
Handbook of Bilingualism

Psycholinguistic Approaches

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Bilingualism and Thought

ABSTRACT This chapter discusses the implications of recent theoretical and empirical investigations in linguistic relativity for the study of bilingualism. It starts with a discussion of new developments in the study of the Sapir-Whorf hypothesis and then offers a framework for the study of bilingualism and thought from a neo-Whorfian perspective. Subsequently, it outlines nine areas in which current empirical inquiry either illuminates thought processes of adult bi- and multilingual individuals or offers productive directions for future studies of bilingualism and thought. The chapter ends with a discussion of ways in which research with bilingual individuals can offer unique contributions to the study of linguistic relativity and to the understanding of the interaction between language and thought.

Traditionally, research on bilingualism and cognition has focused on the implications of bilingualism for individual cognitive processes (cf. Biaystok, chapter 20, this volume). The goal of this type of inquiry is to show the impact of bilingualism *per se* rather than to examine how particular languages—and combinations of languages—may influence the thought processes of their speakers. Studies of the bilingual mental lexicon have commonly focused on lexical processing, rarely touching on linguistic and cultural specificity of conceptual representation. As a result, research in bilingualism has accumulated an impressive amount of knowledge on lexical and cognitive processing in bilingual individuals but tells us little about the impact of cross-linguistic and cross-cultural differences on thought processes (Pavlenko, 1999). In turn, cross-linguistic studies of conceptual representation have established numerous differences in conceptualization of space, time, or motion across speakers of different languages but do not clarify how divergent concepts may be represented in bi- or multilingual speakers.

The goal of the present chapter is twofold. On the one hand, it aims to illuminate thought processes of bilingual individuals whose languages encode particular concepts in different ways. On the other, it aims to write bilingualism into the

inquiry on linguistic relativity and to argue that an in-depth understanding of the relationship between language and thought is impossible without close attention to ways in which multiple languages and forms of thought interact in the minds of bi- and multilingual individuals.

I start with a brief discussion of new approaches to the study of linguistic relativity, paying particular attention to recent reformulations of the terms *language* and *thought*. Then, I critically survey existing proposals on the implications of the Sapir-Whorf hypothesis for users of more than one language and offer a framework for future studies of bilingualism and thought. Subsequently, I outline nine areas in which current empirical investigations either illuminate thought processes of adult bi- and multilinguals or offer productive directions for future inquiry. I end by pointing to ways in which research with bilingual individuals can offer unique contributions to the study of linguistic relativity and, more generally, to the understanding of the interaction between language and thought. Throughout the discussion, I use the terms *bilingualism* and *multilingualism* interchangeably to refer to the use of two or more languages by individual speakers and groups of speakers, as is common in the literature in the field.

Contemporary Approaches to Linguistic Relativity

Since 1992, there has been a new surge of interest in the theory of linguistic relativity, otherwise known as the Sapir-Whorf hypothesis. For Whorf (1956),

The “linguistic relativity principle” . . . means, in informal terms, that users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world. (p. 221)

The debates on linguistic relativity and on the writings of Benjamin Lee Whorf (1956) and his teacher and mentor Edward Sapir (1921, 1929) have waxed and waned throughout the 20th century. The 1960s and the 1970s, dominated by Chomskian generative linguistics, witnessed a profound disillusionment with the theory. Only a few staunch supporters, most notably Dell Hymes, weathered the storm; “most ‘responsible’ scholars have steered clear of relativism. It has become a *bête noire*, identified with scholarly irresponsibility, fuzzy thinking, lack of rigor, and even immorality” (Lakoff, 1987, p. 304). The current impetus for investigations in linguistic relativity came from the groundbreaking work of George Lakoff (1987), John Lucy (1992a, 1992b, 1997a), Dan Slobin (1996, 2000, 2001), and Stephen Levinson and associates (Bowerman & Levinson, 2001; Gumperz & Levinson, 1996; Levinson, 1996, 1997, 2003). Although I refer to these scholars as neo-Whorfians, this label does not imply that these scholars share a common view of linguistic relativity or the relationship between language and thought. Rather, they share a common interest in the ramifications of the Sapir-Whorf hypothesis and a desire to abandon the traditional debate about the merits of linguistic determinism versus linguistic relativity, a dichotomy that oversimplifies and misinterprets Sapir and Whorf’s original arguments. Instead, neo-Whorfians forge new, complex, and nuanced approaches to the study of ways in which different aspects of language may influence distinct modes of thought. They also acknowledge that some cognitive processes and modes of thought may not be affected by language at all. As a result of these changes, recent years saw both new, sophisticated theoretical proposals and empirical advances in the

study of the relationship between language and thought (Bowerman & Levinson, 2001; Gentner & Goldin-Meadow, 2003; Gumperz & Levinson, 1996; Lakoff, 1987; Levinson, 2003; Lucy, 1992a, 1992b, 1997a; Niemeier & Dirven, 2000; Nuyts & Pederson, 1997; Pütz & Verspoor, 2000).

How are language and thought conceptualized in this inquiry? Although traditional approaches to the study of linguistic relativity focus on structural differences between languages, some contemporary scholars argue that language cannot be neatly reduced to structure, and that structure should be considered as an intrinsic and constitutive, but not necessarily privileged, part of socially significant communicative practices (Duranti, 1994, 1997; Edwards, 1997; Hill & Mannheim, 1992; Rumsey, 1990; Sherzer, 1987). Consequently, rather than limiting themselves to the study of ways in which grammars of different languages may influence the thought of their speakers, these scholars transcend the boundaries of the traditional understanding of the Sapir-Whorf hypothesis and envision multiple ways in which language can influence thought on a variety of levels.

Lucy (1996) identifies three levels of interaction between language and thought: (a) the *semiotic* level, on which we can see the general impact of the use of any natural language; (b) the *structural* level, on which we can see the influence of lexical and morphosyntactic categories (this is the level traditionally connected to the Sapir-Whorf hypothesis); and (c) the *functional* level, which entails the influence of particular ways of speaking. To reflect current interest in discourses, Lucy (1996, 2000) proposes to refer to the functional level as *discursive relativity*, with discourses as social practices, rather than language structures alone, playing the key part in constituting speakers’ worlds.

The present discussion pays attention to both structural and functional, or discursive, levels of interaction between language and thought. The term *discourse* refers to a way of organizing knowledge through linguistic resources and practices or, in other words, to a concatenation of terms and metaphors drawn on systematically to characterize and evaluate actions and events from a particular perspective (Potter & Wetherell, 1987, p. 138). Unlike the traditional view of linguistic relativity, the functional approach is sensitive to alternative discursive constructions of reality that may be found within speech communities, influenced by age, gender, ethnicity, or socioeducational background of the speakers. In this view, two different languages are no longer alternative ways of describing the

“same reality”: They not only differ from each other, but also consist of multiple discourses associated with various contexts.

This approach was found to be productive in the study of language and space, previously explored exclusively through the lenses of structural relativity. Pederson (1995) found that rural and urban speakers of Tamil in South India differed systematically in their verbal and nonverbal performance on three problem-solving spatial tasks (a memory task, a route completion task, and inferencing) because of differences in habitual linguistic encoding of spatial information: Absolute references were more typical of Tamils from rural settings, and relative references were more typical for those from urban settings. His study suggests that even in areas such as spatial terminology, usually seen as uniform within a particular language, differences in discursive practices may result in differences in verbal and nonverbal performance.

Undoubtedly, different neo-Whorfian scholars espouse distinct views of language and of the relationship between language and thought. What is important for the present chapter is the shared acknowledgment that speakers' construction of the world may be influenced by the structural patterns of their languages, as well as by their discourses, and that it may be changed through participation in alternative discourses, such as schooling, or through additional language learning. This perspective builds on Whorf's (1956) original assumption that second language (L2) learning—just like socialization into new discourses—may result in assimilation of new perspectives and conceptual restructuring.

The goal of neo-Whorfian inquiry is to examine the influence of language, conceived of either as structures or as discourses, on thought. Thought is typically defined in two ways: Some scholars focus on the contents of thought, that is, speakers' conceptualizations of the world; others examine the processes of thinking, such as attending, remembering, or reasoning (Lucy, 1992b). More often than not, the two foci are combined, and the scholarly inquiry examines ways in which differences in linguistic encodings correspond to different conceptualizations and lead to differences in cognitive processes. Consequently, in what follows I see *concepts* as mental representations that affect individuals' immediate perception, attention, and recall and allow members of specific language and culture groups to conduct identification, comprehension, inferencing, and categorization along similar lines (Pavlenko, 1999).

This approach to conceptual representation recognizes that concepts are based on linguistic and perceptual bases and distinguishes between language-based (or language-related) concepts and concepts not immediately linked to language, for which language users may have a mental representation but no specific linguistic means of encoding. The latter possibility was also recognized by Whorf (1956), who emphasized his interest in “linguistic thinking” or “thought insofar as it is linguistic” (pp. 67–68).

Language-based concepts in turn are subdivided into lexicalized and grammaticized concepts. *Lexicalized* concepts entail lexical encodings of natural objects, artifacts, substances, events, or actions, and *grammaticized* concepts entail morphosyntactically encoded notions, such as number, gender, tense, or aspect (Slobin, 2001). Bruner (1996), Chafe (2000), Hill and Mannheim (1992), and Lucy (1992a, 1992b, 1996, 1997a) also argue for an expansion of the scope of the study of mental representations from lexicalized and grammaticized concepts to narrative structures, discourses, and discursive indexing of identities.

In addition to defining what one understands as language and thought, it is crucial to define what is considered as evidence of influence of language on thought. In the present chapter, I adopt Lucy's (1992a, 1996, 1997a, 2000) view that, to avoid showing the influence of “language on language,” one needs to consider (whenever possible) evidence from both verbal and nonverbal behaviors. *Non-verbal* behaviors refer to those elicited through classification, categorization, sorting, matching, memory, and role-playing tasks; *verbal* behaviors include elicitation, inferencing, and picture description, as well as interviews, storytelling, and other conversational activities (of particular importance here is the speakers' selection of aspects of reality for subsequent description and memorization). In this view, the influence of language on thought will be seen as the case where “the particular language interpretation guides or supports cognitive activity and hence the beliefs and behaviors dependent on it” (Lucy, 1997b, p. 295). Some scholars also argue that early psychological studies of linguistic relativity oversimplified the Sapir-Whorf hypothesis “to make it fit experimental paradigms” (Lee, 1997, p. 454) and, as a result, “effectively side-stepped looking at what people mean by what they say, and what they do, interactionally, with words” (Edwards, 1997, p. 22). Consequently, underscoring Whorf's original interest in “habitual thought,” neo-Whorfians

aim to combine experimental research with the study of thought in context, that is, in daily activities and practices, at the intersection of linguistics, psychology, and anthropology (Edwards, 1997; Hunt & Agnoli, 1991; Lucy, 1992b, 1996, 1997a).

