Space in Language and Cognition

Explorations in Cognitive Diversity

STEPHEN C. LEVINSON

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Max Planck Institute for Psycholinguistics

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SPACE IN LANGUAGE AND COGNITION

Explorations in Cognitive Diversity

Languages differ in how they describe space, and such differences between languages can be used to explore the relation between language and thought. This book shows that even in a core cognitive domain, such as spatial thinking, language influences how people think, memorize and reason about spatial relations and directions. After outlining a typology of spatial coordinate systems in language and cognition, it is shown that not all languages use all types, and that non-linguistic cognition mirrors the systems available in the local language. The book reports on collaborative, interdisciplinary research, involving anthropologists, linguists and psychologists, conducted in many languages and cultures around the world, which establishes this robust correlation. The overall results suggest that most current thinking in the cognitive sciences underestimates the transformative power of language on thinking. The book will appeal to all researchers interested in the relation of language to other areas of cognition – linguists, psychologists, anthropologists, philosophers – and especially to students of spacial cognition.

STEPHEN C. LEVINSON is Director of the Max Planck Institute for Psycholinguistics and Professor of Comparative Linguistics at the University of Nijmegen. His publications include *Pragmatics* (Cambridge, 1983), *Politeness* (co-author, Cambridge, 1987), *Rethinking linguistic relativity* (co-editor, Cambridge, 1996), *Language acquisition and conceptual development* (co-editor, Cambridge, 2001), and *Presumptive meanings* (2001).

Language, culture and cognition

Editor
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Max Planck Institute for Psycholinguistics, Nijmegen

This new series looks at the role of language in human cognition – language in both its universal, psychological aspects and its variable, cultural aspects. Studies will focus on the relation between semantic and conceptual categories and processes, especially as these are illuminated by cross-linguistic and cross-cultural studies, the study of language acquisition and conceptual development, and the study of the relation of speech production and comprehension to other kinds of behaviour in cultural context. Books come principally, though not exclusively, from research associated with the Max Planck Institute for Psycholinguistics in Nijmegen, and in particular the Language and Cognition Group.

1 Jan Nuyts and Eric Pederson (eds.) *Language and Conceptualization*
2 David McNeill (ed.) *Language and Gesture*
3 Melissa Bowerman and Stephen C. Levinson (eds.) *Language Acquisition and Conceptual Development*
4 Gunter Senft (ed.) *Systems of Nominal Classification*
5 Stephen C. Levinson *Space in Language and Cognition*

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Preface

This book is about the relation between language and spatial cognition. Spatial cognition is at the heart of our thinking. It has long been noted that spatial thinking provides us with analogies and tools for understanding other domains, as shown by the efficacy of diagrams, the pervasive spatial metaphors of everyday language, the evocativeness of place in memory, and the special role that geometry, astronomy and cartography have played in the development of science and technology. Spatial cognition probably plays this central role because it seems to be the evolutionarily earliest domain of systematic cross-modal cognition: any animal needs to relate what its eyes, ears and limbs tell it about the immediate structure of the world around it – foraging, avoiding predators and finding home-base require this. Yet many species operate with restricted abilities to pool this information freely, and human higher-level cognition and consciousness may have evolutionary origins in a special, freer exchange of information across all the modalities that contribute to spatial knowledge and awareness.

This book is especially concerned with just one aspect of spatial cognition, namely **frames of reference** as expressed in spatial language and everyday thinking. Consider a sentence like: *The cat is behind the truck.* It is ambiguous (or general) over two kinds of scenes: one in which the cat is at the truck's rear-end, and another in which it is by one side of the truck, but the truck is between the speaker and the cat. In the first interpretation, *behind* is taken to mean at the intrinsic facet (of the truck) that we would call a *back*, and in the other interpretation, it is the speaker's location that determines what is going to count as *behind*. These are different frames of reference (sometimes called the 'intrinsic' and the 'deictic') – based on the truck and the speaker respectively – and this book is about this kind of difference in the way in which we can construe spatial relations. This kind of distinction is by no means a shallow linguistic difference, a semantic nuance as it were. Consider

the following extraordinary symptoms of damage to the right parietal area of the cortex, damage which is well known to produce in some patients a 'neglect' of the left visual field. Bisiach and Luzzatti (1978) asked a group of such patients to imagine the cathedral square in their native city, Milan: when told to imagine they were standing on the cathedral steps they could describe the right side of the square but not the left, but when told to imagine standing at the other end of the square facing the cathedral, they could now describe the other side (again to their right), but not the prior one. Clearly, the patients had a complete mental model of the square independent of their imagined position in it (otherwise they could not have described both sides), but the projection as it were of a mental image from a particular vantage point is always obscured for them on the left side. The complete memory of the square is said to be in an *allocentric* frame of reference, while the visual imagery is in an *egocentric* frame of reference, and the two clearly are processed in different areas of the brain (most likely the hippocampus and the right parietal respectively). Thus spatial representation is a complex, multi-layered phenomenon, and distinct frames of reference implicate distinct mental systems.

