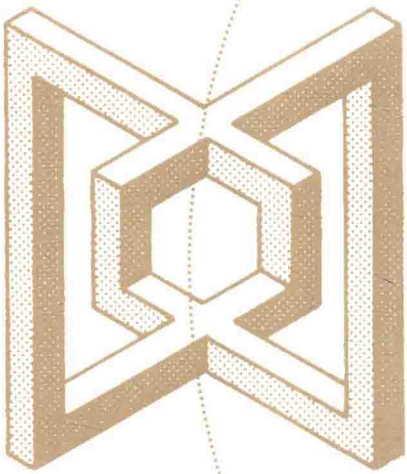

空间运动事件的心理认知研究

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An Exploration of English and Chinese

纪瑛琳 著

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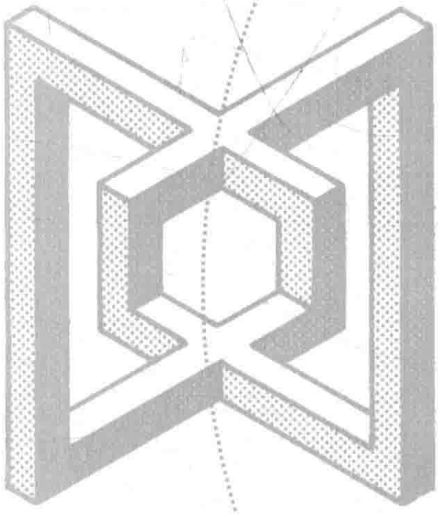

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For my mother

献给我的母亲—周瑞云

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CHAPTER 1

Space in language and cognition

The general relationship between language and cognition has long been a much-debated issue across disciplines such as philosophy, anthropology, psychology, linguistics and cognitive science. However, only recently has lively discussion of this issue arisen in the domain of space. Space is an ideal test-bed for the relationship between language and thought because this specific domain suitably demonstrates 'two extremes of testability and ineffability' (Papafragou *et al.* 2002: 192). On the one hand, there are a growing number of linguistic studies showing considerable crosslinguistic variations in encoding spatial location and motion events. On the other, the disciplines of psychology and behavioural science provide objective means to measure the influence of spatial language on cognition.

As Levinson (2003) comments, there are two millennia of Western ideas about spatial thinking. Spatial competence, ranging from finding one's way across a place, retrieving a lost object in an area, to describing one's location as relative to a given landmark, permeates every aspect of our daily life. Different types of spatial abilities, such as navigation, are determined by biological and neurological mechanisms shared by human beings, as well as other species. Spatial experience is crucial to our lives and the spatial mode of thinking is reflected in many other domains, as exemplified by Levinson (2003: 16): 'The new term starts *after* Christmas' (temporal specification); 'He is a *distant* kin of mine' (kinship); 'He is a person of *high* social status' (social structure); 'For numeric fields, it is important to test for *lower* and *upper bounds*' (mathematics); 'He is recently in *deep* depression' (emotion); to name a few.

In Western philosophy, space is considered to be a material conception, with a variety of instantiations: a substance with geometrical properties (e. g. Plato), a nested series of places with its bound far reaching out of universe (e. g. Aristotle), an intuition, an *a priori* conceptual form that organizes our conception of space (e. g. Kant; see Levinson 2003: 6-8 for a detailed review). Closely related to these ideas is a deeply rooted tradition in the psychology of language that views spatial language as a direct reflection of our egocentric and relativistic spatial concepts (e. g. Clark 1973, Lyons 1977, Miller and Johnson-Laird 1976, Piaget and Inhelder 1956). Fodor (2008) clearly illustrates this nativist view:

> [*T*] *he inductive evaluation of that hypothesis itself requires* (inter alia) *bringing the property* green or triangular *before the mind as such. You can't represent something as green or triangular* unless have the concepts GREEN, OR, and TRIANGULAR. *Quite generally, you can't represent anything as* such as such *unless you already have the concept* such and such... *This conclusion is entirely general; it doesn't matter whether the target concept is primitive* (*like green*) *or complex* (*like GREEN OR TRIANGULAR*). (2008: 139)

As far as language learning is concerned, nativism holds that the acquisitional process can be characterized by a straightforward mapping of words onto antecedent concepts (e. g. Clark 1973, Jackendoff 1983, Landau and Jackendoff 1993).

