19

CONCLUSION: COGNITIVE LINGUISTICS, SECOND LANGUAGE ACQUISITION AND L2 INSTRUCTION—ISSUES FOR RESEARCH

Peter Robinson and Nick C. Ellis

1 Introduction: Language use and language learning

Cognitive Linguistics and usage-based models explain how we learn language using environmentally adaptive, domain-general, cognitive abilities (such as attention scheduling and working memory). We learn language while processing input and *doing* things with words and gesture in socially conventionalized ways (narratives, conversations) to communicate intentions and ideas to others (see Bybee, 2006; Goldberg, 2006; Gullberg, 2006; Hudson, 2007; Langacker, 1999; MacWhinney, 1999; O' Grady, 2005; Talmy, 2000; Tomasello, 2003 and their chapters in this volume). Functionalist and concept-oriented approaches to first and second language acquisition (SLA) share complementary interests in these issues (e.g., Andersen, 1984; Bardovi-Harlig, 2000; Bates, 1976; Bates & MacWhinney, 1982; Becker & Carroll, 1997; Berman, 1987; Berman & Slobin, 1994; Bloom, 1970; Cromer, 1974; Dietrich, Klein & Noyau, 1995; Givon, 1985, 1995; Greenfield & Smith, 1976; Hickman, 2003; Karmiloff Smith, 1979; Klein, 1986; Li & Shirai, 2000; Mandler, 2004a; Nelson, 1996; Perdue, 1993a, 1993b; Sato, 1990; Schumann, 1978; Schlesinger, 1982; Slobin, 1973, 1985; Snow & Ferguson, 1977; Stromqvist & Verhoeven, 2004; Tomlin, 1990; Von Stutterheim & Klein, 1987). Cognitive Linguistics describes how cognitive routines (focusing attention, event construal) and conceptual structure interface with language in the mind, and how the *processes* that give rise to learning are embodied in adaptive responses to communicative contexts and task demands (Coventry & Guijarro Fuentes, this volume; Lakoff & Johnson, 1998; MacWhinney, 1999;

Tomasello, 1999, 2003; Tomasello, Kruger & Ratner, 1993) which mediate, and so variably direct and support them (Ceci, 1996; Dai & Sternberg, 2004; Engestrom & Middleton, 1996; Lave & Wenger, 1991; Sternberg & Wagner, 1994; Snow, 1994; Suchman, 1987).

Cognitive Linguistics and usage-based models therefore emphasize that language is learned from participatory experience of processing input and producing language during *interaction* in social contexts where individually desired non-linguistic outcomes (a bank transfer, another cup of milk) are goals to be achieved (or not) by communicating intentions, concepts and meaning with others. These issues are complementary, too, to pedagogic rationales for adult second language (L2) learner needs analysis, communicative language teaching, and the design of materials and programs that aim to deliver it (Breen & Candlin, 1980; Crombie 1985; Johnson, 1996, 2004; Long, 2006; Long & Doughty, in press; Milanovich & Saville, 1996; Munby, 1978; Norris, Brown, Hudson & Yoshioka, 1998; Van den Branden, 2006; Widdowson, 1978; Wilkins, 1976); to proposals for when and how to intervene in L2 communication to focus attention on form–meaning relationships during classroom interaction (Achard, this volume; Doughty, 2001; Doughty & Williams, 1998; Ellis, 2006, this volume; Long, 1991, 2007; Long & Robinson, 1998; Tyler, this volume; VanPatten, 2004); and to proposals for task-based language teaching that claim increasing the complexity of the communicative and conceptual demands of tasks directs learner attention to the "code" resources different languages make available to meet them, and that sequencing tasks on this basis thereby promotes "rethinking" for speaking and interlanguage development (Garcia Mayo, 2007; Gilabert, 2004, 2007; Ishikawa, 2007; Kuiken, Moss & Vedder, 2005; Kuiken & Vedder, 2007; Rahimpour, 1999; Robinson, 1996b, 2001a, 2001b, 2003b, 2005a, 2007a, in press; Robinson & Gilabert, in press; Robinson, Ting & Urwin, 1995).

