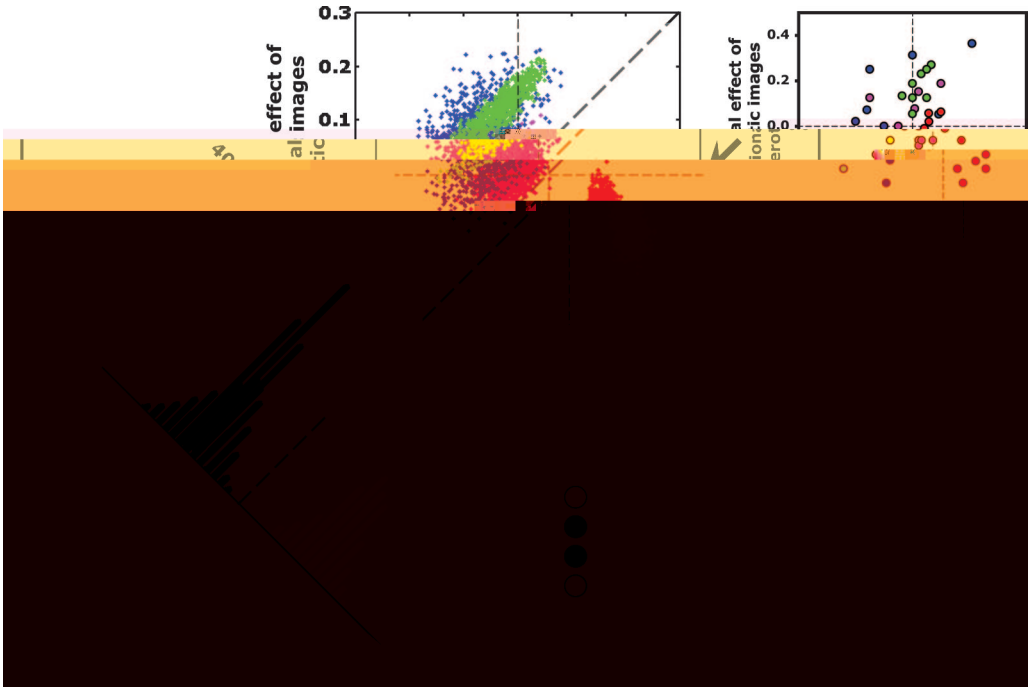

Fig. 3. Attentional effects (indexed by the difference in performance accuracy of the Gabor patch orientation task) of the invisible erotic images for different participating groups. Different colors indicate heterosexual male (red), heterosexual female (green), gay male (blue), and gay/bisexual female (magenta) observers. Each participant contributed one point in *Right*. Bivariate distributions of 1,000 bootstrapped sample means for each group are plotted in *Center*. Horizontal and vertical axes represent the attentional effect of the invisible female and male erotic images, respectively. The bootstrapped sample means were projected onto the diagonal axis for each group (*Left*). The resulting univariate distributions show a count of points. On this new axis, negative values (left side) indicate that male erotic images attracted more attention, and positive values (right side) indicate that female erotic images attracted more attention.

Left

Upper

Lower

Discussion

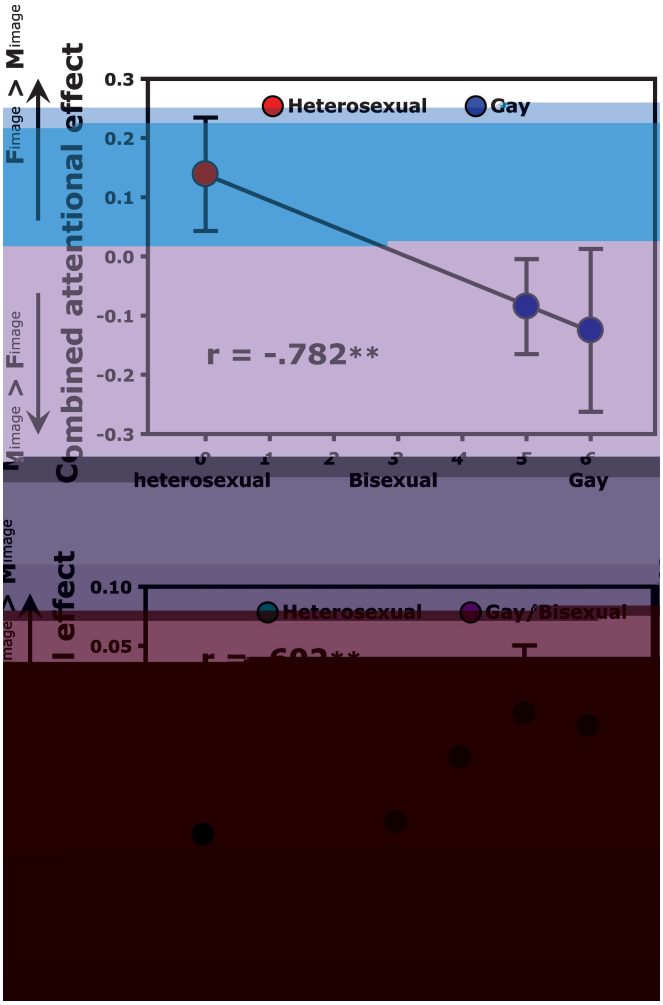

Fig. 4. Correlations between attentional effects of the invisible erotic images and the Kinsey scores (sexual orientations) reported by the observers. For male observers (*Upper*), low (0, heterosexual) and high (5 or 6, gay) Kinsey scores are associated with attraction to invisible female and male erotic images, respectively. For female observers (*Lower*), increased Kinsey scores (going from heterosexual to bisexual to exclusively gay) are associated with decreased attraction to invisible male erotic images. **, $P < 0.005$.

Methods

Participants.

Stimuli and Procedure.

Objective Measures of the Suppression Effectiveness.

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Attention and performance
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