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Is power–space a continuum? Distance effect during power judgments

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ABSTRACT

Despite the increasing evidence suggesting that power processing can activate vertical space schema, it still remains unclear whether this power–space is dichotomic or continuous. Here we tested the nature of the power–space by the distance effect, a continuous property of space cognition. In two experiments, participants were required to judge the power of one single word (Experiment 1) or compare the power of two words presented in pairs (Experiment 2). The power distance was indexed by the absolute difference of power ratings. Results demonstrated that reaction time decreased with the power distance, whereas accuracy increased with the power distance. The findings indicated that different levels of power were presented as different vertical heights, implying that there was a common mechanism underlying space and power cognition.

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How abstract concepts such as power are mentally represented is an essential question that has received much attention within the domain of cognitive psychology. In the psychological literature, power has been defined as the ability or capacity to influence others through the control of resources (Galinsky, Gruenfeld, & Magee, 2003; Keltner, Gruenfeld, & Anderson, 2003). In our daily life, when we talk about power, we often use vertical information in our language. For example, leaders who supervise their employees have "high" status, or are "up" in the hierarchy, whereas the employees are at the "lower" levels of the hierarchy. Simply put, power is metaphorically understood as vertical height in physical space: "control is up, lack of control is down" (Lakoff, 1987; Lakoff & Johnson, 1980).

This idea is broadly in line with the grounded cognition framework (e.g., Barsalou, 1999, 2008; Glenberg, 1997), which argues that conceptual thinking involves perceptual simulation. Representing abstract concepts reactivates previously stored information from sensory-motor experience to form a simulation of this sensory-motor experience. Supporting this analogue, several lines of evidence suggest the interactions between sensory-motor experience and power (Chiao, 2010; Chiao et al., 2009; Giessner & Schubert, 2007; Mason, Magee, & Fiske, 2014; Schubert, 2005; Zanolie et al., 2012).

First, power judgments are affected by spatial information in the vertical dimensions provided by vision. In one of their experiments, Schubert (2005) presented participants with a series of pairs of group labels (e.g., employer–employee, master–servant), one at the top and the other at the bottom of the screen, and required them to judge which label was powerful. Participants reacted faster when powerful group labels appeared at top and powerless group labels appeared at the bottom. In the other experiments, single words referring to powerful or powerless groups were presented. Participants decided whether the word represented a powerful or powerless group. The stimulus position (either at the top or at the bottom of the computer screen) or response key (up or down cursor keys) was manipulated. Interactions between stimulus position

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or response key and power were found, i.e. participants responded faster to powerful groups when they appeared at the top of the screen and to powerless groups when they appeared at the bottom of the screen, and they responded faster to powerful groups with the up cursor key and to powerless groups with down cursor key. Our study further found that such interactions also appeared during tasks without explicit power evaluation, i.e., requiring participants to report whether the words represented people or animals (Jiang, Sun, & Zhu, 2015).

Second, neuroimaging studies on a related abstract concept (i.e. social status) demonstrated that status judgment was mediated by parietal lobe regions that process up and down in allocentric space (Chiao, 2010; Chiao et al., 2009; Mason et al., 2014); these findings also point to partially overlapping mental representations of power and space. Given that people who have high status often hold power, status judgments likely also include power appraisal. Results from these neuroimaging studies thus implicate the parietal lobes as a locus of interactions between space and power.

A third stream of research has shown that processing the concept of power produced an implicit reorientation of visuospatial attention, whereby powerful words bias attention upwards and powerless words bias attention downwards. In a recent study, target letters preceded by power judgment of words were identified faster when their spatial position was congruent with the perceived power of the preceding word than when it was incongruent (Zanolie et al., 2012). Higher P1 amplitude was also recorded for congruent trials (Zanolie et al., 2012). These effects are thought to result from an up-down image schema automatically activated during power processing.

Although all the previous studies suggested that power processing activated vertical space schema, it still remains unclear whether this power–space is dichotomic or continuous. One conjecture is that different levels of power are presented as different vertical heights. However, the dichotomic manipulation of power (powerful vs. powerless) and vertical space (up vs. down) in the previous studies cannot rule out another possibility. That is, participants might just relate powerful to up and powerless to down. If the concept power and spatial schema were both activated, participants would easily notice the dichotomic relation between power and space.

Distance effect could be used to test the nature of the power–space. Distance effect has been found in the judgment of many abstract concepts which were represented as a continuous space, such as numbers or status. It denotes the phenomenon that the amount of time it takes to compare two items of a concept is an inverse function of how much numerical distance separates those items. For example, people responded more slowly when they compare the numbers that are closer in quantity (e.g., 98 vs. 99) relative to those farther in quantity (e.g., 11 vs. 99, Dehaene, Piazza, Pinel, & Cohen, 2003; Moyer & Landauer, 1967). The distance effect has also been demonstrated in the social domains such as status (Chiao, Bordeaux, & Ambady, 2004; Chiao et al., 2009). Chiao et al. (2004) used "assistant professor" as an anchor and asked participants to decide whether the presented occupations (e.g., assistant professor, secretary) were higher, lower than or equal to the status of the anchor. They found that participants responded faster and faster with the increased status distance of each occupation from the anchor (i.e., long RT for assistant professor than secretary). Von Hecker, Klauer, and Sankaran (2013) found similar results by asking participants to compare the status of novel persons based on their interactions the participants previously learned from a story. Given that the distance effect could not be applied to dichotomic representations, if power–space is a continuum, distance effect could also apply to power judgment, like number or status.

However, unlike status, the distance on power cannot be directly identified.[1] It is difficult to judge which one is close to employee on the power rank, employer or manager. Compared with status, the concept of power is more likely to be presented continuously in the brain. Thus, for power, it is hard to select an explicit anchor and different items with various distances from the anchor. Therefore, we adopted a power judgment task without anchor in two experiments. In Experiment 1, participants explicitly judged whether the words represented a powerful or powerless group. We argued that participants also needed an intrinsic anchor which was supposed to be around the middle of the power rank when completing the task (Mussweiler, 2003). They judged the word as powerful, if its power was greater than this intrinsic anchor, and powerless if its power was lower than it. Then, the power distance could be identified referring to the power ratings of the words. For powerful words, the higher the power rating of a word is, the farther the word departs from the middle anchor. On the other hand, for powerless words, the lower the power rating of a word is, the farther the word departs from the anchor. Thus, 32 words (16 powerful words) denoting people taken from our previous study (Jiang et al., 2015, see Appendix A) were used as materials. The power of these words was already rated. Given the high rater-consistency of power (Kendall's $W = .76$, cf. methods), the power ratings in Jiang et al.'s study can be used to assess the distance. The mean rating of all the words (3.76) was used as anchor to calculate power distance. In Experiment 2, participants were presented two-word pairs and asked to judge which one represents a more powerful group. The power distance could be identified referring to each participant's power ratings of the words. For example, if a participant rated "king" as 9 and "soldier" as 4, then the distance was 5. Similarly, 12 words denoting people taken from Jiang et al. (2015, see Appendix A) were used as materials. It was predicted that reaction time would decrease with the power distance.

1. Experiment 1

In the experiment, participants viewed a series of eye gazes change (upward vs. downward), while hearing the 32 words described before, one at a time. They were required to judge whether the words represented powerful or powerless groups. It is predicted that reaction time would decrease with the power distance of each word.

[1] Besides, power and status are conceptually different. Power is a kind of resources and status is a kind of respect (Hays, 2013).

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