In sum, neo-Whorfians acknowledge that different language levels may affect distinct cognitive processes and activities to varying degrees or not at all. Contemporary investigations of linguistic relativity, conducted both in experimental and naturalistic contexts, aim at uncovering ways in which cross-linguistic differences in lexical and morpho-syntactic categories, as well as in discourses, correspond to different conceptual representations of objects, actions, events, time, or space and lead to differences in thought processes.

Bilingualism and Linguistic Relativity

Over the years, bilingualism rarely entered into debates about language and thought: Current collections of work on linguistic relativity are devoted exclusively to explorations in monolingual contexts (for an exception, see a chapter by Gomez-Imbert in Gumperz & Levinson, 1996). This monolingual bias does not, however, come from Whorf (1956), one of the first to champion the importance of “multilingual awareness” and to argue that “to restrict thinking to the patterns merely of English, and especially to those patterns which represent the acme of plainness in English, is to lose a power of thought which, once lost, can never be regained” (p. 244).

Whorf’s writings clearly show his belief that additional language learning has the power of transforming or enhancing the speaker’s worldview. It is, therefore, ironic, that later on his work was misinterpreted as an argument for linguistic determinism, a view according to which the language one speaks determines one’s view of the world once and forever. Clearly, Whorf, an avid language learner committed to comparative linguistics, did not and could not entertain such a possibility; rather, he argued for the benefits of linguistic pluralism (Fishman, 1980). His early supporters expressed a similar interest in implications of linguistic relativity for L2 learning and use (J. Carroll, 1963) as well as an awareness that bilingualism of their research participants may have an impact on their findings (J. Carroll, 1963; J. Carroll & Casagrande, 1958). At times, they even expressed a belief that “whoever learns a new

language becomes a new person” (Rossi-Landi, 1973, p. 33).

Eventually, however, the phenomena of bilingualism and translation were co-opted to refute linguistic relativity in a way succinctly summarized by Stubbs (1997): “But languages are not incompatible. We can translate between them. And bilinguals speak different languages, but they do not perceive the world differently when they switch from one language to another” (p. 359). In the field of bilingualism, this thesis was espoused by Macnamara (1970, 1991), who repeatedly argued that if the Whorfian hypothesis were true, bilinguals would be doomed, having to conform to one of the three patterns: (a) “think” in Language A when speaking either A or B, that is, employ the semantic framework appropriate to Language A; as a result, the speakers’ attempts to understand Language B or to make themselves understood “would be quite futile” (Macnamara, 1991, p. 48); (b) “think” in a “hybrid” manner, appropriate to neither language, that is, employ a hybrid semantic system and risk “understanding no one and being understood by no one” (Macnamara, 1991, p. 48); (c) have two semantic systems, appropriate to their two languages. The third possibility, according to Macnamara (1970), means that bilinguals will think differently depending on which language is used and consequently will have difficulties (a) “communicating” with themselves and (b) translating into one language what was said in another. In a later paper, Macnamara (1991) took a less radical view and suggested that in the third case bilinguals would be able to translate and to communicate with speakers of either language. Yet, he claimed that these implications ran afoul of the guiding principles of natural language semantics—whatever can be expressed in one language, can be translated into another—and quipped that if linguistic relativity on the scale proposed by Whorf were true, then Whorf’s own learning of Hopi and Navaho would be “extremely mysterious” (Macnamara, 1991, p. 49), if not impossible.

Not surprisingly, other scholars in bilingualism, many of them bi- and multilingual themselves, tried to counter Macnamara’s (1970, 1991) and other similar arguments. Paradis (1979), in his reply to Macnamara (1970), argued that the first two options and difficulties with translation are indeed the case, and that none of the three cases described could be used to refute the Whorfian hypothesis *ad absurdo*. In fact, Macnamara’s first option closely describes the phenomenon of first language (L1) transfer, well established in the field of second

language acquisition (SLA) and indeed known to impede intercultural communication. His second option is reminiscent of a language contact situation in which speakers of a contact variety may develop new linguistic repertoires and new conceptualizations distinct from those employed by members of their L1 and L2 communities. And the third option well describes bicultural bilinguals who adjust their linguistic and conceptual repertoires depending on the interlocutor.

Interestingly, some bicultural bilinguals do indeed experience difficulties in translating from one language to another (cf. Todorov, 1994). These difficulties are often commented on by bilingual writers who view translation as an approximation at best (for an in-depth discussion of the work of bilingual writers, see Beaujour, 1989; Kellman, 2000; Pavlenko, 1998). Some of these individuals, particularly those who had learned a second language later in life, see themselves as living in two different and often incompatible worlds; others view L2 socialization as a means of an intense personal transformation (Beaujour, 1989; E. Hoffman, 1989; Kellman, 2000; Pavlenko, 1998; Wierzbicka, 1985). What emerges from these testimonies is a far more nuanced picture of linguistic effects than could ever be imagined within a monolingual perspective. This picture deserves further examination, if only because it directly contradicts facile statements about bilinguals not seeing the world differently through the lenses of their two languages. Consider, for instance, a statement by the well-known linguist Anna Wierzbicka (1985):

It is not impossible (though very difficult) to leave the experiential world of one's native language for that of another language, or stretching the metaphor to the limit, to inhabit two different worlds at once. But when one switches from one language to another it is not just the form that changes but also the content. (p. 187)

In fact, it is quite possible that bilinguals are the only ones to experience directly the effects of linguistic relativity, and to fully understand these effects, we need to pay more attention to linguistic transitions. Yet, many researchers continue to see bilingualism as a challenge for the Sapir-Whorf hypothesis and bilinguals as undesirable and "messy" subjects who should be excluded from experimental research to eliminate intervening variables. Clearly, initial empirical studies, such as Lucy's (1992a), had to be carried out with monolingual

speakers to establish baseline cross-linguistic differences. What is unfortunate is that once such differences have been established for particular languages or concepts, further research was rarely if ever conducted with bilingual speakers.

Several reasons explain this lack of attention to bilingualism. To begin, many linguists and psychologists, particularly in North America, are still reluctant to acknowledge that more than half of the world's population is bi- and multilingual (Romaine, 1995); thus, if we are to grapple with the Sapir-Whorf hypothesis or any other cognitive theory, we have to understand how it plays out with multilingual speakers. The research with bilingual subjects is further compromised by the lack of understanding of bilingualism in mainstream psychology. Some researchers treat bilingualism as a monolithic phenomenon and thus do not pay much attention to linguistic trajectories of their study participants; others consider it possible to use bilingual subjects as if they were monolingual, either completely discounting their bilingualism (Berlin & Kay, 1969, p. 12) or assuming that because the subjects had learned the L2 postpuberty, it would not affect their L1 (cf. Munnich, Landau, & Doshier, 2001).

These researchers are clearly unaware of two facts. First, the critical period is no longer a given in the field of SLA (Birdsong, 1999; Ioup, Boustagui, El Tigi, & Mosel, 1994), and even if it were, it had been posited (and explored) regarding phonological and syntactic but not conceptual competence. Furthermore, research has demonstrated that regardless of the age of acquisition, L2 learners' L1 competence in a variety of domains, including conceptual representation, is subject to L2 influence (Cook, 2003; Pavlenko, 2000).

Several scholars have pointed to the pervasive monolingual bias of explorations in cognitive psychology and linguistics. Hunt and Agnoli (1991) expressed concern over ways in which the scholarly community had ignored experiences of bilingual individuals, who may perceive their two worlds as untranslatable and incommensurable. Green (1998) cautioned against approaching all bilinguals in the same way because they may have different levels of expertise and different competences in their two languages. Ochs (1993) and Lee (1997) advocated a view of L2 socialization as enculturation into new ways of thinking and speaking.

Building on these proposals, I suggest that research on linguistic relativity can and should incorporate bilingualism as a test case rather than as an argument against the Whorfian hypothesis. The

context-sensitive view advocated here sees bilinguals as members of multiple discursive communities with linguistic repertoires that are not necessarily identical to those of monolingual speakers. Consequently, individual bilingualism is seen (a) as a conglomerate of linguistic and social trajectories, whereby differences in age and history of language acquisition, as well as in language proficiency, may lead to distinct effects of language on thought; (b) as a dynamic process whereby L2 socialization is viewed as a productive site of possible cognitive transformations and enrichment, in accordance with Whorf's (1956) original arguments. This perspective allows me to offer a framework (see also Pavlenko, 1999, 2000, 2002a) that incorporates seven possible relationships between language and thought in individual bi- and multilinguals:

1. *Coexistence of L1 and L2 conceptual domains* is directly implied by the Sapir-Whorf hypothesis and suggests that "bicultural bilinguals using different languages may draw on distinct conceptual representations and index distinct discursive identities.
2. *L1-based conceptual transfer* refers to the L1-based conceptual system guiding L2 language learning and use, at least in the beginning and intermediate stages of L2 acquisition.
3. *Internalization of new concepts* entails adoption of L2 words—and underlying concepts—into the L1 of immigrant bilinguals and learners in language contact situations who perceive the need to emphasize distinctions nonexistent in the L1 or to refer to new objects and notions specific to the L2 community.
4. *Shift from L1 to L2 conceptual domain* refers to a shift of category prototypes or boundaries in the process of L2 socialization.
5. *Convergence of L1 and L2 conceptual domains* entails creation of a unitary concept, domain, or system distinct from both the L1 and L2 based, which may occur in simultaneous bilingualism or arise as a result of language contact.
6. *Restructuring of a conceptual domain* refers to a case where a shift is not complete but certain elements may be deleted from or incorporated in a concept or a conceptual domain.
7. *Attrition of previously learned concepts* involves a loss of previously learned concepts, classification schemas, categorical distinctions, or narrative conventions, evidenced

in deviation from L1-based categorization patterns.