Findings from research into Cognitive Linguistic, usage-based learning are also important to understanding core issues in cognitive psychology and learning theory such as the nature of the cognitive processes involved in category formation and induction (e.g., Anderson & Lebriere, 1998; Elman, 2004; Gentner, Holyoak & Kokinov, 2001; Hudson, 2007, this volume; Holland, Holyoak, Nisbett & Thagard, 1989; Mandler, 2004b; Murphy & Ross, 2005; Nosofsky, 1986; Palmeri, 1997; Pothos, 2005; Rosch, 1975; Sloman & Rips, 1998; Smith & Medin, 1981; Taylor, 1995, this volume), and the cognitive abilities contributing to implicit and explicit learning and automatization of this (L1, L2, and other) knowledge (Bybee, 2006, this volume; Carlson, 1997; Carroll, 2001; DeKeyser, 1997, 2001, 2007; Ellis, 1994, 1995, 2002, 2003, 2005, in press, this volume; Ellis & Schmidt, 1998; Hulstijn, 2001; Hulstijn & Ellis, 2005; Hulstijn & Schmidt, 1994; Knowlton & Squire, 1996; Logan, 1988; MacWhinney, this volume; Perruchet & Vintner, 2002; Reber, 1993; Reber & Allen,

1978, 2000; Robinson, 2003a, 2004, 2005b; Robinson & Ha, 1993; Schmidt, 1992, 1994, 1995; Speelman & Kirsner, 2005).

The issues raised, and implications drawn, are thus wide in scope since Cognitive Linguistics deals broadly with the relationships between language function, linguistic expression and conceptual structure. The "unit" of description Cognitive Linguistics provides for capturing these relationships during language use and language learning is the "construction" (see, e.g., the chapters by Achard, Ellis, Goldberg & Casenhiser, Gries, Langacker, Lieven and Tomasello, and O'Grady this volume). Goldberg (2006) and Tomasello (2003) have both described in detail how constructions—at various levels of schematicity—and usage-based learning, together, provide the complementary *property* (what knowledge is at point A) and *transition* theories (how it changes to knowledge at point B over time, see Cummins, 1983; Gregg, 2001) that are necessary for explaining *first* language (L1) acquisition. However, *reconstructing* a language, and learning an L2, clearly poses additional issues to those involved in constructing it during child L1 acquisition, and these fall into two broad areas in need of further theory and empirical research.

Firstly, the *input* to L1 and instructed adult L2 learning differs in quantity and consistency, and in acknowledgement of this a number of compensatory pedagogic L2 interventions have already been proposed and researched (see, e.g., Chaudron, 1988; Doughty, 2001, 2003; Gass, 2003; Long, 2007; Mackey & Gass, 2006; Parker & Chaudron, 1987; White, 1998; Yano, Long & Ross, 1994). Research into child language learning described by Goldberg and Casenhiser, this volume, provides experimental evidence of the optimizing effects of manipulating type and token frequencies, and skewing input to speed construction learning which may offer some additional insights of pedagogic value in this regard. How we assess whether second language (L2) learners have constructions, what they are, and how type and token frequency in the input to usage-based learning affects their L2 abstraction, generalizability, and productivity in L2 use throughout development are some of the issues for research that we consider in detail in the third section of this chapter.

Secondly, L1 constructions, their form–meaning pairings, are *entrenched* in the adult L2 learner and so are likely to affect L2 construction learning and the processes of function-form and form-function mapping in comprehension and production in variable ways (see MacWhinney, this volume). Languages differ in the way they "structure concepts" requiring expression during communication, by "windowing attention" to aspects of event structure that are available for coding linguistically (Talmy, 2000, this volume). Consequently, ways of "thinking for speaking" (Cadierno, this volume; Odlin, this volume; Slobin, 1996, 2004) at the conceptualization stage of message production (de Bot, 1992; Kormos, 2006; Levelt, 1989) have to be realigned with L2 syntactic and grammatical encoding

options during message formulation and it is not yet clear how revised encoding procedures that follow from "rethinking-for-speaking" could become established in the L2 user during development, or how they are related to the prior stage in message formulation, i.e., L2 lexical encoding and lemma activation. These are issues for research that we consider in the fourth section of this chapter.