> The child acquires English expressions for space and time by learning how to apply these expressions to the *a priori* knowledge he has about space and time... The exact form of this knowledge, then, is dependent on man's biological endowment—that he has two eyes, ears, etc., that he stands upright, and so on—and in this sense it is innate. (Clark 1973: 28)

The preconceptions about the nature of human spatial cognition have recently been challenged by a vast bulk of experimental evidence showing systematic variations in the linguistic encoding of spatial events and experiences across languages. As a case in point, Berman and Slobin (1994) investigate how children across languages develop their narrative style in spatial discourses. Their observation is that English and German children produce discourses characterized by a rich array of manner verbs used in conjunction with path phrases (e. g. *fly out of* the tree hole), while their Spanish, Hebrew and Turkish counterparts describing the same event tend to mention manner of motion only rarely and leave path details to be inferred on the part of the reader (i. e. mere indication of the successive static locations of the protagonist as in '*exit* the tree hole and *land* on the branch'). These findings are rather unexpected to the researchers who set out with the aim of looking for some linguistic universals across their dataset, as expounded by themselves, as follows:

> We began the study with an expectation that there was a basic set of semantic notions that all children would try to express... [But] we were repeatedly surprised to discover how closely learners stick to the set of distinctions that they have been given by their language... We are left then with a new respect for the powerful role of each individual language in shaping its own world of expression... (Berman and Slobin 1994: 44)

It is firmly held in Western philosophy, as well as in the modern disciplines of psychology and cognitive science, that human spatial cognition should be enshrined in an innate and modular system; it is thus an area where any language effect on cognition is least likely to be found:

> If any domain has a plausible claim to strong language-independent perceptual and cognitive organization, it is space. The ability to perceive and interpret spatial relationships is clearly fundamental to human activity, and it is supported by vision and other highly structured biological systems... Little wonder it has seemed likely to many investigators that the

language of space closely mirrors the contours of nonlinguistic spatial understanding. (Bowerman 1999: 387)

A forceful refute to this view of innateness is a systematic investigation conducted by Levinson (2003) of many languages and cultures, in collaboration with anthropologists, linguists and psychologists. His focus is on the spatial coordinate systems in language and cognition, in particular, the robust correlation between coordinate systems available in the local language and non-linguistic spatial thinking. His overall results reveal the transformative power of language on thinking: even in a core cognitive domain of spatial thinking, language influences how people think, memorize and reason about spatial relations and directions. This line of study is followed by a series of psycholinguistic investigation on the relationship between spatial language and cognition, showing that linguistic differences can have far-reaching cognitive effects as far as the spatial domain is concerned (see Chapters 5 and 6 for details). Although these studies may diverge on theoretical frameworks and research methodologies, they reveal a systematic effect of spatial language on spatial thinking across different components of the spatial system (e. g. spatial reference, static location, motion events), varied types of experimental contexts (e. g. elicited production task, non-linguistic behavioural task), and different types of learners (L1 children and adults, L2 adults, children with language disorder). Such findings revive, to a large extent, the Whorfian hypothesis of linguistic relativity and lead to different revised versions (i. e. 'mild' or 'weak') of it (e. g. Slobin's [2004] 'Thinking for speaking' hypothesis).

The experimental studies reviewed and reported in the current book follow the strategy developed by Lucy (1992), summarized by Levinson (2003: 19) as follows:

a. Pick the domain of spatial expressions and spatial cognition.
b. Look at the linguistic coding of the spatial domain in different types of languages (such as English and Chinese in this case).
c. Look independently at the non-linguistic coding of spatial experi-

ence in non-linguistic cognition in speakers of English and Chinese.

In the particular domain of space, language and cognition, some fundamental questions recur, which include, but not restricted to:

a. How natural or innate spatial concepts are in human cognition?
b. What components of space do world languages readily encode and by what linguistic devices?
c. Which force mainly guides the acquisition of spatial expressions in L1 children and L2 learners, the cognitive universality of innate core knowledge of space or the properties unique to a given language that children are exposed to from their infanthood?
d. What is the nature of the relationship between spatial language and cognition? Are there varied modes of underlying spatial representations or a single framework of spatial representation that includes different modalities adaptive to local languages?

The current book does not seek to answer all the above questions; rather, it aims to illuminate certain aspects of these issues as regards two particular languages: English and Chinese. It extends the investigation to space and cognition by focusing on whether the spatial expressions of bilingual learners reflect language-specific modes of spatial conceptualization (Chapters 3 and 4) and whether children's spatial reasoning develops with their acquisition of spatial language (Chapters 5 and 6). Specifically, Chapters 3 and 4 examine verbal description of motion events by Chinese/English adult bilinguals in production tasks. If spatial expressions of advanced bilingual speakers still differ from those of monolinguals in ways that suggest influences from source and/or target languages, it can be concluded that language-specific differences are not superficial: learning a different language implies a new way of spatial conceptualization. Chapters 5 and 6 report a non-verbal similarity judgment task that aims to assess the mental conceptualization of motion events of Chinese and English par-

ticipants who are 3, 8 and adult. If children's judgment of the similarity of motion scenes is similar prior to acquiring the spatial language patterns exhibited by adults, but shows differences after such acquisitions, it can be concluded that language influences spatial cognition.