I will now review the evidence for these and other possible effects from the studies of linguistic relativity. Despite the fact that neo-Whorfian theorizing made requirements for convincing evidence more rigorous and the terms of debate more complex, several studies forged exciting new directions in the study of language and thought. I discuss this research in terms of cross-linguistic differences in nine basic concepts, which allow us to talk about our surroundings and experiences: color, objects and substances, number, space, motion, time, emotions, and personhood. I also discuss the findings in the inquiry on discursive relativity and autobiographical memory, paying particular attention to work that either illuminates bilinguals' thought processes or offers new directions for research in bilingualism.

Color

The domain of color reference has been at the center of debates on linguistic relativity for more than 50 years. This interest stems from the fact that different languages treat the notion of "color" differently by encoding varying numbers of colors in different ways (e.g., nominally, verbally, adjectivally) and making different semantic distinctions between hues. For instance, classic Greek did not distinguish between the colors English speakers call *blue* and *black*; contemporary Russian and Italian offer, respectively, two and four terms corresponding to the English *blue* (Hunt & Agnoli, 1991). Some languages, such as Fon (Benin) or Ngbaka-ma'bo (Central Africa), do not even conceptualize color as a dimension independent of other parameters of colored objects (Dubois, 1997; Lucy, 1997b).

Initial color studies offered some evidence that color codability (i.e., availability of a verbal label) makes colors more distinct and therefore more memorable (cf. Brown & Lenneberg, 1954; J. Carroll & Casagrande, 1958). In contrast, later studies argued that color perception is subject to universal, physiologically based constraints, and that it is perceptual salience, not language, that may cause differences in memory (Berlin & Kay, 1969; Heider, 1972). The split between proponents and opponents of universal constraints on color cognition is still characteristic of the field (cf. Hardin & Maffi, 1997). At the same time, the field has come

closer to acknowledging both biological and cultural/linguistic influences on color cognition.

The proponents of relativity acknowledge the physiological basis of color vision but argue that earlier studies were compromised because of the lack of attention to linguistic status of color terms and because of their reliance on focal colors, on the basic color terms of American English, on the Western concept of color, on bilingual informants (in Berlin & Kay, 1969), and on methodologies at odds with the researchers' own objectives (Dubois, 1997; Hardin & Banaji, 1993; Hunt & Agnoli, 1991; Lucy, 1992b, 1997b; Saunders & van Brakel, 1997a, 1997b). In turn, the supporters of universal constraints on color cognition agree that such influences may be moderated by language (cf. Davies & Corbett, 1997; Davies, Sowden, Jerrett, Jerrett, & Corbett, 1998). Studies show that, in some contexts, perception of and memory for colors may be influenced by their codability in the speaker's language, as seen on sorting, categorization, and memory tasks (Davidoff, Davies, & Roberson, 1999; Davies & Corbett, 1997; Davies et al., 1998; Kay & Kempton, 1984; Lucy, 1997b). For instance, speakers of Setswana (a Bantu language spoken in Botswana), a language that has a single term *botala* for *blue* and *green*, were more likely than speakers of English and Russian to group the two colors together (Davies & Corbett, 1997).

To date, only a few studies have addressed bilinguals' color concepts. Ervin-Tripp (1961/1973) demonstrated that Navaho-English bilinguals' color categories differ from those of monolingual speakers of English and Navaho and form one underlying system. In turn, bilingual speakers of Kwakwa'la (spoken on Vancouver Island) and English differentiate between *yellow* and *green* when speaking English but in Kwakwa'la stick to the composite term *lhenxa* (yellow-with-green) (Saunders & van Brakel, 1997a). Saunders and van Brakel (1997b) note that several informants in Kay and Berlin's subsequent research (Kay, Berlin, Maffi, & Merrifield, 1997; Kay, Berlin, & Merrifield, 1991) appeal to L2 loans from English and Spanish when discussing colors.

The L2 influence was also found in a study by Caskey-Sirmons and Hickerson (1977) that examined color boundaries of native speakers of Korean, Japanese, Hindi, Cantonese, and Mandarin who had learned English as adults. The researchers found that the boundaries for nonoverlapping color terms had shifted in the process of L2 socialization and were no longer comparable to the

areas mapped by monolingual speakers of these languages. For instance, in Hindi there is no word for *gray*. Not surprisingly, in the achromatic series monolingual Hindi speakers did not map the gray area. In contrast, three of five Hindi-English bilinguals did map such an area, showing sensitivity to the new distinction acquired in English.

In sum, it appears that, in the case of divergent color systems, bilinguals' conceptual representations and consequently patterns of verbal and nonverbal categorization may differ from those of monolingual speakers. These representations may be unified or language dependent and may incorporate new concepts and distinctions internalized in the process of L2 socialization.

Objects and Substances

The second prominent area of research involves linguistic and conceptual differences in representation of objects and substances. This line of inquiry derives from cross-linguistic differences in number marking. The majority of European languages are known as noun class languages and mark most nouns for number. These languages encode a count/mass distinction morphosyntactically; that is, they include the notion of "unit" or "form" as a part of a basic meaning of a noun, directing attention to number. Other languages, such as Yucatec, Japanese, or Mandarin, are known as classifier languages and lack a morphosyntactic count/mass distinction. In these languages, nouns commonly refer to substances, rather than objects, and must be accompanied by a numeral classifier that provides information about material properties of the referent (Foley, 1997; Lucy, 1992a). Because classifier languages provide no syntactic support for the object/substance distinction, they offer a natural arena in which to investigate cognitive behaviors of both children and adults.

Studies have established that children learning English show preference for shape-based classification of various objects as early as 2 years of age; similar preferences are shown by English-speaking adults. In contrast, Yucatec- and Japanese-speaking children and adults show preference for material-based classification on verbal and nonverbal tasks, with Yucatec adults exhibiting it also in their everyday activities (Gentner & Boroditsky, 2001; Imai, 2000; Imai & Gentner, 1997; Lucy, 1992a; Lucy & Gaskins, 2001). Zhang and Schmitt (1998) also investigated effects that particular types of classifiers have on conceptualization and categorization

of objects. Speakers of Mandarin in their studies perceived objects that share a classifier as more similar to each other than did speakers of English; in recall tasks, they were more likely than speakers of English to recall classifier-sharing objects in clusters.

To date, I know of no studies that address shape- versus material-based object categorization preferences of bilingual subjects to see whether, for instance, the learning of English modifies categorization preferences of Japanese speakers or vice versa. Other interesting questions in this area arise regarding childhood bilinguals: When does language start influencing categorization preferences in different domains? How do children reconcile incompatible patterns? Lucy and Gaskins (2001) suggest that in the area of object categorization such influence occurs in later childhood; work on motion patterns and spatial cognition shows that in these areas the influence starts early on (Bowerman & Choi, 2001; Gentner & Boroditsky, 2001; Gopnik, 2001).

In addition to number marking, languages may differ in ways they encode even such everyday objects as shoes and boots or cups and glasses. For instance, both English and Russian have translation equivalents of *cups/chashki* and *glasses/stakany*, but objects that English-speakers consider to be paper cups are seen as *stakanchiki* (small glasses) in Russian, a language in which "glassness" is defined through shape and the absence of handles rather than through material. As a result, speakers of languages that encode objects differently perform differently on sorting and categorization tasks (Kronenfeld, 1996; Malt, Sloman, & Gennari, 2003; Malt, Sloman, Gennari, Shi, & Wang, 1999).

A few studies also throw light on the bilinguals' performance. Graham and Belnap (1986) showed that intermediate and advanced Spanish learners of English who had resided in the United States less than a year exhibited L1-based categorization patterns in cases where boundary differences in English did not correspond to those in Spanish (e.g., in the case of *chair*, *stool*, and *bench* vs. *silla* and *banco*). Malt and Sloman (2003) asked three groups of L2 users of English to name common household objects in English. The stimuli consisted of 60 pictures of storage containers (bottles, jars, etc.) and 60 pictures of housewares (dishes, plates, bowls, etc.). The researchers reported that even the most advanced speakers in their study, ones who had been in the United States for 8 or more years and had 10 or more years of formal English instruction, exhibited some discrepancies from mono-

lingual naming patterns, especially when it came to the housewares.

Together, these findings point to a pervasive influence of L1-based categorization patterns and to difficulties in acquiring full conceptual representations in the L2. Future studies of object categorization will need to pay closer attention to similarities and differences in L1 and L2 categorization patterns and consider the possibility of L2 influence on L1, as well as the interaction between three or more languages with distinct patterns.

Number and Numeric Systems

The third line of inquiry also draws on differences in number marking, as well as on those in number encoding. As discussed, languages differ significantly in grammatical number marking: Classifier languages, such as Indonesian or Japanese, lack the category altogether; noun class languages, such as English, allow their speakers to differentiate one *basket* from two or more *baskets*; and some languages, like Yimas, differentiate among one *impram* (basket), two *impraml* (baskets), and more than two *impramat* (baskets) (Foley, 1997). Lucy's (1992a) work showed that, because objects are marked for number in English but not in Yucatec, speakers of the two languages differ systematically in memory for objects.

Languages also differ in number encoding, using a variety of systems. Most languages have a base number and number names that are often a contraction of smaller units. English, for instance, is a base 10 language in which 21 could be expressed as "two tens and one." Although base 10 system has now taken over most languages, numerical encoding remains highly variable, with base 2 used in some aboriginal languages in Australia and base 20 in Eskimo and Yoruba (Dehaene, 1997). The most transparent reflection of the decimal structure is found in the grammar of Asian languages with roots in ancient Chinese (Chinese, Japanese, and Korean among them), in which number names are fully congruent with the base 10 numeration system. When speakers of these languages learn numeracy, all they have to learn are the digits from 0 to 9 and the notion of place value; then they can generate numbers without any further memorization (e.g., 17 is represented as *seventeen* in English but as *ten-seven* in Korean or Japanese). In contrast, children learning English or French have to learn by rote not only the numerals from 0 to 10, but also those from 11 to 19, and the tens numbers

from 20 to 90. What are the cognitive consequences of these linguistic differences?