This book has two main goals. First, it should serve as an introduction to an important subject – spatial coordinate systems in language and cognition – which has not generally been treated in a unified way, but rather conceptualized differently in different disciplines. All of the different senses, vision, audition, touch and smell, generate spatial representations, and in many ways these seem necessarily divergent. But since we can talk about what we see, or image a description, some convergence must be possible, but how much? Secondly, the book uses this particular domain of spatial coordinates to ask searching questions about the general nature of the relation between language and thought, or linguistic coding and non-linguistic categories. For it turns out that there are very substantial differences between languages in the semantic parameters utilized in spatial description, and that makes it natural to ask how these parameters correlate with non-linguistic cognition. The major discovery that is documented in the book is that these linguistic differences correlate with, and seem to induce, major differences in spatial cognition across human groups. This is an unexpected finding, and it has major implications for how we should think about the language–cognition interface.

These two lines of enquiry converge in general questions about what may, somewhat grandiloquently, be described as the 'architecture of the mind'. Some real insight into this structure can be derived from

cross-linguistic and cross-cultural observations. An analogy may be telling: just as we may be able to trace the course of an underground river system by dumping dye into a river before it goes underground, so by focussing on language-specific semantic parameters and seeing where they turn up in 'inner space' – the conceptual system – we can perhaps discover something about our inner languages or representations and how they connect to one another.

In this book, I have followed a construal and typology of systems that has emerged out of the work of the Language and Cognition (previously Cognitive Anthropology Research) Group at the Max Planck Institute for Psycholinguistics, work with many colleagues that is based on in-depth field analysis of over forty, mostly unwritten languages spoken in small-scale, traditional societies. This we feel gives us a much better grip on human diversity in spatial language and cognition than has hitherto been available. Most of the literature on spatial language is predominantly based on familiar European languages, and the corresponding psychology and neurophysiology on that of Western subjects. Theories and typologies that have come from this narrower base often diverge from the picture I present here – even though I have of course drawn on all this scholarly background (see especially Miller and Johnson-Laird 1976, Herskovits 1986, Svorou 1994, Talmy 1983, 2000, Vandeloise 1991).

What will emerge from the studies that are reviewed in this book are a number of major surprises, raising fundamental questions about the nature of human spatial cognition. The surprises include:

Different human groups use different spatial frameworks, often with distinctive sets of coordinate systems in both language and cognition.

The diversity of frame-of-reference systems can be organized in a universal typology that distinguishes just three major types, from which languages and cultures draw a subset.

There are robust correlations between frames of reference used in language and frames of reference used in non-linguistic memory and reasoning, suggesting a major 'Whorfian' effect of language on cognition.

Consonant with selected frames of reference, different human groups seem to use different types of 'mental map', with consequent differences in many aspects of behaviour, communication and culture.

These discoveries pose a number of far-reaching questions: Why should human cognition in this central area be so variable, and

apparently so much under linguistic and cultural control? How could such a central area of cognition – which is in many species indubitably hard-wired – come to be so much a matter of cultural 'software' in our own species? The answer suggested is that this constitutes central evidence for a co-evolutionary perspective on human cognition, wherein culture and the biological foundations for cognition have co-evolved and mutually adapted.

Acknowledgements

What I know about spatial language and cognition I have acquired in collaboration with many scholars, particularly those who have worked in or been attached to the Max Planck Institute for Psycholinguistics. Working with these scholars on this subject has been the best intellectual adventure of my academic life. I cannot list them all here, but some I must. First, Pim Levelt and Wolfgang Klein had run a project on spatial and temporal reference at the Institute for years before I arrived in 1991, and their path-breaking conceptual work (see, e.g., Levelt 1984, 1996, Jarvella and Klein 1982) made our later work possible. Other senior scholars at the Institute, including especially Melissa Bowerman, have been continuous guides.