Linguistic theory and the descriptions of language it leads to, like findings from research into Second Language Acquisition (SLA), can, but need not, be directly relevant to language instruction. As Langacker, this volume, reminds us, "the impact of linguistic theory on language pedagogy has been less than miraculous and sometimes less than helpful." Over and above *descriptive* and *explanatory* adequacy, a view of language, and the units it characterizes as available for description, must also have *utility* value for pedagogic decision-making at a range of levels, e.g., from dictionary and materials design, to the articulation of portable and accessible classroom explanations, to the assessment of language needs, proficiency and progress (see Achard, this volume: Gries, this volume; Halliday, MacIntosh & Strevens, 1964; Hudson, this volume; Hutchinson & Waters, 1978; Langacker, this volume; Rutherford & Sharwood Smith, 1988; Swales, 1990; Tyler, this volume; Widdowson, 1990 for discussion). These latter, as yet little-explored, utility issues aside, in the following section we describe why we feel, in principle, the *view* of language characterized by Cognitive Linguistics and captured by usage-based models of construction learning, supplements (not supplants) many current educational concerns and practices in L2 pedagogy, before summarizing issues we propose for empirical research into these in the remaining two sections of this chapter.

2 Linguistics, language acquisition and language teaching

Over the last fifty years, as Tyler (this volume) notes, there have been a "dizzying array of approaches to L2 teaching." In part this has been because various characterizations of language (its properties) have been adopted in theories of SLA (see Ritchie & Bhatia, 1996) and often conflicting implications from these have been drawn for L2 instruction. In the 1950s, structural approaches to linguistic description (Fries, 1952) and the Contrastive Analysis Hypothesis of Second Language Acquisition (Lado, 1957) were both drawn on to motivate audiolingual methodology and materials for language teaching (see Howatt & Widdowson, 2004, for review). What all L2 learners had to do, the audiolingual method assumed, was habituate to the L2 "structural patterns" that differed from those in the L1 (what Fries, 1957, called learners' "blind spots"; cf. Ellis' discussion of "learned inattention," this volume), and in these areas of

L1-L2 contrast language production, pattern practice, and explicit negative feedback were provided to jointly facilitate this L2 "learning" process. What Fries (1952, p. 56) called "structural meaning" was emphasized in materials design and methodology, and in order to highlight it, "lexical meaning" and variation were minimized and controlled during instructional exposure. However, this particular co-articulation of property and transition theory, and the pedagogy it gave rise to, were soon called into question.

Supplanting the first element in this equation, in the 1960s "generative" approaches to linguistic theory were proposed, positing "deep" universal properties of human languages underlying apparent "surface structure" differences between them (Chomsky, 1965). Innate knowledge of these purely "formal" properties was invoked to explain how all L1 learners could proceed at the same rate, and with the same guarantee of success, despite variation in, and the "logical" insufficiency of, the amount of input and negative feedback they received, and regardless of the apparent surface-level discrepancies between the languages they learned. Complementary to these proposals, SLA research into "interlanguage" (Selinker, 1972) and "natural" sequences of Second Language Acquisition, which were seemingly shared with child L1 learners and robust despite L1 differences among populations of L2 learners (Dulay & Burt, 1974; Dulay, Burt & Krashen, 1982; Felix, 1981; Lightbown, 1983), led to the non-interventionist "Natural Approach" (Krashen & Terrell, 1983) to L2 instruction and the "Procedural Syllabus" (Prabhu, 1987) for delivering it. These prioritized the provision and pedagogic sequencing of comprehensible input, alone: L2 learners' language production, and negative feedback on it which attempted to direct learners' attention to the formal elements of language, and how they encode meanings, were seen to be of little, if any, importance, and neither was encouraged. But subsequent empirical research into the effects of L2 instruction showed that a focus on meaning alone, as in the Natural Approach, French Canadian immersion, and other non-interventionist programs of instruction (see Long & Robinson, 1998 for review)—while leading to considerable levels of success in activities requiring L2 listening and reading abilities (see Cummins, 1988; Siegel, 2003)—resulted in a limited (not natural) acquisitional endstate, especially as revealed by evidence of the poor oral L2 production abilities of learners after many years in, and upon exiting, bilingual-immersion programs (Day & Shapson, 1991; Gass, 2003; Harley & Swain, 1984; Lightbown, 2000; Swain, 1985).

