

## Language as Destiny? Or Not

### Essay Review of *Space in Language and Cognition: Explorations in Cognitive Diversity* by Stephen C. Levinson<sup>1</sup>

Nora S. Newcombe

Temple University, Philadelphia, Pa., USA

Benjamin Whorf has had an astoundingly long-lasting effect on psychology, anthropology and linguistics. I first encountered the Whorf hypothesis when I was an undergraduate, reading selections from his 1956 book – the idea that our languages constrained our thought intrigued me to no end. During graduate work in the seventies, however, I gathered that the hypothesis was dead, discredited by research showing the cross-cultural universality of color perception despite variations in color naming [Heider, 1972]. Starting in the 1990s, though, Whorf has turned out not to be as dead as had been rumored. An increasing volume of work has appeared that indicates that his obituary was written prematurely, with doubt even cast on the conclusions concerning color [Davidoff, Davies, & Roberson, 1999]. A fundamental part of this neo-Whorfian movement has been Stephen Levinson's thinking about spatial language and cognition. It is valuable to have most of his arguments and data gathered together in this thought-provoking book.

Briefly, Levinson's work (conducted with a number of collaborators) revolves around the fact that certain languages of the world – unlike, for example, English – describe spatial relations in absolute terms, best glossed as *north/south/east/west*, rather than in relative terms such as *right/left*. Thus, for example, these languages might describe a knife as to the *north* of a plate rather than to its *right*. This way of speaking has certain disadvantages, such as the fact that four diners seated at a square table would each describe their knife–plate arrangements differently, despite the fact that the 'picture' the knife and plate present to each diner's eye is identical. But the absolute mode of speaking about space also has advantages, notably its definitive and unambiguous method of communicating location.

If these facts were all that Levinson discussed, we would hardly have a controversial book, merely an anthropological curiosity. The gripping part of the argu-

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ment comes from the fact that Levinson and his collaborators claim that the use of absolute (or relative) spatial terms has fundamental consequences for spatial cognition. Speakers of absolute languages need to have a constant sense of cardinal direction in order to speak correctly. Maintaining this sense leads, according to Levinson, to a constant awareness of directionality. Speakers of absolute languages, unlike speakers of relative languages, can point to home, or north, or indeed any unseen location, with great accuracy and rapidity, from anywhere and in the course of any activity. In fact, this ability to dead reckon, Levinson argues, comes to provide the dominant or even the only mode of conceptualizing the spatial world for speakers of absolute languages. The ubiquity of the awareness and its obligatory nature are seen in data showing that even the gestures used during anecdotes or story-telling in absolute linguistic communities preserve spatial accuracy – if a ship is sailing into port, for instance, its path is shown by the speaker's hand as coming from and headed for the directions actually involved. In addition, in various experiments, Levinson and his collaborators have presented data regarding differences in how speakers of absolute and relative languages interpret instructions to create the 'same' display as one they saw on a table-top. Having looked at the plate and knife and then having rotated in place 180 degrees to look at another table, an absolute speaker would set the knife to the north of the plate (i.e., to its left), while a relative speaker would do what to most readers of this journal would come naturally – place the knife to the right of the plate (i.e., on the south side).

So far, so fascinating. But how strong are the conclusions that we can draw from these observations? It is here that Levinson inspires controversy, because he takes quite a strong position regarding interpretation. Contemporary thinking about language and thought has distinguished three versions of the claim of linguistic influence: language as lens, language as category shaper, and language as tool kit [Gentner & Goldin-Meadow, 2003]. The first view is Whorf's, the second view is that language can influence categories at the margins, where the extensions become fuzzy, and the last is that language provides new representational resources that augment those available nonverbally. In this typology, Levinson belongs in the first grouping, despite occasional disclaimers on his part. He argues for the non-universality of spatial categories, an especially dramatic claim because spatial cognition is required for successful adaptation, and he also argues that spatial cognition is basically and obligatorily different in different linguistic communities rather than just momentarily or fleetingly or optionally different. In doing so, he believes he undermines nativism (or at least what he calls 'simple nativism') and modularity of mind, and provides reason to endorse either a 'partially' constructivist or a Vygotskian view of human development.