In a series of studies, Miura and associates (Miura, 1987; Miura, Kim, Chang, & Okamoto, 1988; Miura & Okamoto, 1989) compared cognitive representation of number of American, Chinese, Japanese, and Korean first graders by asking the children to construct various numbers with two types of rods, short ones that represented 1 unit, and longer ones that represented 10 units. They found that Chinese, Japanese, and Korean children preferred to use a combination of 10-unit and 1-unit rods, while American children were more likely to represent numbers through a collection of 1-unit rods. The researchers explained the difference through the fact that the notion of place value is an inherent component of linguistic encoding of number in Asian languages, but needs to be understood and internalized by English-speaking children. They also found that more Asian children than American children were able to construct each number in two ways, which suggests greater flexibility of mental number manipulation.

In turn, Miller and Stigler (1987) showed that Chinese children between 4 and 6 years of age outperformed English-speaking American children of the same age on abstract counting and on counting sets of objects varying in size and arrangement; Chinese children could also count higher than their American peers. The "teens" created a particular stumbling block for American children; they were also more likely to skip numbers and were the only ones to produce nonstandard numbers such as "forty-twelve."

Together, these studies suggest that number encoding in Asian languages facilitates understanding of basic mathematical concepts such as place value, numerical relations such as part-whole, and the mental manipulation of number quantities required for numerical reasoning. At the same time, it is also possible that dramatic differences between populations are enhanced by social and cultural factors (cf. Towse & Saxton, 1997). Furthermore, the early differences in understanding of the place value concept, mental flexibility, or counting skill may be strictly developmental; it remains to be determined what role, if any, they play in later mathematical performance.

Little is known at this point about implications of grammatical number marking differences for bilinguals' verbal and nonverbal performance, even though numerous studies have addressed mathematical performance of bilingual children and

adults (for a discussion, see Bialystok, chapter 20, this volume). These studies have established that some areas of numerical cognition are language-independent (Spelke & Tsivkin, 2001), that there is an advantage in calculation speed for the preferred language (Noel & Fias, 1998), that the preferred language is not necessarily the first one but may be the language of schooling (Vaid & Menon, 2000) or training (Spelke & Tsivkin, 2001), and that L1 dominance for mental computation may decrease with the length of residence in the L2 context (Tamamaki, 1993). These studies, however, focused on bilingualism per se, rather than on the effects of having two diverging numeric systems. Future studies could examine numeracy development in bilingual children who are learning two distinct numerical systems and see, for instance, whether there is transfer of skills and concepts, such as place value, from one language into another.

Space

The fourth area in which both lexicosemantic and morphosyntactic differences may be important involves conceptualization of space and memory for spatial arrangements. Cross-linguistic differences in conceptualization of space are commonly discussed in terms of three frames of reference. An *absolute* frame uses information external to both the speech participants and the figure-ground scene, such as north, south, east, or west; this frame is commonly used by the speakers of Tzeltal, a Mayan language, spoken in Mexico. An *intrinsic* frame uses the features of the object in question as the point of departure, and the *relative* or *deictic* frame is based on projections from the human body, such as "in front (of me)" or "to the left." The latter frames are commonly used by speakers of English or Dutch to describe small layouts for which absolute systems are not appropriate. Studies have shown that different speech communities may favor different reference frames. As a result, members of these speech communities differ systematically in their performance on verbal and nonverbal problem-solving, memory, role-playing, and description elicitation tasks, with Tzeltal speakers, for instance, favoring an absolute frame of reference for tabletop arrangements, and Dutch speakers opting for the relative one (Bowerman, 1996a, 1996b; M. Carroll, 1993, 1997; Choi & Bowerman, 1991; Levinson, 1996, 1997, 2003; Pederson, Danziger, Wilkins, Levinson, Kita, & Senft, 1998).

Munnich, Landau, and Doshier (2001) hypothesized that, because the distinction between immediate support (typically expressed with the preposition *on*) and nonsupport (typically expressed with the prepositions *above* or *over*) is obligatory in English but not in Japanese or Korean, speakers of these languages may differ in remembering contact information regarding specific spatial arrangements. Although speakers of Japanese and Korean did indeed differ from speakers of English on a linguistic task, there were no significant differences among the groups on a spatial memory task. These results may indicate that language does not influence this area of spatial cognition (as argued by the authors) or, alternatively, they may stem from the logic of the experiment or the nature of the stimuli. It is also possible that they are caused by the subject selection criteria. All of the Japanese and Korean participants in the study were undergraduate and graduate students in U.S. universities. The authors argued that, because the participants had learned their English after the age of 12, they would not be expected to have nativelike proficiency in English. In fact, their English proficiency is irrelevant (even though we can expect it to be relatively high). What is crucial here is the possibility that 10 or more years of English learning and subsequent residence in an English-speaking environment with high linguistic demands may have had an impact on the participants' L1 competence (Cook, 2003; Pavlenko, 2000). It is thus entirely possible that both the Japanese and Korean participants performed as bilinguals and not in a manner representative of monolingual speakers of the two languages.

To date, it is not yet clear how spatial information is represented in the memory of different types of bilinguals. Studies in SLA suggest that, at least in the initial and intermediate stages, L1-based spatial categories aid in the process of L2 learning, at times resulting in L1 transfer (Becker & Carroll, 1997; Jarvis & Odlin, 2000). In contrast, acculturated Russian L2 users of English were shown to transform their conceptualization of public space under the influence of the English concept of "personal space," which does not exist in Russian (Pavlenko, 2003). All of these studies, however, relied exclusively on verbal tasks. It is therefore critical to see how bilinguals whose languages favor different frames of reference would behave on nonverbal tasks of the kind used in the study by Pederson et al. (1998).

Motion

The fifth area, also influenced by both lexicosemantic and morphosyntactic differences, involves conceptualization of motion and thus memory for states and actions. Here, following Talmy (1991), researchers distinguish between two types of languages. *Satellite-framed* languages, such as English, favor constructions in which main verbs refer to the manner of motion and verb satellites indicate its path (e.g., *come in*, *run in*, *dash in*). These languages have an elaborate domain of manner of movement, presumably because it is obligatorily marked syntactically (Slobin, 2000). *Verb-framed* languages, such as French or Spanish, favor constructions in which the main verb refers to the path of motion and the marking of manner may require an additional verb (e.g., *entrar corriendo* to enter by running). (Clearly, most languages have both types of constructions, and this classification refers to the preferred construction rather than to the only one available.)

A series of large-scale cross-linguistic empirical studies conducted by Slobin and associates (Berman & Slobin, 1994; Slobin, 1996, 2000) convincingly demonstrated that speakers of satellite-framed languages represent manner and directed motion as a single conceptual event, while users of verb-framed languages build mental images of physical scenes with minimal focus on the manner of movement. Speakers of satellite-framed languages also tend to pay more attention to motor patterns, rate, and quality of movement than speakers of verb-framed languages and experience more mental imagery related to manner of movement in naturalistic contexts (Slobin, 2000). The work of Bowerman and Choi (Bowerman, 1996a, 1996b; Bowerman & Choi, 2001; Choi & Bowerman, 1991) demonstrated that children learning English, a satellite-framed language, and Korean, a verb-framed language, exhibit sensitivity to language-specific categorization principles before their second birthday and use these principles for non-linguistic cognitive purposes in categorization tasks and in everyday activities.

Again, little is known to date about ways in which motion categories are represented by bilingual speakers. Slobin (2000) found that, after reading a passage from Isabel Allende's *The House of Spirits*, Spanish-English bilinguals reported distinctly different imagery in the two languages, with more manner of motion imagery in English (but still much less than reported by monolingual

speakers of English). A series of empirical studies by Jarvis (1994, 2000) demonstrated that beginning and intermediate learners of English who described collisions appealed to L1 transfer in their use of motion verbs and produced strikingly different descriptions. In future studies, it is important to use a combination of verbal and nonverbal tasks to examine how motion is represented in bilinguals who speak a satellite-framed and a verb-framed language.

Time

Yet another concept intrinsically linked to both space and motion is time. Explorations of cross-linguistic differences in encoding and conceptualization of time are rooted in Whorf's (1956) original arguments about the lack of the time concept in Hopi. Several critics, most notably Gipper (1976) and Malotki (1983), argued against Whorf, pointing out that Hopi has a rich and extended temporal system. At the same time, both Gipper (1976) and Malotki (1983) admitted that, although their work rejects the notion of Hopi as a "timeless" language, it supports the idea that the Hopi sense of time and the role time plays in their lives and culture do not correspond to Western notions. Gipper (1976) described the Hopi time experience as cyclic rather than linear, and Malotki (1983) emphasized that "for a good many Hopi who are living on their ancestral land and are clinging to what is left of their ancient traditions, time is basically an organic experience which unfolds in harmony with the cyclic rhythms of their social, agricultural, or religious events" (p. 633). Lucy (1996) pointed out that Malotki (1983) and others, who look for a "concept of time" in Hopi, completely miss Whorf's crucial point about distinct structuration of the time words in English and Hopi grammars. In other words, the issue is the difference between conceptualizations of time rather than the lack or existence of an abstract time concept in Hopi.

The debate about the concept of time was so heated that not until recently did scholars dare to approach the issue again from a Whorfian perspective. To date, Boroditsky's (2001) study is the only one explicitly engaged with bilingual subjects. The researcher shows that English and Mandarin use different spatiotemporal metaphors when talking about time: English favors horizontal metaphors (e.g., *ahead* of time, *behind* schedule, looking

forward); Mandarin typically describes time as vertical, using spatial morphemes *shàng* (up) and *xià* (down) (notably, each language has a handful of the opposite metaphors as well). In her study, Boroditsky (2001) compared performance of native speakers of English and Mandarin-English bilinguals on a series of psycholinguistic tasks, all conducted in English. The subjects were first exposed to visual stimuli that served as either horizontal or vertical spatial primes. Then, they were asked to answer a true/false question about time, with half of the questions using a horizontal metaphor (March comes *before* April) and half using purely temporal terms (March comes *earlier* than April). She found that both English-speaking and Mandarin-speaking subjects answered the before/after questions faster after horizontal primes than after vertical primes. They did differ, however, on the purely temporal questions: English speakers answered them faster after horizontal primes and bilinguals after vertical primes. These differences were taken to signify differences in the temporal thought in the two speech communities, English and Mandarin.