Many contemporary approaches to L2 instruction, by contrast, are interventionist, allowing a role for a "Focus on Form" (Doughty & Williams, 1998: Long, 1991) during meaningful engagement with the L2, and in some cases adopting task-based approaches to organizing curriculum content (Candlin & Murphy, 1987; Long, 1985, 2007; Long & Norris,

2000; Van den Branden, 2006). In these approaches communicative tasks are theorized and designed along dimensions contributing to their information-processing demands on L2 comprehension and production, and also along dimensions contributing to the nature and amount of interaction they encourage and require for successful completion (Bygate, Skehan & Swain, 2001; Cameron, 2001; Ellis, 2003; Garcia Mayo, 2007; Gass & Crookes, 1993; Long, 1989, 1996; Mackey & Gass, 2006; Robinson, 2001b, 2007a, in press; Skehan, 1998). Opportunities for communicatively contextualized implicit and explicit negative feedback such instruction provides are matched to options in delivering it methodologically, as these are suitable to learners with a range of strengths in aptitudes, and the cognitive and other abilities contributing to them (Ackerman, 2003; Carroll, 1993; Dornyei, 2002, 2005; Dornyei & Skehan, 2003; Robinson, 2002, 2005c, 2007b; Skehan, 1989, 2002; Snow, 1987, 1994; Sternberg, 2002; Sternberg & Wagner, 1994), the aim being to do this using optimally effective techniques for drawing learner awareness to form–meaning mappings in the L2, and the communicative functions these can help serve. Cognitive Linguistics provides a view of language that is relevant to these aims, in which, as Langacker (this volume) points out, the centrality of meaning, the meaningfulness of grammar, and its usage-based nature are all fundamental assumptions.

2.1 Usage-based models and L2 instruction—Learning by doing and syllabus design

As the chapters in this book have made clear, Cognitive Linguistics describes the properties of language in very different ways than either structuralist or generative approaches. There are no deep "structures" and no formal "rules" that generate permissible "strings" which the lexicon fills out. The product of learning reveals cross-linguistic differences in how languages structure conceptual content for expression, and Cognitive Linguists describe these differences. But the processes which give rise to them are shared by all language learners. Usage-based models of acquisition argue language is learned from the input, using general cognitive mechanisms, sensitive to type and token frequency, resulting in item-specific knowledge and more abstract categories of form–meaning relationships that are integrated with and supported by conceptual structures, as these become established in the child during cognitive development. There is no Logical Problem (Baker & McCarthy, 1981): language input is sufficient evidence for the general learning processes that give rise to its abstract representation. No innate linguistic knowledge (Pinker, 1994) is needed to supplement these processes.

Usage-based models assume language acquisition is input-driven and experiential. They assume first-person experience of language (by children

or adults) during situated, communicative language use provides evidence of *patterns* in the input that carry *meaning*, and that these patterns are learned while doing something with communicative intent, like playing "peekaboo" with mommy, or exchanging currency in a foreign country. A second language classroom providing learners with plentiful exposure to meaningful input, and opportunities to use the L2 while performing realistic communicative activities would be complementary, therefore, to the "input-driven" and "experiential" assumptions of usage-based learning. Content-based (Brinton, Snow & Wesche, 1989), immersion (Harley, Allen, Cummins & Swain, 1990), Natural Approach (Achard, this volume) and task-based (Van den Branden, 2006) programs (while differing in procedures for content selection, and other implementational details) all provide these. The various syllabi adopted in these programs specify instructional units in terms of holistic communicative activities, sequenced using non-linguistic criteria (see Long, 2007; Long & Crookes, 1992; Robinson, 1994, 2001b, in press; White, 1988 for review). Such approaches do not divide up the language to be learned, by presenting grammatical structures, notions and functions, lexical items, or other units of language separately, and serially, for the learner to later "synthesize" and put together during communicative practice (Wilkins, 1976). They require the learner to "analyze" the language used on pedagogic tasks, or during immersion program instruction in domains such as mathematics, physics, etc., in line with their own perceptions of the form–meaning connections that the L2 makes, and that need to be understood and used to achieve communicative goals under real-time operating conditions, and the processing constraints they impose.