The book begins with a detailed review of an experimental study investigating children's motion expressions from typological and developmental perspectives (Chapter 2). The study under review compares, in the first instance, adults' expression of motion events in Chinese and English in an experimental situation, in which participants were asked to describe animated cartoons involving spontaneous and caused motion events. The results show that Chinese falls into different typological groups depending on event type: it looks more satellite-framed with spontaneous motion events, but more verb-framed with caused motion events. It is therefore suggested that Chinese presents a 'parallel' system in which both verb- and satellite-framed structures are available in equally frequent contexts. The study in focus further examines whether, and how, language-specific differences affect the course of children's acquisition of spatial language. The author investigates expressions of spontaneous and caused motion events in Chinese speakers at ages 3, 4, 5, 6, 8, 10 and adults, compared with motion descriptions in age-matched English speakers. The findings reveal universal cognitive influences: the number of motion components expressed in an utterance increased with age in both languages (more pronounced progression in English than in Chinese). In particular, there was a developmental progression in utterance density in caused motion expressions (all ages). Further, language-specific factors are found to have an equally important impact. Irrespective of the nature of motion (spontaneous or caused), utterance density was significantly higher for Chinese children than for English children between the ages of 3 and 8. This is largely because motion events are typically expressed in Chinese in a verb compound that greatly facilitates the simultaneous encoding of multiple information components. Such typological and developmental findings are reviewed in detail in Chapter 2, from various aspects, such as the theoretical debates concerning typological and acquisitional issues and specific coding strategies that can otherwise influence the results of the study.

After Chapter 2's theoretical and experimental background for studies to be reported in the book, Chapters 3 and 4 focus on whether the spatial expressions of bilingual learners reflect language-specific modes of spatial conceptualization. Given that earlier studies have shown variations in the mental representation of spatial events among bilingual learners of satellite-and verb-framed languages (Hohenstein *et al.* 2006), these two chapters aim to extend the research along this line to serial verb languages like Chinese. The rationale of this study is that if language-specific differences are only superficial and can be easily ignored once another language is spoken, then reorganization of spatial information in a second language should be less problematic. However, if spatial conceptualization is constrained by the specific properties of a given language and speaking a different language implies a new way of conceptualizing motion events, then bilingual learners will have difficulty in fully adapting to target spatial language patterns. Two specific research questions are explored in each chapter: a. how do motion expressions of Chinese/English adult bilinguals vary across proficiency levels (i. e. beginners, intermediate, advanced) within each L2 group? b. how do motion expressions of Chinese/English bilinguals differ from those of monolinguals at a given proficiency level? The analyses of the data focus on three aspects: a. information selection (e. g. manner, path, cause); b. information locus: in the verb root or in other devices (e. g. preposition, adverbial, gerund); c. information distribution across an utterance. Quantitative methods (*t*-tests and ANOVA) are used to measure group differences.

Chapters 5 and 6 focus on the development of spatial cognition in Chinese and English children. Previous studies of language influences on spatial conceptualization tend to zoom in on languages with opposing typological properties (satellite-versus verb-framed). These two chapters extend the research to Chinese, which shows both satellite-and verb-framing properties and presents a 'new' third type of 'equipollent' language in motion event typology (Slobin 2004). The two studies reported in these chapters involve languages showing less dramatic differences (equipollently-framed Chinese and satellite-framed English), with the aim of revealing whether the effects of language are strong enough to lead to variations in mental representation of space, even with minimal

differences between languages.

The majority of studies on spatial cognition are conducted with adults only (Levinson 2003). One criticism of such studies is that any differences between groups could be due to culture rather than language. The studies in Chapters 5 and 6 provide a rigorous test of linguistic influence on cognition by involving differently aged children to tie language acquisition to cognitive development. Given that previous research has shown some link between children's cognition and language acquisition in verb-and satellite-framed languages (Hohenstein 2005), it remains to be seen whether similar links would be evident in young learners of a serial verb language like Chinese. As such, these two chapters aim to determine whether a developmental pattern in acquisition of spatial language, as reviewed in Chapter 2, manifests itself in children's spatial cognition. The psycholinguistic studies investigate language-specific influences on mental representation of motion events by examining different aged learners of Chinese in comparison with learners of English. Two specific research questions are explored: a. how does conceptualization of motion events (change-of-location type) vary between speakers of Chinese and English? b. how does motion event conceptualization change across ages? Such investigations aim to test the linguistic relativity hypothesis (Whorf 1956), that is, if the results indicate that children's cognition is similar, prior to becoming accustomed to using the spatial language in ways typical to their native language, but then shows differences after such habitual use, it can be concluded that language-specific categories shape the way we mentally represent motion events.

Chapters 5 and 6 report non-verbal tasks, in which participants judge similarities between dynamic motion cartoons. The experimental design involves dozens of triads of cartoon clips. Within each triad, there is a target motion scene in which manner and path of motion are given (A boy walks into the room) and two alternative scenes: one shows variation in manner only (same-path: A boy *hops* into the room) and the other shows change in path only (same-manner: A boy walks *out of* the room). Older participants watch videos and select by computer button the stimulus most similar to the target. A 'number-shadowing' condition is provided in which numbers in random sequence are 'shadowed'