Boroditsky (2001) also examined the effects of age of acquisition and length of exposure on reaction time. She found that age of acquisition—but not the overall length of exposure—was a reliable predictor of patterns of response: The later in life did the participants learn English, the more likely they were to show the vertical bias in their responses. It is unfortunate, however, that the researcher did not examine the effects of exposure to the L2 context, which are likely to differ from the effects of overall length of exposure (i.e., participants who had studied English for 10 years, 5 of them in the United States, may be much more competent and acculturated than those who studied English for 15 years, with only 1 or 2 of them in an English-speaking context). In future studies, it would be important to pay more attention to this variable and to conceptualizations of time on which speakers draw in daily language use and thus in "habitual thought."

Emotions

The next area of investigation, emotion terms and discourses, has produced a wealth of studies that explored cross-linguistic differences and their implications for how emotions are constructed—and experienced—in different cultures (Athanasidou

& Tabakowska, 1998; Edwards, 1997; Enfield & Wierzbicka, 2002; Harkins & Wierzbicka, 2001; Harré, 1986; Heelas, 1986; Kövecses, 2000; Lutz, 1988; Lutz & White, 1986; Markus & Kitayama, 1991, 1994; Wierzbicka, 1999). This work has been extended to an empirical context with both monolingual and bilingual subjects. Pavlenko's (2002c) study showed that speakers of Russian and American English exhibited systematic differences in their description of two short films portraying emotional situations. English encodes emotions through adjectives; as a result, American narrators discussed emotions as states. In contrast, Russian favors emotion verbs, particularly imperfective and reflexive verbs (it also contains some emotion adjectives and adverbs). Consequently, Russian narrators discussed emotions as actions and processes and paid more attention to the body language and movements of the film characters.

In a study in which the same visual stimuli were used with Russian-English bilinguals, Pavlenko (2002b) found that these bilinguals may be in the process of restructuring their basic concepts of emotion from process to state. In the Russian narratives, this restructuring resulted in instances of L2 influence on L1, such as incorporation of perception copulas and change-of-state verbs. Some bilinguals also seemed to have lost categorical distinctions between various emotions required by Russian. In turn, Rintell (1984) examined emotion identification by L2 users of English. The researcher found that intermediate learners of English, familiar with emotion vocabulary but not with emotion scripts (which include prosodic and pragmatic aspects of emotion performance), failed to identify some of the emotions when listening to tape-recorded conversations in English.

Together, the studies above suggest that different languages may rely on different means of linguistic encoding of emotions and on different conceptualizations. L2 learners, at least in the early stages, may be unfamiliar with culture-specific emotion scripts and conceptualizations and instead appeal to L1-based representations in comprehension and production. In the process of L2 socialization, bilinguals may transform their conceptualizations of emotions and possibly form two distinct emotion repertoires in their two languages. In the future, it would be advisable to look at areas in which emotion conceptualizations diverge and see how bi- and multilingual speakers categorize and express these emotions in their two languages.

Personhood

The eighth area of inquiry examines cross-linguistic differences in conceptualization of personhood. This notion is expressed both in lexicalized (e.g., forms of address, kinship terms) and grammaticized concepts (e.g., verbal marking). Most importantly, it is expressed in personal pronouns, which combine properties of both lexicalized and grammaticized concepts and encode complex relationships between selves and societies. Pronominal systems differ widely across languages, with some languages encoding only a few pronouns and others as many as 200 (Mühlhäusler & Harré, 1990). Studies in linguistic anthropology that examine pronominal systems, terms of address, and discourses of personhood suggest that "selves" and "persons" are differently conceptualized, encoded, and performed around the world (Becker, 1995; Foley, 1997; Markus & Kitayama, 1991, 1994; Mühlhäusler & Harré, 1990; Rosaldo, 1980; Shweder & Bourne, 1984). Some scholars view these differences in terms of the opposition between the egocentric, individualistic, and autonomous Western concept of self and the sociocentric, context-embedded conception espoused in many traditional societies (Foley, 1997; Shweder & Bourne, 1984). Others argue that this dichotomous view oversimplifies the issues, and that even within the same speech community selves may be constructed differently in distinct contexts (Hollan, 1992).

To date, only a few studies have attempted to examine some aspects of bilinguals' representations of personhood. C. Hoffman, Lau, and Johnson (1986) presented Chinese-English bilinguals with four character descriptions. Two contained lexical labels in English (*artistic type* and *liberal type*) but not Chinese, and the other two did the reverse. When the language of description did not offer a convenient lexical label, several sentences were used to describe the character in question. The analysis of the participants' performance on four tasks (free impression elicitation, free recall, recognition, and inference) demonstrated the effects of concept codability, that is, availability of lexical labels. When character traits were lexicalized, the participants exhibited superior performance on impression and recall tasks, while subjects without the benefit of a label exhibited superior memory on recognition tasks, which required close attention to presented information. These results suggest that bicultural bilinguals may possess two sets of language- and culture-specific personhood concepts

that are activated in interactions in the language in question and facilitate comprehension, recognition, and recall.

In turn, Heyman and Diesendruck (2002) explored how the distinction between the verb *to be* and its Spanish counterparts *ser* and *estar* influences the reasoning of Spanish-English bilingual children about human psychological characteristics. *Ser* commonly refers to permanent characteristics and properties; *estar* refers to temporary states and properties. The study showed that bilingual children had formed distinct conceptual representations of these verbs: They treated *ser* and *to be* as more likely to convey the stability of psychological characteristics than *estar*. In view of the difficulties experienced by native speakers of English in internalizing conceptual distinctions between *ser* and *estar*, this and similar contrasts (e.g., English *to know* versus Spanish *saber/conocer* or French *savoir/connaître*) could be productively explored in future research with bilinguals at different proficiency levels.

Future studies could also explore how bi- and multilinguals at different proficiency and cultural competence levels conceptualize and perform selves in relations to other persons. For instance, cultural competence in Japanese involves the ability to evaluate one's own status with regard to that of one's interlocutor(s) and to mark the differences linguistically in an appropriate manner without appearing either rude or exaggeratedly polite. Cultural competence in French or Russian involves the ability to differentiate appropriately between the informal and formal you (*tu/vous* or *ty/vy*). A nativelike conceptual representation of these lexicalized and grammaticized concepts would involve not only the knowledge of and about such distinctions, but also the knowledge of links between these categories and linguistic practices, namely, in which contexts particular personal pronouns, honorifics, forms of address, or caste terms are likely to be used.

Discourse

The next line of inquiry focuses on discourses, showing that members of different speech communities may rely on different interpretive stances, frames, and scripts to decide on the tellability of events and to reconstruct worlds in stories (Berman & Slobin, 1994; Chafe, 1980, 2000; Liebes & Katz, 1990; McCabe & Bliss, 2003; Sherzer, 1987; Slobin, 1996, 2000; Tannen, 1980). Ervin-Tripp's

(1954/1973, 1964/1973, 1967/1973) pioneering explorations have shown that bicultural bilinguals often draw on different cultural themes when responding to visual prompts in their respective languages. In a somewhat different format, her work has been followed up by Koven (1998), who examined ways in which simultaneous Portuguese-French bilinguals talked about the same personal experience in their two languages. She found that these children of Portuguese immigrants drew on different linguistic repertoires when telling their stories: In Portuguese, they resorted to colloquial discourses they had learned from their peasant parents and relatives; in French, they drew on discourses of urban youth. As a result, the stories in French exhibited a more critical stance and indexed the storytellers as tough Parisian youths, while the stories in Portuguese took a less empowered stance, linked to the speakers' rural and immigrant origins. Together, these studies point to the possibility of bilingual speakers indexing different identities in their two or more languages through the use of distinct linguistic repertoires.

Cross-linguistic studies of storytelling also suggest that different speech communities may rely on different narrative conventions and structures, the latter seen by Bruner (1996) as evidence of narrative thought. Western stories typically have a problem resolution part, while in some other cultures, the conflict is created but not necessarily resolved in the story; this in turn influences comprehensibility by interlocutors raised in different narrative traditions (Holmes, 1997; McCabe & Bliss, 2003; Mistry, 1993). Moreover, while most European languages favor temporal—and often chronological—narrative sequencing, stories told in the American Indian language Kuna focus much more on location, direction, and ways in which actions are performed, so that Western listeners and readers have difficulty following these narratives in translation (Sherzer, 1987). Here, future studies could build on previous inquiry identifying speech communities in which narratives are constructed differently and examining ways in which bi- or multilingual speakers construct stories about “the same” event in the languages in question.

Autobiographical Memory

The last line of inquiry to be discussed is investigation of bilingual autobiographic memory. Several studies, most notably the work of Schrauf and

associates, suggest that bilinguals tend to retrieve memories in the same language in which they were encoded or at least to report them more vividly and in more detail if reporting in the language of the event (Javier, Barroso, & Muñoz, 1993; Marian & Neisser, 2000; Schrauf, 2000; Schrauf & Rubin, 1998, 2003). The stories told in the language of the event are more elaborate, detailed, and emotional; they include more idea and thought units and evoke a higher level of imagery and emotional texture (Javier et al., 1993). At the same time, it is clear that most memories, like any other inner speech activities, can be translated according to the needs of the context, even though some aspects may be transformed or deleted in translation (cf. Pavlenko, 1998).

Interesting evidence regarding such transformations comes from memoirs of bilingual writers (Pavlenko, 1998, 2001; Todorov, 1994). These personal testimonies suggest that autobiographical tellings in the writers' two or more languages are often quite distinct and incompatible because the languages and the discourses associated with them shape the stories in distinct ways. This intriguing intersection between narrative conventions and autobiographic memory awaits further exploration with bilingual participants. Future inquiry will allow us to assess the impact of cross-linguistic differences in narrative structure and conventions on verbal recalls of events that took place in distinct linguistic contexts.

The studies of autobiographic memory also suggest that the metaphor of two—or more—different worlds is not simply a poetic affordance but an apt description of the lives of bicultural bilinguals. As Schrauf and Rubin (2003) state regarding bilingual immigrants, these bilinguals are people with dual sociocultural worlds or associational networks that consist of “an innumerable concatenation of forgotten, half-remembered, and vividly remembered contexts in which [they] came to communicative and cultural competence, learning where and when and how to be unconsciously ‘native’” (p. 134).