How strong is Levinson's case? I think the verdict is 'not proven.' There are good reasons, in my view, to question the non-universality argument and to prefer something more like a 'category shaper' view (although maybe not quite even that). Note, however, that in questioning the idea of non-universality, I do not believe I am favoring the nativism or modularity of mind that Levinson regards as the default position. In fact, there is a coherent and attractive position between simple nativism (Levinson's term) and the Standard Social Science Model (the pejorative way nativists refer to something not too far from Levinson's position).

In the space of a short review, it is not possible to address all the reasons why I have doubts. Most of them stem from the fact that my research is in spatial cogni-

tion, and Levinson simply does not appear to be well acquainted with that research area and may misunderstand some of what he has read. [For overviews of this literature, see Newcombe, 2002; Newcombe & Huttenlocher, 2000; Shettleworth, 1998]. Most researchers in spatial cognition, whether focusing on humans or non-human animals, are at this point agreed that mobile organisms use multiple redundant systems for location and for planning navigation. Most researchers think that the highest level cut between such systems is between viewer-centered (or egocentric) ones, which would include use of the terms *right* and *left*, and environment-centered (or allocentric) ones, which would include use of compass directions. However, these researchers do not think that either system alone is sufficient for spatial adaptation – each has weaknesses as well as strengths, so they are complementary. Dead reckoning (or inertial navigation) is a viewer-centered system that is extremely useful in the dark or when landmarks are not available, as on the ocean or in a featureless plain, but it is subject to drift due to the accumulation of error. Thus, Levinson's claim that speakers of absolute spatial languages are not only excellent dead reckoners but also primarily or exclusively reliant on this system is implausible on the face of things, because correction from fixes on external landmarks is essential for survival. Similarly, use of environment-centered frameworks is central to spatial inference and planning of detours and alternative routes, so it is difficult to believe Levinson's claim that speakers of relative spatial languages are primarily reliant on strip or route maps for navigation.

There are some specific findings in the spatial cognition literature, problematic for his thesis, which Levinson either does not cite or seems to misinterpret. For example, Barbara Tversky and Holly Taylor [1992a, b] have shown that English speakers naturally mix uses of *N/S/E/W* and *right/left* in spatial descriptions and that they easily comprehend mixed descriptions and use them to build unified spatial representations. Similarly, although male English speakers are more likely to use *N/S/E/W* in giving directions, females vastly increase their use of these terms in response to a simple request to do so [Ward, Newcombe, & Overton, 1986]. As another example, young infants seem to categorize both spatial contrasts that are lexicalized in their language environment and those that are not, suggesting the existence of spatial understanding prior to spatial language [Hespos & Spelke, 2004; McDonough, Choi, & Mandler, 2003]. True, adults ultimately seem to pay little attention to contrasts not used in their language, such as 'tight fit' for speakers of English [McDonough et al., 2003], a phenomenon that Levinson cites as evidence of the impact of language. But the key question is whether this is a soft or hard limitation. Tellingly, the adults in the McDonough et al. study were given an open-ended task. Spatial contrasts they do not use frequently might simply have ranked low in their hierarchy of hypotheses about what the experimenter was requesting. Such a situation is quite different from a hard inability to conceptualize space in alternative ways. Indeed, the very fact that English speakers can engage in this debate suggests that they must have the ability to appreciate different spatial category systems.

A vigorous empirical controversy has focused on this issue of hard or soft limitations with regard to interpretations of Levinson's 180-degree turn tasks. As I have suggested for use of cardinal direction terms or appreciation of tight-fit relations, performance in the 180-degree turn task may simply reflect first-pass guesses as to how to interpret ambiguous instructions. Supporting this hypothesis, Li and

Gleitman [2002] have shown that initial interpretations about where to put objects after 180-degree rotations are not that hard to change (as they ought to be if they were tightly linked to language). Instead, placements seem to change flexibly in response to changes in context. That is, speakers of a relative language can interpret spatial situations as speakers of absolute languages do, with minimal adjustments to testing procedures. Although Levinson believes he has evidence undermining the Li and Gleitman data [Levinson, Kita, Haun, & Rasch, 2002], the story is not yet finished. There are data that will keep this important exchange going [Gleitman, Li, Papafragou, Gallistel, & Abarbanell, in preparation].

