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One's own name distorts visual space

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Abstract

Here, we demonstrated that one's own name attracts the subjective location of a visual target. We simultaneously presented observers their own name and others' name in the left and right visual fields. A target circle was presented for 53 ms around the center of the display 200 ms after the names disappeared. Ten observers were required to manually reproduce the target location by pointing with the mouse. The results indicated that the observers significantly mislocalized the target 1.61' on average toward the location of their own name. These observations indicated that the visual space is distorted by one's own name, which biases the spatial distribution of visual attention.

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1. Introduction

Self-related information has a special status in our everyday life. For example, we often visually notice our own name among others' names without effort. This is partly because one's own name automatically attracts one's attention [1], [2], [8], [9], [10] and [12].

Moreover, a self-related item causes memory recognition enhancement of a nearby neutral item that is presented simultaneously with the self-related item [e.g. 13]. The evidence indicates that a self-related item can be bound up with a spatially nearby neutral item. That is, a self-related item is presumably grouped in memory together with a spatially nearby neutral item. This suggests that a neutral item is localized with a bias toward a self-related item because the spatial distances between elements within a single group are judged to be shorter than those between elements each belonging to different groups [6]. However, there have been no previous studies regarding whether or how a self-related item impacts the localization of a nearby neutral item.

The present study was performed to examine whether one's own name, as a representative of self-related information, alters the subjective location of a target that is presented close by. Previous studies on spatial localization have shown that a spatial landmark object attracts the subjective location of a target [4], [11], [14] and [15]. However, previous studies used neutral landmark objects, such as a visual flash. Therefore, the present study was performed to examine how one's own name, as a landmark with a high degree of self-relatedness, affected the localization of a nearby item.

2. Method

Fifteen naive observers (eleven females, four males; M_{age} = 23.33 years, SD = 1.99) each with normal or corrected-to-normal visual acuity participated in the experiment, which was conducted in a dark room.

The fixation cross was always presented at the center of the display with a bright background (luminance: 99.7 cd/m^2). We used five Japanese names (the observer's own name and four others' names: 松尾, 田沢, 富樫, and 赤石), which were written vertically and subtended about 6.00° in height. The center of the names was 7.48° above and offset 6.80° leftward or rightward from the fixation cross. The target circle with a radius of 0.17° was presented within a horizontal range of 3.40° centered at the location 7.48° above the fixation cross. A probe with the same stimulus parameters as the target was presented at a random location within 3.40° from the target location, and hence the averaged target-probe distance was not different between the name conditions described below. The stimuli were presented on a 19-inch CRT monitor with a resolution of 1024 × 768 pixels and refresh rate of 75 Hz. A PC/AT-compatible computer controlled the presentation of stimuli and collection of data. The observer's visual field was fixed using a chin-head rest placed at a viewing distance of 60 cm. Stimuli and the experiment were programmed in Delphi 6.

As shown in Fig. 1a, pressing the space key started the trial. Name stimuli were simultaneously presented for 500 ms on both sides of the peripheral visual field 500 ms after the key press. With a 200 ms blank display, a target was presented for 53 ms. A probe was presented 500 ms after disappearance of the target until a response was made. The observers were instructed to ignore the peripheral names, remember the target location, and manually reproduce the target location by moving the probe on the computer with a mouse. In the own name condition, the observer's own name and one of the other names were presented. The location of the observer's own name was counterbalanced between the left and right visual fields. In addition to the observer's own name condition

described above, tests were also performed under a control condition where two of the four others' names were presented on both sides of the visual field. Each observer performed 200 trials: two name locations (right and left), ten name pairs (*i.e.,* the combination of five names taken two names at a time), and 10 repetitions in randomized order; 40 trials were performed for the observer's own name condition and 160 trials for the control condition.

3. Results

Fig. 1b shows the results of this experiment. We analyzed the x-coordinates of the reproduced positions to examine how the localization of the target was affected by the left-right name locations. For each observer, target mislocalization toward the observer's own name was calculated by subtracting the average reproduced position in the control condition from that in the observer's own name condition with sign inversion of the subtracted value when the observer's own name was presented in the left visual field. Here, positive mislocalization values represent target mislocalization toward the location of the observer's own name. The results showed that the observers mislocalized the target by 1.61′ on average toward the location of their own name. One-sample *t* test revealed a significant target mislocalization toward the location of the observer's own name with a large effect size ($t_{14} = 2.46$, $p < 0.03$, Cohen's $d = 0.90$). There was no significant correlation between the degree of mislocalization and observers' age ($r = .26$, $p > .35$). Welch's *t*-test revealed that the degree of mislocalization of female observers (2.18′) was significantly larger than that of male observers (0.06′) ($t_{13} = 2.24$, $p < .05$, Cohen's $d = 1.73$).