Interaction Between Languages and Thought in Bilingual Individuals

In sum, while recognizing that concepts not encoded in a particular language may nevertheless be imagined by its speakers, research has convincingly demonstrated that lexically and morphosyntacti-

cally encoded concepts sensitize speakers of a particular language to specific distinctions and ensure the ease and uniformity of everyday processes of encoding and decoding. In this, salient mental representations facilitate recall, categorization, and comprehension along the lines of habitual modes of thought and may complicate communication with members of other speech communities. We can also see that outcomes of the few studies with bilingual subjects are quite different from those with monolinguals. While the studies with monolingual participants show systematic intergroup differences (or lack thereof) in verbal and nonverbal performances, bilinguals may exhibit the seven—and possibly more—different performance patterns outlined in the beginning of the chapter.

To begin, some bilinguals draw on distinct conceptual representations when speaking their respective languages (Saunders & van Brakel, 1997a), experience different imagery related to the L1- and L2-based concepts (Slobin, 2000), draw on distinct discourses and linguistic repertoires, and index distinct discursive identities in their two languages (Ervin-Tripp, 1954/1973, 1964/1973, 1967/1973; Koven, 1998; Pavlenko, 1998, 2001). These verbal behaviors suggest coexistence of L1- and L2-based conceptual domains. Strong evidence has accumulated in support of the second pattern, L1-based conceptual transfer experienced by beginning and intermediate L2 learners (Becker & Carroll, 1997; Boroditsky, 2001; Graham & Belnap, 1986; Jarvis, 1994, 2000; Jarvis & Odlin, 2000; Pavlenko & Jarvis, 2002). The third pattern, internalization of new concepts, is well documented in the study of conceptually driven lexical borrowing, loan translation, and code switching in immigrant bilingualism (Pavlenko, 2002a; Romaine, 1995). Limited evidence is also available for processes such as shift (Caskey-Sirmons & Hickerson, 1977), convergence (Ervin-Tripp, 1961/1973), restructuring (Caskey-Sirmons & Hickerson, 1977; Pavlenko, 2002b), and attrition (Pavlenko, 2002b) of language-based concepts in the process of L2 socialization (for an in-depth discussion, see Pavlenko, 2002a).

Different types of bilinguals behave differently in experimental and natural contexts. Simultaneous bicultural bilinguals may develop representations different from those of sequential or late bilinguals; among late bilinguals, foreign language users and speakers with minimal exposure to the target language may differ from L2 users socialized into the target language community. Overall, language-influenced conceptual changes appear to be affected

by eight factors (for an in-depth discussion, see Pavlenko, 1999, 2000). *Individual* factors include (a) the speakers' language learning histories; (b) their language dominance and proficiency; (c) the degree of biculturalism and acculturation; and (d) expertise in the domain in question. *Interactional* factors include (e) the context of language interaction and (f) the linguistic status of the interlocutor (i.e., familiarity with the speaker's languages). *Linguistic* and *psycholinguistic* factors include (g) the degree of relatedness between the mental representations in the languages in question (concept comparability) and (h) the degree to which the concept of one language could be expressed in the other language and the means with which it is expressed (type of encoding).

Together, investigations of bilingual performance on verbal and nonverbal tasks and in natural contexts show that conceptual representations may be transformed in adulthood in the process of L2 socialization. These findings have important implications for the study of the bilingual mental lexicon. To date, most studies in this area have engaged with the lexical level of processing and representation. Conceptual processing, if included, was tested through naming and recognition tasks. The present discussion suggests that conceptual representations of bilingual individuals are complex and dynamic phenomena, and that to create a full picture of how specific concepts are represented in the memory of particular bilingual individuals or groups of individuals, a variety of verbal and nonverbal tasks will need to be used, including but not limited to naming, categorization, matching, inferencing, memory tasks, role playing, elicited storytelling, and most importantly, the study of habitual thought (i.e., spontaneous behavior in naturalistic contexts). Further research in this area has enormous potential for discovery of new effects of language on cognition that would be distinct from what we see in cross-linguistic explorations with monolingual speakers.

While I have outlined some directions for future inquiry in the respective sections, three more general comments need to be made. First, to date there are only a few studies that explore cross-linguistic differences in conceptual representation in bilingual individuals. None of these studies offers a rigorous combination of verbal and nonverbal tasks with extensive investigation of habitual modes of thought. In the future, it would be preferable to conduct studies that combine different types of evidence and explore effects in different kinds of bilingual individuals. Second, while at

least a few studies were conducted with bilingual individuals, none were conducted with other types of multilinguals; this lacuna is still awaiting to be filled. Finally, because recent inquiry suggests that sign language use may enhance individuals' face memory (Arnold & Mills, 2001), future inquiry also needs to consider possible cross-modal linguistic effects on the thought processes of hearing and deaf sign language users.

Conclusion

As Duranti (1997, p. 60) points out, the fact that our notions of language and worldview have changed means that some of the assumptions on which Sapir and Whorf's work was based are no longer taken for granted, and that the range of the phenomena investigated under the rubric of "linguistic relativity" has been modified and expanded. This chapter proposed a number of ways in which research on linguistic relativity could benefit from including bilingual subjects and, conversely, has shown how the study of the bilingual lexicon, memory, and cognition could gain from new directions offered in neo-Whorfian inquiry. Current empirical and phenomenological studies with bilingual subjects strongly suggest that languages may indeed create different worlds for their speakers, and that participation in discursive practices of a new target language community may transform these worlds. Together, these studies convincingly demonstrate that bilingualism could be extremely beneficial for enriching the speakers' linguistic repertoires and offering them alternative conceptualizations crucial for flexible and critical thinking. No one understood this better than Benjamin Lee Whorf, who more than 60 years ago argued that "those who envision a future world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice" (1941/1956, p. 244).

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References

- Arnold, P., & Mills, M. (2001). Memory for faces, shoes, and objects by deaf and hearing signers and hearing nonsigners. *Journal of Psycholinguistic Research*, 30, 185–195.
- Athanasidou, A., & Tabakowska, E. (Eds.). (1998). *Speaking of emotions: Conceptualisation and expression*. Berlin, Germany: Mouton de Gruyter.
- Beaujour, E. (1989). *Alien tongues: Bilingual Russian writers of the 'first' emigration*. Ithaca, NY: Cornell University Press.
- Becker, A. (1995). *Body, self, and society: The view from Fiji*. Philadelphia: University of Pennsylvania Press.
- Becker, A., & Carroll, M. (1997). *The acquisition of spatial relations in a second language*. Amsterdam: Benjamins.
- Berlin, B., & Kay, P. (1969). *Basic color terms: Their universality and evolution*. Berkeley, CA: University of California Press.
- Berman, R., & Slobin, D. (1994). *Relating events in narrative: A crosslinguistic developmental study*. Hillsdale, NJ: Erlbaum.
- Birdsong, D. (1999). *Second language acquisition and the critical period hypothesis*. Mahwah, NJ: Erlbaum.
- Boroditsky, L. (2001). Does language shape thought? Mandarin and English speakers' conceptions of time. *Cognitive Psychology*, 43, 1–22.
- Bowerman, M. (1996a). Learning how to structure space for language: A crosslinguistic perspective. In P. Bloom, M. Peterson, L. Nadel, & M. Garrett (Eds.), *Language and space* (pp. 385–436). Cambridge, MA: MIT Press.
- Bowerman, M. (1996b). The origins of children's spatial semantic categories: Cognitive versus linguistic determinants. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 145–176). Cambridge, U.K.: Cambridge University Press.
- Bowerman, M., & Choi, S. (2001). Shaping meanings for language: Universal and language-specific in the acquisition of spatial semantic categories. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 475–511). Cambridge, U.K.: Cambridge University Press.
- Bowerman, M., & Levinson, S. (Eds.). (2001). *Language acquisition and conceptual development*. Cambridge, U.K.: Cambridge University Press.
- Brown, R., & Lenneberg, E. (1954). A study in language and cognition. *Journal of Abnormal and Social Psychology*, 49, 454–462.
- Bruner, J. (1996). Frames for thinking: Ways of making meaning. In D. Olson & N. Torrance (Eds.), *Modes of thought: Explorations in culture and cognition* (pp. 93–105). Cambridge, U.K.: Cambridge University Press.
- Carroll, J. (1963). Linguistic relativity, contrastive linguistics, and language learning. *International Review of Applied Linguistics*, 1, 1–20.
- Carroll, J., & Casagrande, J. (1958). The function of language classifications in behavior. In Maccoby, E., Newcomb, Th., & E. Hartley (Eds.), *Readings in social psychology* (pp. 18–31). New York: Holt.
- Carroll, M. (1993). Deictic and intrinsic orientation in spatial descriptions: A comparison between English and German. In J. Altarriba (Ed.), *Cognition and culture* (pp. 23–44). Amsterdam: Elsevier.
- Carroll, M. (1997). Changing place in English and German: Language-specific preferences in the conceptualization of spatial relations. In J. Nuyts & E. Pederson (Eds.), *Language and conceptualization* (pp. 137–161). Cambridge, U.K.: Cambridge University Press.
- Caskey-Sirmons, L., & Hickerson, N. (1977). Semantic shift and bilingualism: Variation in color terms of five languages. *Anthropological Linguistics*, 19, 358–367.
- Chafe, W. (Ed.). (1980). *The Pear Stories: Cognitive, cultural, and linguistic aspects of narrative production*. Norwood, NJ: Ablex.
- Chafe, W. (2000). Loci of diversity and convergence in thought and language. In M. Pütz & M. Verspoor (Eds.), *Explorations in linguistic relativity* (pp. 101–123). Amsterdam: Benjamins.
- Choi, S., & Bowerman, M. (1991). Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition*, 41, 83–121.
- Cook, V. (2003). *Effects of the second language on the first*. Clevedon, U.K.: Multilingual Matters.
- Davidoff, J., Davies, I., & Roberson, D. (1999). Color categories in a stone-age tribe. *Nature*, 402, 604–605.
- Davies, I., & Corbett, G. (1997). A cross-cultural study of color grouping: Evidence for weak linguistic relativity. *British Journal of Psychology*, 88, 493–517.
- Davies, I., Sowden, P., Jerrett, D., Jerrett, T., & Corbett, G. (1998). A cross-cultural study of English and Setswana speakers on a color triads task: A test of the Sapir-Whorf hypothesis. *British Journal of Psychology*, 89, 1–15.
- Dehaene, S. (1997). *The number sense: How the mind creates mathematics*. New York: Oxford University Press.
- Dubois, D. (1997). Cultural beliefs as nontrivial constraints on categorization: Evidence from

