

When actions speak: Embodied effects on non-literal uses of spatial terms

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Embodied views of language suggest that spatial concepts, formed from our direct physical experience with our environment, are reflected in more abstract uses of spatial language (Bergen et al., 2007; Glenberg & Kaschak, 2002; Lakoff, 1987; Zwaan, 1999). These accounts find support in experimental evidence that processing spatial language involves the activation of imagery corresponding to the axis of movement (Richardson et al., 2003; Zwaan et al., 2004). Although several mental simulation studies have explored specific relationships between motion and language, the majority have tended to focus on the activation of mental imagery following language comprehension tasks. Does embodied experience likewise influence lexical choices in production? The aim of the present study is to investigate whether direction of vertical movement (i.e., moving up/down) influences word choice describing horizontal movement (*go up/down the street*).

The focus of our examination is the use of the spatial terms *up* and *down* to describe motion with no vertical component. Although generally associated with vertical movement, the words *up* and *down* are frequently used to describe horizontal movement (e.g., *He walked up the street*), as when giving directions. In this study, we asked whether participants' lexical choices when giving directions would be influenced by their bodily movements and perceptions immediately prior to giving directions.

150 individuals were randomly approached at five different locations on the University of Louisiana at Lafayette campus and asked to provide directions to a nearby pizzeria. The participants were sampled at five locations, with 30 volunteers at each: 1) sitting on benches facing a large flight of exterior stairs; 2) walking up the exterior staircase; 3) walking down the exterior staircase; 4) sitting at an outdoor café (not facing the stairs); and 5) walking along the sidewalk behind the building (with no stairs in sight). Each participant was approached individually and asked for directions to the pizzeria.

Based on the embodiment hypothesis, we predicted that enacting or perceiving physical movement would have an effect on word choice whereby upward motion would lead to more use of *up* and downward motion would lead to more use of *down* in participants' directions. As predicted, use of *up* and *down* differed significantly amongst the sampled groups, $\chi^2(12, N = 150) = 50.26, p < .001$ (Figure 1). Specifically, we observed a tendency to use both *up* and *down* amongst participants who were stopped while walking up the stairs ($M = .57$), and a tendency to just use *down* amongst participants who were stopped while walking down the stairs ($M = .47$); participants who did not have stairs in their fields of view (those walking behind the building and those seated at the café) tended to use neither *up* nor *down* in their directions ($M = .53$). These findings are consistent with an embodied view of language and provide ecologically valid support for the claim that non-literal uses of spatial terms may retain strong connections to embodied physical movement associated with the terms.

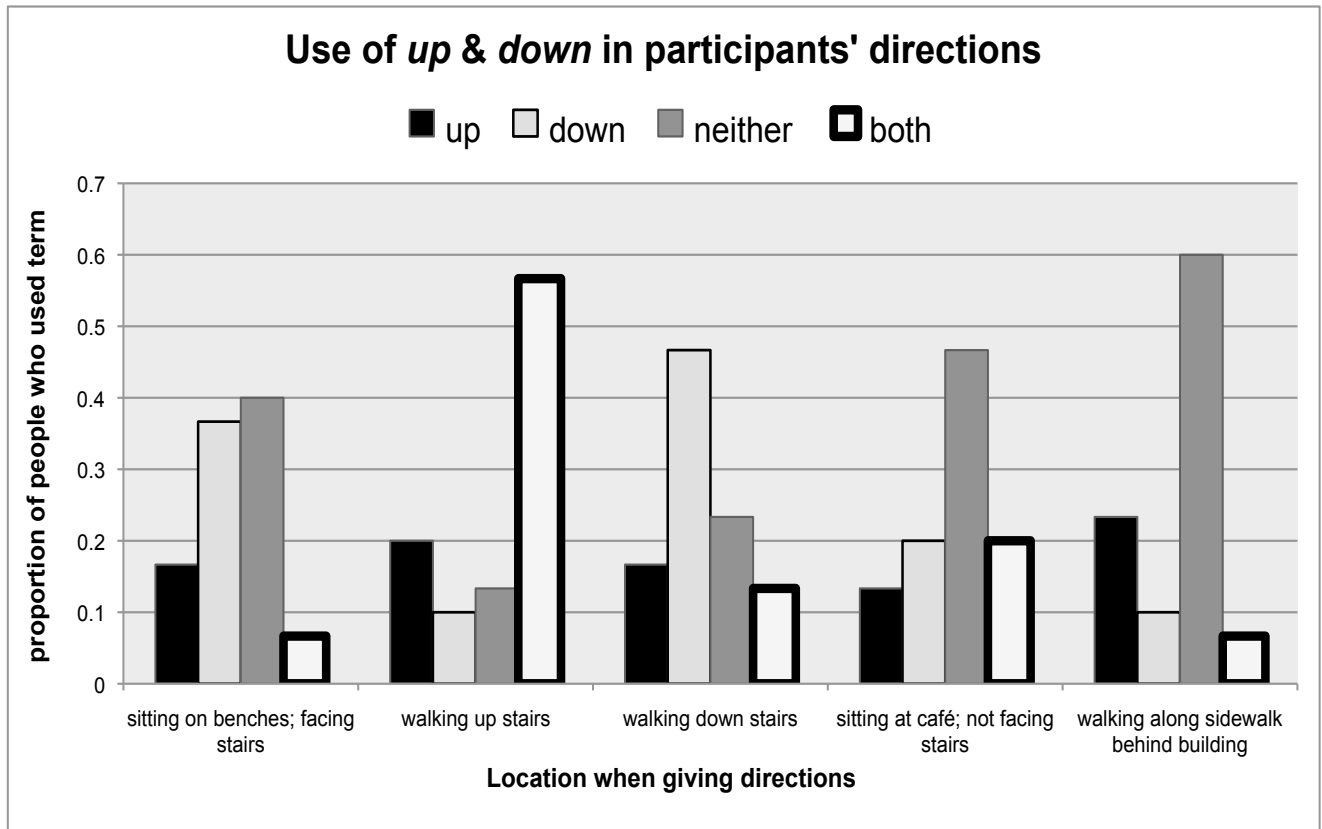


Figure 1: Participants' use of *up*, *down*, neither *up* nor *down*, or both *up* and *down* in directions

References

- Bergen, B., Lindsay, S., Matlock, T., & Narayanan, S. (2007). Spatial and linguistic aspects of visual imagery in sentence comprehension. *Cognitive Science*, 31(5), 733-764.
- Glenberg, A., & Kaschak (2002). Grounding language in action. *Psychonomic bulletin review*, 9(3), 558-565.
- Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago, IL: University of Chicago Press.
- Richardson D., Spivey M., Barsalou L., McRae K. (2003). Spatial representations activated during real-time comprehension of verbs. *Cognitive Science*, 27, 767–780.
- Zwann R. (1999). Embodied cognition, perceptual symbols, and situation models. *Discourse Processes*, 28, 81–88.
- Zwaan R., Madden C., Yaxley R., & Aveyard M., (2004). Moving words: dynamic representations in language comprehension. *Cognitive Science*, 28, 611–619.