The work reported on here – especially in Chapter 5, but throughout this book as well – was undertaken in a collaborative way with many other scholars. From 1991, there worked in my research group the following scholars, each of whom contributed in many ways to both the data and theory here described, as often reflected in reference to their own work: Martha Alibali, Felix Ameka, E. Annamalai, Giovanni Bennardo, Balthasar Bickel, Jürgen Bohnemeyer, John Bowden, Penelope Brown, Eve Danziger, Sue Duncan, Michael Dunn, James Essegbey, Nick Evans, Deborah Hill, Bill Foley, Suzanne Gaskins, Marianne Gullberg, Raquel Guirardello, Daniel Haun, John Haviland, Ingjerd Hoëm, Elizabeth Keating, Adam Kendon, Anna Keusen, Sotaro Kita, Kyoko Inoue, Hedda Lausberg, Lourdes de León, Paulette Levy, Kristine Jensen de Lopez, John Lucy, Bill McGregor, Sergio Meira, Laszlo Nagy, David Nash, Sabine Neumann, Asli Özyürek, Eric Pederson, Björn Rasch, Bernadette Schmitt, Eva Schultze-Berndt, Annie Senghas, Gunter Senft, Chris Sinha, Jane Simpson, Aaron Sonnenschein, Miriam van Staden, Sabine Stoll, Christel Stolz, Jürg Wassmann, Thomas Widlok, David Wilkins, Roberto Zavala. This book owes a fundamental debt to all of them – they have contributed data and ideas in abundance to the

programme on which this book reports. However, this book is my particular take or overview of the collective results, and they will not necessarily agree with every detail of theory, data or analysis.

I should single out a few colleagues who were especially engaged in the space project, and have played a crucial role in thrashing out the theoretical framework and methods in many a brain-storming session: Balthasar Bickel, Penelope Brown, Melissa Bowerman, Eve Danziger, Suzanne Gaskins, John Haviland, Sotaro Kita, Lourdes de León, John Lucy, Eric Pederson, Bernadette Schmitt, Gunter Senft, Thomas Widlok, David Wilkins. In this case, because they care passionately, they will each disagree intensely with some of my analyses below – but, OK folks, your turn! Also crucial at various points was advice from Pierre Dasen, Paul Kay, Wolfgang Klein, Ewald Lang, Pim Levelt, David McNeill and Dan Slobin. I should mention a special debt to Laszlo Nagy, who crunched the statistical data in Chapter 5 on my behalf, and helped draft a paper that never appeared (on which the chapter is based), because it was dependent on another that suffered a similar fate. In addition, our research group has been blessed by the most extraordinarily capable PhD students, who have contributed to the space project over the years, and whose names are mentioned above. I also owe thanks to many students and assistants who have helped in the preparation of field kits, experiments, field equipment, diagrams, drawings and analyses of data – especially Gertie de Groen and Bernadette Schmitt.

There is another fundamental kind of debt that I owe, this time to the people of OolappaaLaiyam in Tamilnadu, the people of Hopevale (in far north Queensland), the people of Majosik' (Tenejapa, Chiapas, Mexico), and the people of Rossel Island (Milne Bay Province, Papua New Guinea). These are the people who really opened my eyes to the diversity of human language and cognition. I would like to thank particularly those who patiently worked alongside me and tried to teach me the ways of their communities: O.K. Sundurum, Roger Hart, the late Tulo Gordo and the late Jack Bambi, Antun Gusman Osil, Xun Gusman Chijk', Isidore Yidika. They have all helped me, an outsider helpless in their complex social and physical environments, at some risk to their own local standing. They helped me, I think, because they could sense they had something important to tell the wider world. Some reward perhaps is that it will be their voices that, preserved in the Max Planck archives, will talk to their descendants at a time when they participate fully in the world of scientific knowledge.

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Anyone who has done fieldwork beyond the end of the normal lines of communication will know only too well the logistic, political, diplomatic and emotional travails that are entailed. I have been fortunate to have been helped by many colleagues and local authorities, and to have shared some of the burdens with my wife, Penelope Brown, whose expertise on Tzeltal is reflected in many of the pages below.

For much help in the preparation of a complex manuscript, I am grateful as ever to my indefatigable secretary and assistant, Edith Sjoerdsma. A number of scholars read the manuscript and gave me written comments – my thanks to Jürgen Bohnemeyer, Penny Brown, Nick Enfield, Pim Levelt, Gunter Senft and two anonymous referees. Finally, I have drawn on a number of articles that I have published earlier, and I am grateful to the American Anthropology Association, Cambridge University Press, MIT Press and Annual Reviews Inc., for permission to reuse material and republish various paragraphs, as indicated in footnotes.

COMPANION BOOKS

There are two other books in this series that have emerged from the same large collaborative project. One of these, *Grammars of space* (ed. Levinson and Wilkins), provides a great deal more information about linguistic description in a number of the crucial languages under discussion, written by experts in each of the languages and their cultural settings. That book also gives a good idea of the linguistic methods employed for the classification of languages according to the typology of frames of reference. A second book, *Tilted worlds* (Brown and Levinson), provides an in-depth look at one cultural group where absolute and intrinsic frames of reference are dominant. Here we were able to study in depth all aspects of the language and cognition, including language acquisition and gesture, in a Highland Mayan community. This last book will give the reader a sense of the rich texture that is inevitably lost in a wide survey of the kind represented by this book.

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