A priori, I think it very likely that language merely provides a default method for interpreting ambiguous instructions in spatial tasks, rather than setting a definite limitation on how the task could ever be interpreted, based on the fact, already discussed, that survival requires the use of multiple spatial frameworks. Additionally, a long tradition of developmental work that began with Piaget (and not reviewed by Levinson) has used tasks of the 180-degree reproduction sort. The bottom line of these studies, in my view, is that young children make mistakes in these situations due to their difficulties in dealing with conflicting frames of reference [see Vasilyeva, 2002, for a recent example], a fact that is directly at odds with the idea that language constrains frames of reference to a single option.

There is one oddity in the Levinson book that deserves correction, especially as it takes us back to the issue of situating theory somewhere between simple nativism and the Standard Social Science Model. Levinson repeatedly uses research by Elizabeth Spelke and her associates on the ‘geometric module’ to support his position that language can fundamentally modify spatial functioning. This group has reported striking findings in a simple search task in which a toy is hidden in one of four identical corners in a rectangular room. First, when the walls of the room are unfeatured, young children use the geometry of the room to search mostly in the two congruent corners (e.g., the ones where the long wall is to the left of the short wall), largely ignoring the other two corners. Second, when features such as a colored walls are added, young children do not use them, even though doing so would allow them to search correctly (e.g., to look where the long wall is to the left of the short blue wall, not the short white wall). They begin to use features only after they can produce the terms *right* and *left* [Hermer & Spelke, 1996; Hermer-Vasquez, Moffet, & Munkholm, 2001]. However, there is good reason to be skeptical about these conclusions, based on a variety of studies not cited by Levinson, including data showing that children have difficulty using features in combination with geometry only in extremely small rooms that lack ecological validity [Learmonth, Newcombe & Huttenlocher, 2001; Learmonth, Nadel, & Newcombe, 2002; for a review, see Cheng & Newcombe, in press].

What is interesting about Levinson’s use of the ‘geometric module’ work is that the position of Spelke and her group is actually fundamentally at odds with the one Levinson wants to push. They see the geometry findings as supporting a nativist position that envisions strong modularity. In their view, the role of language is to allow humans to transcend the limitations of modular functioning that bind other species. If this were true, language would indeed have a profound role in human cognition. But the effects would not be culture- and language-specific; presumably, speakers of an absolute language could also come to use features such as a colored wall to constrain their searches in a rectangular room, perhaps when they were able

to use terms like *north* and *east*. Thus, Levinson's use of the 'geometric module' data undermines his over-arching assumption that proving that language influences thought will provide evidence against nativism. If language influences thought in a specific way, then nativism is undermined. But if language influences thought in a general way, as Spelke thinks, nativism is left intact.

As the nativist-empiricist debate becomes mired in contradictions, it is increasingly clear that we will need to commit to a third way. A nice example comes from recent research on the development of folk biology and folk sociology. Astuti, Solomon and Carey [2004] found support for neither what they called the Innate Conceptual Content hypothesis nor the Unconstrained Learning hypothesis. Instead, they found two different patterns for the two domains, neither of which fit the simple models. There was cross-cultural convergence in adults' biological thinking that apparently emerged, not from innate beliefs, but from expectable interactions with the material world. And there was initial cross-cultural similarity in reasoning about family groups that became culturally differentiated for adults.

A similar balance between nativism and empiricism is emerging for many other domains, including spatial cognition and development [Newcombe & Huttenlocher, 2000]. In brief, certain starting points in newborn understanding and functioning interact with predictable and variable aspects of the environment to produce development and, eventually, mature competence. Predictable input characterizes many biologically crucial domains, including the spatial one, so that one expects more convergence than divergence across human groups in these cases. However, variable input, as can occur with different systems of linguistic description, may lead to some degree of corresponding variation.

In short, speakers of absolute and relative languages may well differ at the margins. For example, it would not surprise me to learn that speakers of absolute languages are more likely than speakers of relative languages to be able to point to north (although the recent work of Gleitman et al. provides some reason to be skeptical even of this conclusion). But a difference of this kind is a long shot away from inhabiting deeply different spatial worlds. It would take more than Levinson's book to convince me that speakers of different languages differ fundamentally in their spatial thought and way-finding.

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