Analytic approaches to syllabus design therefore allow for plentiful opportunities for L2 exposure, and provide learners with a "first-person", "participatory" perspective on the language experienced, and its meaningful coordinates in communicative context. In classrooms where such syllabi are followed, language is predominantly learned incidentally while "doing" something else for which it is useful. This is complementary to usage-based approaches to language learning: an approach to instruction which took descriptions of language from Cognitive Linguistics—or any other approach to linguistic description—and used those as a basis for serially delivering explicit instruction in grammar (so promoting third-party, outsider understanding of language taught as object) would not. Educational philosophers (Dewey, 1916), intelligent systems designers (Schank, 1999), SLA researchers (Hatch, 1978), and developmental psychologists (Bruner, 1960) have all argued (among others), that we "learn by doing," and more effectively so than when we are "taught" "facts" for passive absorption.

2.2 Cognitive Linguistics and conceptualization—Case-based reasoning and task-based L2 communication

Learning by doing presents us with problems which we have to resolve using existing systems of knowledge. Early L2 learning, therefore, is influenced by the L1 system (see Ellis, this volume; MacWhinney, this volume; Odlin, this volume). And inevitably, by trying to "do" more than we currently know how to, we must develop the "means" to do it, or we fail. Learning is success-driven, but also failure-driven, as is memory (Schank, 1999). Communication breakdowns, and the resulting failure to accomplish intentions, provide learners of L2s with vivid memories for "cases" of unsuccessful prior experience in using the L2, and from which they can reason towards better scripts, plans, and frames for performance in subsequent efforts to communicate (Ellis, 2005; Fillmore, 1985; Goffman, 1974; Robinson & Gilabert, in press; Schank, 1999; Schank & Abelson, 1977). We develop, that is, when our own systems of L2 knowledge (how its forms realize meanings) functionally adapt to (and so reorganize under) various pressures to conceptualize and perform communicatively. Where the L1 system constrains and impedes the L2 system's adaptation to these pressures we are prompted to shed its influence.

We learn best by apprenticed, gradual, approximation to the demands placed on knowledge and skilled execution that complex problems in untutored environments pose on our abilities in a domain (landing an aircraft in a blizzard, on an unknown airfield, at night, without a co-pilot; doing simultaneous translation of an important speech, with live air feed, amid conditions of distraction, such as a noisy crowd of demonstrators). In child language learning, apprenticeship—scaffolded by caregivers and the language environment their input provides—is largely guaranteed, and the demands of communication in the L1 unfold slowly, and naturally, in pace with the child's own cognitive, conceptual and social development (Brown, 1973; Cromer, 1991; Nelson, 1996; Ninio & Snow, 1996; Schneider, Schumann-Hengesteler & Sodian, 2005; Slobin, 1973; Tomasello, 1999, 2003). In adult L2 learning, the situation is different. Being cognitively developed, and socially aware, adults often want to communicate more than they can in the L2 right from the start, and the support they have available for doing this is very often lacking. In untutored settings *input* is often not guaranteed, and so has to be sought out, as do interlocutors who may, or may not, adjust their L1 input to the L2 learner's level making it comprehensible, and who may, or may not, sustain engagement in *interaction* and negotiate meaning (out of lack of interest, shared goals, or frustration), or provide *feedback* on the L2 learner's language (or if they do so, not with any useable level of consistency).

Instructional programs aim to offer this support (comprehensible input, scaffolded interaction and usable feedback) by organizing learner

participation in, and teacher interventions into, the classroom performance of pedagogic tasks and by facilitating understanding of their conceptual content (Jonassen, 1999). When such tasks are classified and sequenced for learners in an order of increasing conceptual and communicative complexity (Robinson, 2005a, 2007a), which approximates the order in which the child engages in them, it prompts, thereby, the development of the language abilities they need to accomplish them successfully. The mind is a dynamic, complex system, evolved to adapt to a complex environment, and language is one adaptive response to it that the mind has evolved (Ellis, 1998, 2002, 2003; Ellis & Larsen-Freeman, 2006; Thelen & Smith, 1994). When the complexity in the target adult language environment is pared down in the scaled world of the L2 language classroom (Ehret, Gray & Kirshenbaum, 2000), consistency with existing L1 systems of thinking and speaking is established. When it is gradually increased, adaptation to the L2 is facilitated. Parents provide this consistency and challenge for children: classrooms aim to provide it for L2 learners.