- colors and odors. *Behavioral and Brain Sciences*, 20, 188.
- Duranti, A. (1994). *From grammar to politics: Linguistic anthropology in a Western Samoan village*. Berkeley: University of California Press.
- Duranti, A. (1997). *Linguistic anthropology*. Cambridge, U.K.: Cambridge University Press.
- Edwards, D. (1997). *Discourse and cognition*. London, England: Sage.
- Enfield, N., & Wierzbicka, A. (Eds.). (2002). The body in description of emotion: Cross-linguistic studies. Special issue. *Pragmatics and Cognition*, 10, 1-25.
- Ervin, S. (1973). Identification and bilingualism. In A. Dil (Ed.), *Language acquisition and communicative choice. Essays by Susan M. Ervin-Tripp* (pp. 1-14). Stanford, CA: Stanford University Press. (Original work published 1954)
- Ervin-Tripp, S. (1973). Semantic shift in bilinguals. In A. Dil (Ed.), *Language acquisition and communicative choice. Essays by Susan M. Ervin-Tripp* (pp. 33-44). Stanford, CA: Stanford University Press. (Original work published 1961)
- Ervin-Tripp, S. (1973). Language and TAT content in bilinguals. In A. Dil (Ed.), *Language acquisition and communicative choice. Essays by Susan M. Ervin-Tripp*, (pp. 45-61). Stanford, CA: Stanford University Press. (Original work published 1964)
- Ervin-Tripp, S. (1973). An issei learns English. In A. Dil (Ed.), *Language acquisition and communicative choice. Essays by Susan M. Ervin-Tripp* (pp. 62-77). Stanford, CA: Stanford University Press. (Original work published 1967)
- Fishman, J. (1980). The Whorfian hypothesis: Varieties of valuation, confirmation and disconfirmation: I. *International Journal of the Sociology of Language*, 26, 25-40.
- Foley, W. (1997). *Anthropological linguistics*. Oxford, U.K.: Blackwell.
- Gentner, D., & Boroditsky, L. (2001). Individuation, relativity, and early word learning. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 215-256). Cambridge, U.K.: Cambridge University Press.
- Gentner, D., & Goldin-Meadow, S. (Eds.). (2003). *Language in mind: Advances in the study of language and thought*. Cambridge, MA: MIT Press.
- Gipper, H. (1976). Is there a linguistic relativity principle? In R. Pinxten (Ed.) *Universalism versus relativism in language and thought. Proceedings of a colloquium on the Sapir-Whorf hypothesis* (pp. 217-228). The Hague, The Netherlands: Mouton.
- Gopnik, A. (2001). Theories, language, and culture: Whorf without wincing. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 45-69). Cambridge, U.K.: Cambridge University Press.
- Graham, R., & Belnap, K. (1986). The acquisition of lexical boundaries in English by native speakers of Spanish. *International Review of Applied Linguistics in Language Teaching*, 24, 275-286.
- Green, D. W. (1998). Bilingualism and thought. *Psychologica Belgica*, 38, 251-276.
- Gumperz, J., & Levinson, S. (Eds.). (1996). *Rethinking linguistic relativity*. Cambridge, U.K.: Cambridge University Press.
- Hardin, C., & Banaji, M. (1993). The influence of language on thought. *Social Cognition*, 11, 277-308.
- Hardin, C., & Maffi, L. (Eds.). (1997). *Color categories in thought and language*. Cambridge, U.K.: Cambridge University Press.
- Harkins, J., & Wierzbicka, A. (Eds.). (2001). *Emotions in crosslinguistic perspective*. Berlin, Germany: Mouton de Gruyter.
- Harré, R. (Ed.). (1986). *The social construction of emotions*. Oxford, U.K.: Blackwell.
- Heelas, P. (1986). Emotion talk across cultures. In R. Harré (Ed.), *The social construction of emotions* (pp. 234-266). Oxford, U.K.: Blackwell.
- Heider, E. (1972). Universals in color naming and memory. *Journal of Experimental Psychology*, 93, 10-20.
- Heyman, G., & Diesendruck, G. (2002). The Spanish *ser/estar* distinction in bilingual children's reasoning about human psychological characteristics. *Developmental Psychology*, 38, 407-417.
- Hill, J., & Martinheim, B. (1992). Language and world view. *Annual Review of Anthropology*, 21, 381-406.
- Hoffman, C., Lau, I., & Johnson, D. (1986). The linguistic relativity of person cognition: An English-Chinese comparison. *Journal of Personality and Social Psychology*, 51, 1097-1105.
- Hoffman, E. (1989). *Lost in translation. A life in a new language*. New York: Penguin Books.
- Hollan, D. (1992). Cross-cultural differences in the self. *Journal of Anthropological Research*, 48, 283-300.
- Holmes, J. (1997). Struggling beyond Labov and Waletzky. *Journal of Narrative and Life History*, 7, 91-96.
- Hunt, E., & Agnoli, F. (1991). The Whorfian hypothesis: A cognitive psychology perspective. *Psychological Review*, 98, 377-389.
- Imai, M. (2000). Universal ontological knowledge and a bias toward language-specific categories

- in the construal of individuation. In S. Niemeier & R. Dirven (Eds.), *Evidence for linguistic relativity* (pp. 139–160). Amsterdam: Benjamins.
- Imai, M., & Gentner, D. (1997). A crosslinguistic study of early word meaning: Universal ontology and linguistic influence. *Cognition*, 62, 169–200.
- Ioup, G., Boustagui, E., El Tigi, M., & Mosel, M. (1994). Reexamining the critical period hypothesis: A case study of successful adult SLA in a naturalistic environment. *Studies in Second Language Acquisition*, 16, 73–98.
- Jarvis, S. (1994). *L1 influence on interlanguage lexical reference*. Unpublished manuscript, Indiana University, Bloomington.
- Jarvis, S. (2000). Methodological rigor in the study of transfer: Identifying L1 influence in the interlanguage lexicon. *Language Learning*, 50, 245–309.
- Jarvis, S., & Odlin, T. (2000). Morphological type, spatial reference, and language transfer. *Studies in Second Language Acquisition*, 22, 535–556.
- Javier, R., Barroso, F., & Muñoz, M. (1993). Autobiographical memory in bilinguals. *Journal of Psycholinguistic Research*, 22, 319–338.
- Kay, P., Berlin, B., Maffi, L., & Merrifield, W. (1997). Color naming across languages. In C. Hardin & L. Maffi (Eds.), *Color categories in thought and language*. Cambridge, U.K.: Cambridge University Press.
- Kay, P., Berlin, B., & Merrifield, W. (1991). Bio-cultural implications of systems of color naming. *Journal of Linguistic Anthropology*, 1, 12–25.
- Kay, P., & Kempton, W. (1984). What is the Sapir-Whorf hypothesis? *American Anthropologist*, 86, 65–79.
- Kellman, S. (2000). *The translingual imagination*. Lincoln: University of Nebraska Press.
- Kövecses, Z. (2000). *Metaphor and emotion: Language, culture, and body in human feeling*. Cambridge, U.K./Paris: Cambridge University Press/Editions de la Maison des Sciences de l'Homme.
- Koven, M. (1998). Two languages in the self/the self in two languages: French-Portuguese bilinguals' verbal enactments and experiences of self in narrative discourse. *Ethos*, 26, 410–455.
- Kronenfeld, D. (1996). *Plastic glasses and church fathers: Semantic extensions from the ethnoscience tradition*. New York: Oxford University Press.
- Lakoff, G. (1987). *Women, fire, and dangerous things. What categories reveal about the mind*. Chicago: University of Chicago Press.
- Lee, P. (1997). Language in thinking and learning: Pedagogy and the new Whorfian framework. *Harvard Educational Review*, 67, 430–471.
- Levinson, S. (1996). Language and space. *Annual Review of Anthropology*, 25, 353–382.
- Levinson, S. (1997). From outer to inner space: Linguistic categories and non-linguistic thinking. In J. Nuyts & E. Pederson (Eds.), *Language and conceptualization* (pp. 13–45). Cambridge, U.K.: Cambridge University Press.
- Levinson, S. (2003). *Space in language and cognition*. Cambridge, U.K.: Cambridge University Press.
- Liebes, T., & Katz, E. (1990). *The export of meaning: Cross-cultural readings of Dallas*. New York: Oxford University Press.
- Lucy, J. (1992a). *Grammatical categories and cognition. A case study of the linguistic relativity hypothesis*. Cambridge, U.K.: Cambridge University Press.
- Lucy, J. (1992b). *Language diversity and thought. A reformulation of the linguistic relativity hypothesis*. Cambridge, U.K.: Cambridge University Press.
- Lucy, J. (1996). The scope of linguistic relativity: An analysis and review of empirical research. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 37–69). Cambridge, U.K.: Cambridge University Press.
- Lucy, J. (1997a). Linguistic relativity. *Annual Review of Anthropology*, 26, 291–312.
- Lucy, J. (1997b). The linguistics of “color.” In C. Hardin & L. Maffi (Eds.), *Color categories in thought and language* (pp. 320–346). Cambridge, U.K.: Cambridge University Press.
- Lucy, J. (2000). Introductory comments. In S. Niemeier & R. Dirven (Eds.), *Evidence for linguistic relativity* (pp. ix–xxi). Amsterdam: Benjamins.
- Lucy, J., & Gaskins, S. (2001). Grammatical categories and the development of classification preferences: A comparative approach. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 257–283). Cambridge, U.K.: Cambridge University Press.
- Lutz, C. (1988). *Unnatural emotions: Everyday sentiments on a Micronesian atoll and their challenge to Western theory*. Chicago: University of Chicago Press.
- Lutz, C., & White, G. (1986). The anthropology of emotions. *Annual Review of Anthropology*, 15, 405–436.
- Macnamara, J. (1970). Bilingualism and thought. In J. Alatis (Ed.), *Georgetown University 21st Annual Round Table* (Vol. 23, pp. 25–40). Washington, DC: Georgetown University Press.

