

On the “Whats” and “Hows” of “Where”: The Role of Salience in Spatial Descriptions (Abstract)

Laura A. Carlson

Department of Psychology, University of Notre Dame, USA

According to Clark [1] language is a joint activity between speaker and listener, undertaken to accomplish a shared goal. In the case of spatial descriptions, one such goal is for a speaker to assist a listener in finding a sought-for object. For example, imagine misplacing your keys on a cluttered desktop, and asking your friend if s/he knows where they are. In response, there are a variety of spatial descriptions that your friend can select that vary in complexity, ranging from a simple deictic expression such as “there” (and typically accompanied by a pointing gesture), to a much more complicated description such as “its on the desk, under the shelf, to the left of the book and in front of the phone.” Between these two extremes are descriptions of the form “The keys are by the book”, consisting of three parts: the located object that is being sought (i.e., the keys); the reference object from which the location of the located object is specified (i.e., the book) and the spatial term that conveys the spatial relation between these two objects (i.e., by). For inquiries of this type (“where are my keys?”), the located object is pre-specified, but the speaker needs to select an appropriate spatial term and an appropriate reference object. My research focuses on the representations and processes by which a speaker selects these spatial terms and reference objects, and the representations and processes by which a listener comprehends these ensuing descriptions.

The “Whats”

With respect to selection, one important issue is understanding why particular terms and particular reference objects are chosen. For a given real-world scene, there are many possible objects that stand in many possible relations with respect to a given located object. On what basis might a speaker make his/her selection? Several researchers argue that reference objects are selected on the basis of properties that make them salient relative to other objects [2,3,4]. Given the purpose of the description as specifying the location of the sought-for object, it would make sense that the reference object be easy to find among the other objects in the display. However, there are many different properties that could define salience, including spatial features, perceptual properties, and conceptual properties.

With respect to spatial features, certain spatial relations are preferred over others. For example, objects that stand in front/back relations to a given located object are preferred to objects that stand in left/right relations [5]. This is consistent

with well-known differences in the ease of processing different terms [6,7]. In addition, distance may play an important role, with objects that are closer to the located object preferred to those that are more distant [8]. Thus, all else being equal, a reference object may be selected because it is closest to the located object and/or stands in a preferred relation with respect to the located object.

With respect to perceptual features, Talmy [4] identified size and movability as key dimensions, with larger and immovable objects preferred as reference objects. In addition, there may be a preference to select more geometrically complex objects as reference objects. Blocher and Stopp [9] argued for color, shape and size as critical salient dimensions. Finally, de Vega et al. [2] observed preferences for reference objects that are inanimate, more solid, and whole rather than parts of objects.

Finally, with respect to conceptual features, reference objects are considered “given” objects, less recently mentioned into the discourse [4]. In addition, there may be a bias to select reference objects that are functionally related to the located object [10,11].

In this talk I will present research from my lab in which we systematically manipulate spatial, conceptual and perceptual features, and ask which dimensions are influential in reference object selection, and how priorities are assigned across the spatial, perceptual and conceptual dimensions. Both production and comprehension measures will be discussed. This work will provide a better sense of how salience is being defined with respect to selecting a reference object for a spatial description.

The “Hows”

Implicit in the argument that the salience of an object is computed across these dimensions is the idea that such computation requires that multiple objects are evaluated and compared among each other along these dimensions. That is, to say an object stands out relative to other objects (for example, a red object among black objects) requires that the color of all objects (black and red) be computed and compared, and that on the basis of this comparison, the unique object (in this case, red) stands out (among black). Put another way, an object can only stand out relative to a contrast set [12]. Research in my lab has examined how properties of various objects are evaluated and compared during production and comprehension, and in particular, the point in processing at which properties of multiple objects exert their influence. For example, we have shown that the presence, placement and properties of surrounding objects have a significant impact during comprehension and production [13,11]. I will discuss these findings in detail, and will present electrophysiological data that illustrate within the time course of processing the point at which these features have an impact.

The Main Points

The main points of the talk will be an identification of the features and dimensions that are relevant for selecting a reference object, and an examination of how

and when these features and dimensions have an impact on processing spatial descriptions. Implications for other tasks and other types of spatial descriptions will be discussed.

References

1. Clark, H.H.: Using language. Cambridge University Press, Cambridge (1996)
2. de Vega, M., Rodrigo, M.J., Ato, M., Dehn, D.M., Barquero, B.: How nouns and prepositions fit together: An exploration of the semantics of locative sentences. *Discourse Processes* 34, 117–143 (2002)
3. Miller, G.A., Johnson-Laird, P.N.: Language and perception. Harvard University Press, Cambridge (1976)
4. Talmy, L.: How language structures space. In: Pick, H.L., Acredolo, L.P. (eds.) *Spatial orientation: Theory, research, and application*, pp. 225–282. Plenum, New York (1983)
5. Craton, L.G., Elicker, J., Plumert, J.M., Pick Jr., H.L.: Children’s use of frames of reference in communication of spatial location. *Child Development* 61, 1528–1543 (1990)
6. Clark, H.H.: Space, time, semantics, and the child. In: Moore, T.E. (ed.) *Cognitive development and the acquisition of language*. Academic Press, New York (1973)
7. Fillmore, C.J.: Santa Cruz lectures on deixis. Indiana University Linguistics Club, Bloomington (1971)
8. Hund, A.M., Plumert, J.M.: What counts as by? Young children’s use of relative distance to judge nearbyness. *Developmental Psychology* 43, 121–133 (2007)
9. Blocher, A., Stopp, E.: Time-dependent generation of minimal sets of spatial descriptions. In: Olivier, P., Gapp, K.P. (eds.) *Representation and processing of spatial relations*, pp. 57–72. Erlbaum, Mahwah (1998)
10. Carlson-Radvansky, L.A., Tang, Z.: Functional influences on orienting a reference frame. *Memory & Cognition* 28, 812–820 (2000)
11. Carlson, L.A., Hill, P.L.: Processing the presence, placement and properties of a distractor in spatial language tasks. *Memory & Cognition* 36, 240–255 (2008)
12. Olson, D.: Language and thought: Aspects of a cognitive theory of semantics. *Psychological Review* 77, 143–184 (1970)
13. Carlson, L.A., Logan, G.D.: Using spatial terms to select an object. *Memory & Cognition* 29, 883–892 (2001)