4. Discussion

The results of the present study indicated that an observer's own name significantly attracted the subjective location of the target. Yamada et al. [14,15] suggested that the neural signals of the target and the spatial distribution of observer's attention are integrated in the brain, and this causes mislocalization of the target [14,15]. In a similar way, it is possible that one's own name automatically attracts the observer's attention and consequently biases attentional distribution. The biased distribution of attention may be integrated with the neural signals of the target, inducing target mislocalization toward the observer's own name. As to the individual difference, why female observers showed larger mislocalization than male observers is a future issue to be addressed. Further studies are required to determine whether a similar type of distortion in spatiotemporal representation is triggered by

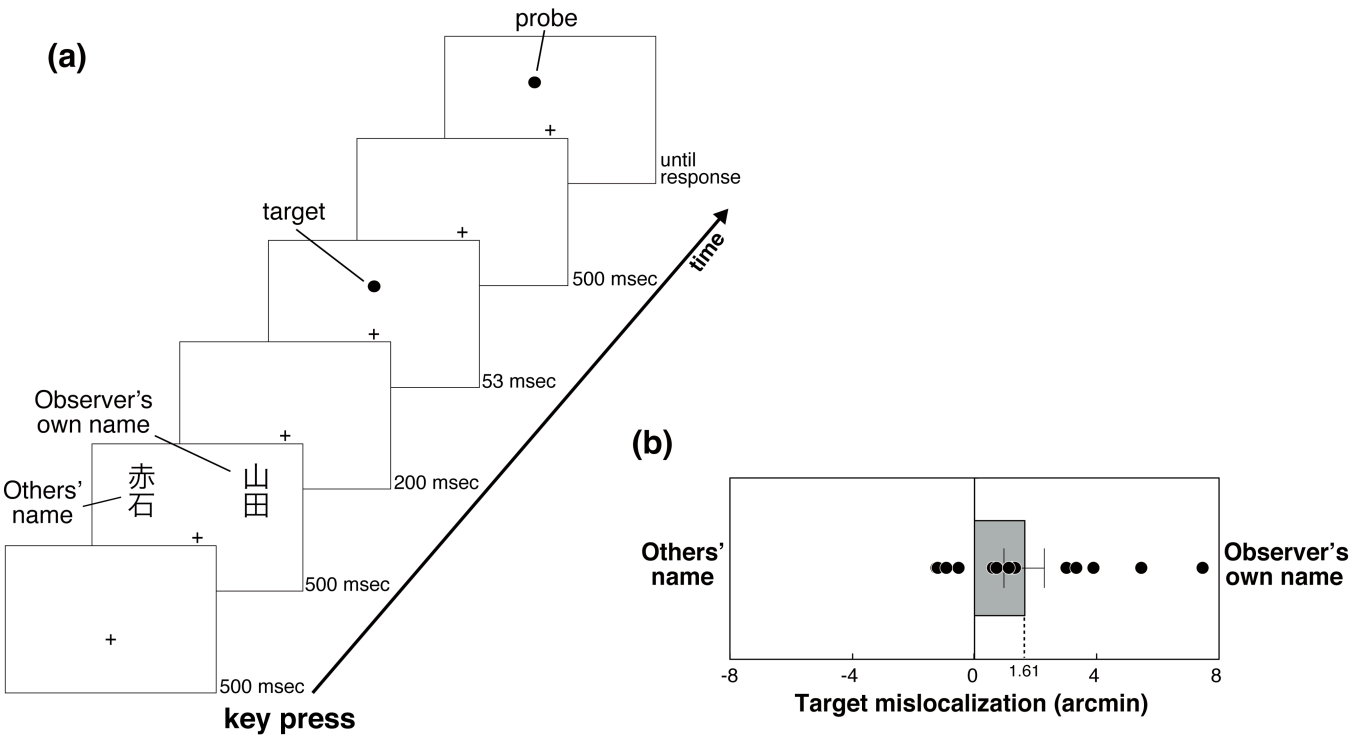

Fig. 1. (a) Schematic representation of stimulus sequence. (b) Results of the experiment. The gray bar indicates the mean mislocalization and the black dots indicate individual mislocalization data. Positive values on the horizontal axis represent target mislocalization toward the observer's own name. The thin bars indicate the standard error of the mean.

one's own picture [7] and emotional or motivational stimuli that would attract observer's attention [3]. It will also be worthwhile to examine mislocalization using one's own name in speech stimuli, because the attentional advantage of one's own name over others' names was originally reported in the auditory domain [5]. Moreover, as the present study used only the family name of observers, it will be of interest to further examine whether such mislocalization occurs toward the observer's given name, and whether the effect depends on the relationship between given name and family name.

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