- Macnamara, J. (1991). Linguistic relativity revisited. In R. Cooper & B. Spolsky (Eds.), *The influence of language on culture and thought: Essays in honor of Joshua A. Fishman's 65th birthday* (pp. 45–60). Berlin, Germany: Mouton de Gruyter.
- Malotki, E. (1983). *Hopi time. A linguistic analysis of the temporal concepts in the Hopi language*. Berlin, Germany: Mouton de Gruyter.
- Malt, B., & Sloman, S. (2003). Linguistic diversity and object naming by non-native speakers of English. *Bilingualism: Language and Cognition*, 6, 47–67.
- Malt, B., Sloman, S., & Gennari, S. (2003). Universality and language specificity in object naming. *Journal of Memory and Language*, 49, 20–42.
- Malt, B., Sloman, S., Gennari, S., Shi, M., & Wang, Y. (1999). Knowing versus naming: Similarity and the linguistic categorization of artifacts. *Journal of Memory and Language*, 40, 230–262.
- Marian, V., & Neisser, U. (2000). Language-dependent recall of autobiographical memories. *Journal of Experimental Psychology: General*, 129, 361–368.
- Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224–253.
- Markus, H., & Kitayama, S. (1994). The cultural construction of self and emotion: Implications for social behavior. In S. Kitayama & H. Markus (Eds.), *Emotion and culture: Empirical studies of mutual influence* (pp. 89–130). Washington, DC: American Psychological Association.
- McCabe, A., & Bliss, L. (2003). *Patterns of narrative discourse: A multicultural, life-span approach*. Boston: Allyn & Bacon.
- Miller, K., & Stigler, J. (1987). Counting in Chinese: Cultural variation in a basic cognitive skill. *Cognitive Development*, 2, 279–305.
- Mistry, J. (1993). Cultural context in the development of children's narratives. In J. Altarriba (Ed.), *Cognition and culture: A cross-cultural approach to psychology* (pp. 207–228). Amsterdam: Elsevier Science.
- Miura, I. (1987). Mathematics achievement as a function of language. *Journal of Educational Psychology*, 79, 79–82.
- Miura, I., Kim, C., Chang, C., & Okamoto, Y. (1988). Effects of language characteristics on children's cognitive representation of number: Cross-national comparisons. *Child Development*, 59, 1445–1450.
- Miura, I., & Okamoto, Y. (1989). Comparisons of U.S. and Japanese first graders' cognitive representation of number and understanding of place value. *Journal of Educational Psychology*, 81, 109–113.
- Mühlhäusler, P., & Harré, R. (1990). *Pronouns and people: The linguistic construction of social and personal identity*. Oxford, U.K.: Blackwell.
- Munnich, E., Landau, B., & Doshier, B. (2001). Spatial language and spatial representation: A cross-linguistic comparison. *Cognition*, 81, 171–207.
- Niemeier, S., & Dirven, R. (Eds.). (2000). *Evidence for linguistic relativity*. Amsterdam: Benjamins.
- Noel, M., & Fias, W. (1998). Bilingualism and numeric cognition. *Psychologica Belgica*, 38, 231–250.
- Nuyts, J., & Pederson, E. (Eds.). (1997). *Language and conceptualization*. Cambridge, UK: Cambridge University Press.
- Ochs, E. (1993). Constructing social identity: A language socialization perspective. *Research on Language and Social Interaction*, 26, 287–306.
- Paradis, M. (1979). Language and thought in bilinguals. In W. McCormack & H. Izzo (Eds.), *The Sixth LACUS Forum* (pp. 420–431). Columbia, SC: Hornbeam Press.
- Pavlenko, A. (1998). Second language learning by adults: Testimonies of bilingual writers. *Issues in Applied Linguistics*, 9, 3–19.
- Pavlenko, A. (1999). New approaches to concepts in bilingual memory. *Bilingualism: Language and Cognition*, 2, 209–230.
- Pavlenko, A. (2000). L2 influence on L1 in late bilingualism. *Issues in Applied Linguistics*, 11, 175–205.
- Pavlenko, A. (2001). "In the world of the tradition I was unimagined": Negotiation of identities in cross-cultural autobiographies. *The International Journal of Bilingualism*, 5, 317–344.
- Pavlenko, A. (2002a). Conceptual change in bilingual memory: A neo-Whorfian approach. In F. Fabbro (Ed.), *Advances in the neurolinguistics of bilingualism* (pp. 69–94). Udine, Italy: Udine University Press.
- Pavlenko, A. (2002b). Bilingualism and emotions. *Multilingua*, 21, 45–78.
- Pavlenko, A. (2002c). Emotions and the body in Russian and English. *Pragmatics and Cognition*, 10, 201–236.
- Pavlenko, A. (2003). Eyewitness memory in late bilinguals: Evidence for discursive relativity. *The International Journal of Bilingualism*, 7, 3, 257–281.
- Pavlenko, A., & Jarvis, S. (2002). Bidirectional transfer. *Applied Linguistics*, 23, 190–214.
- Pederson, E. (1995). Language as context, language as means: Spatial cognition and habitual language use. *Cognitive Linguistics*, 6, 33–62.

- Pederson, E., Danziger, E., Wilkins, D., Levinson, S., Kita, S., & Senft, G. (1998). Semantic typology and spatial conceptualization. *Language*, 74, 557–589.
- Potter, J., & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behavior*. London: Sage.
- Pütz, M., & Verspoor, M. (Eds.). (2000). *Explorations in linguistic relativity*. Amsterdam: Benjamins.
- Rintell, E. (1984). But how did you *feel* about that? The learner's perception of emotion in speech. *Applied Linguistics*, 5, 255–264.
- Romaine, S. (1995). *Bilingualism* (2nd ed.). Oxford, U.K.: Blackwell.
- Rosaldo, M. (1980). *Knowledge and passion: Ilongot notions of self and social life*. Cambridge, U.K.: Cambridge University Press.
- Rossi-Landi, F. (1973). *Ideologies of linguistic relativity*. The Hague, The Netherlands: Mouton.
- Rumsey, A. (1990). Wording, meaning, and linguistic ideology. *American Anthropologist*, 92, 346–361.
- Sapir, E. (1921). *Language: An introduction to the study of speech*. New York: Harcourt, Brace, & Company.
- Sapir, E. (1929). The status of linguistics as a science. *Language*, 5, 207–14.
- Saunders, B., & Van Brakel, J. (1997a). Are there nontrivial constraints on color categorization? *Behavioral and Brain Sciences*, 20, 167–179.
- Saunders, B., & Van Brakel, J. (1997b). Color: An exosomatic organ? *Behavioral and Brain Sciences*, 20, 212–220.
- Schrauf, R. (2000). Bilingual autobiographical memory: Experimental studies and clinical cases. *Culture and Psychology*, 6, 387–417.
- Schrauf, R., & Rubin, D. (1998). Bilingual autobiographical memory in older adult immigrants: A test of cognitive explanations of the reminiscence bump and the linguistic encoding of memories. *Journal of Memory and Language*, 39, 437–457.
- Schrauf, R., & Rubin, D. (2003). On the bilingual's two sets of memories. In R. Fivush & C. Haden (Eds.), *Autobiographical memory and the construction of a narrative self: Developmental and cultural perspectives* (pp. 121–145). Mahwah, NJ: Erlbaum.
- Sherzer, J. (1987). A discourse-centered approach to language and culture. *American Anthropologist*, 89, 295–309.
- Shweder, R., & Bourne, E. (1984). Does the concept of the person vary cross-culturally? In R. Shweder & R. LeVine (Eds.), *Culture theory: Essays on mind, self, and emotion* (pp. 158–199). Cambridge, MA: Harvard University Press.
- Slobin, D. (1996). From “thought and language” to “thinking for speaking.” In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70–96). Cambridge, U.K.: Cambridge University Press.
- Slobin, D. (2000). Verbalized events: A dynamic approach to linguistic relativity and determinism. In S. Niemeier & R. Dirven (Eds.), *Evidence for linguistic relativity* (pp. 107–138). Amsterdam: Benjamins.
- Slobin, D. (2001). Form-function relations: How do children find out what they are? In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 406–449). Cambridge, U.K.: Cambridge University Press.
- Spelke, E., & Tsivkin, S. (2001). Initial knowledge and conceptual change: Space and number. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 70–97). Cambridge, U.K.: Cambridge University Press.
- Stubbs, M. (1997). Language and the mediation of experience: Linguistic representation and cognitive orientation. In F. Coulmas (Ed.), *The handbook of sociolinguistics* (pp. 358–373). Oxford, U.K.: Blackwell.
- Talmy, L. (1991). Path to realization: A typology of event conflation. *Proceedings of the 17th Annual Meeting of the Berkeley Linguistics Society*, 480–519.
- Tamamaki, K. (1993). Language dominance in bilinguals' arithmetic operations according to their language use. *Language Learning*, 43, 239–262.
- Tannen, D. (1980). A comparative analysis of oral narrative strategies: Greek and American English. In W. Chafe (Ed.), *The Pear Stories: Cognitive, cultural, and linguistic aspects of narrative production* (pp. 51–87). Norwood, NJ: Ablex.
- Todorov, T. (1994). Dialogism and schizophrenia. In A. Arteaga (Ed.), *An other tongue. Nation and ethnicity in the linguistic borderlands* (pp. 203–214). Durham, NC: Duke University Press.
- Towse, J., & Saxton, M. (1997). Linguistic influences on children's number concepts: Methodological and theoretical considerations. *Journal of Experimental Child Psychology*, 66, 362–375.
- Vaid, J., & Menon, R. (2000). Correlates of bilinguals' preferred language for mental computations. *Spanish Applied Linguistics*, 4, 325–342.
- Whorf, B. (1956). *Language, thought, and reality* (J. B. Carroll, Ed.). New York: Wiley.

- Wierzbicka, A. (1985). The double life of a bilingual. In R. Sussex & J. Zubrzycki (Eds.), *Polish people and culture in Australia* (pp. 187–223). Canberra: Australian National University.
- Wierzbicka, A. (1999). *Emotions across languages and cultures: Diversity and universals*. Cambridge, U.K./Paris: Cambridge University Press/Éditions de la Maison des Sciences de l'Homme.
- Zhang, S., & Schmitt, B. (1998). Language-dependent classification: The mental representation of classifiers in cognition, memory, and ad evaluations. *Journal of Experimental Psychology: Applied*, 4, 375–385.

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