Cognitive Linguistics offers insights into how such L2 tasks and content can be designed, and sequenced, and production and learning opportunities maximized for learners attempting them, since it is an approach to language description which sees linguistic expression and conceptualization to be mutually dependent, and interfaced with other cognitive and social systems in adult language use and language development. It motivates descriptions of language structure which are psycholinguistically and acquisitionally plausible by drawing on "converging evidence" (see Langacker, 1999) concerning environmental, biological, psychological, developmental, historical, and sociocultural factors—and the domains and methods of inquiry they implicate. SLA researchers, too, consider all of the above factors to impact upon the social and cognitive processes that underlie variation in the rate and extent of language learning, whatever the language being learned, across a range of populations, and social contexts for learning. And in some of the ways, and following some of the rationales, we have discussed briefly above, second language instruction seeks to contrive contexts and interventions that promote the acquisition processes leading to those levels of development that are critical to success in using language for a range of purposes, and across a wide spectrum of personal and institutional settings.

2.3 Overview of areas to be addressed and research issues raised

In what follows we take perspectives on each of these fields and their mutual intersects and areas of overlapping interest, as revealed by the preceding chapters in this volume, placing particular emphasis on issues relevant to the acquisitional and pedagogic underpinnings of effective L2

instruction. There are two broad areas that we address in the remainder of this chapter, raising research topics and questions relevant to each, and we briefly introduce them here. Firstly we address the role of *constructions* in Second Language Acquisition. Both Cognitive Grammar and Cognitive Construction Grammar, as described in the chapters by Langacker and Goldberg and Casenhiser in the first section, assume constructions are the central units of language acquisition. Both assume constructions are stored as a structured inventory of form–meaning pairings, established by learners on the basis of exposure to input during communication, and that constructions are stored in a complex *network* of language knowledge (syntactic, lexical, morphological, phonological, pragmatic, etc.), as Hudson, Taylor and Bybee, this volume, each describe it. Construction Grammar approaches also motivate the description of L1 acquisition put forward by Lieven and Tomasello. The *cognitive processing* issues of how constructions are learned, and from what kind, and quantity of input are important for SLA to address, as well as issues of L2 development over time, and the relationship of construction learning to developmental sequences and acquisition orders that have been observed in SLA (e.g., Becker & Carroll, 1997; Ellis, 2006a; Larson-Freeman, 1976; Perdue, 1993a, 1993b; Pienemann, 1998, 2003; Schumann, 1978).

The issues of which *learning conditions* may be most conducive to construction learning, and the roles of type and token frequency in automatizing and generalizing constructional knowledge under these different conditions, are also important. A number of what Goldberg and Casenhiser call laboratory "training" studies of the effects of different degrees of *awareness* of, and orientations to *form–meaning* relationships during implicit, incidental, intentional, and instructed language learning have been done with adult L2 learner populations. One aim of this research has been to identify whether focusing learner attention on formal characteristics of the L2, or their meanings, or some selective combination of both (Doughty & Williams, 1998; Long, 1991) is most effective in promoting instructed SLA. Many of these studies have involved experimentally controlled exposure to "constructions" in natural L2s (with which learners are in some cases familiar and in others unfamiliar), as well as artificial and semi-artificial language (e.g., de Graaff, 1997; DeKeyser, 1995, 1997; Ellis, 1993; Hulstijn & Ellis, 2005; Robinson, 1995b, 1996a; Williams, 1999, 2005). In some cases constructions (Samoan ergative transitives, incorporated, and locatives; English ditransitives and datives) have been presented with different frequencies, and associative chunk -strengths (Robinson, 1997, 2005b: Robinson & Ha, 1993). In general (see Norris & Ortega, 2000) *explicit* conditions, in which learners are made aware of positional cues to constructional forms, or cues to correspondence between these forms and their meanings have been found to be more effective in promoting successful post-treatment assessments of

construction learning, compared to *implicit* learning conditions where such awareness is not promoted or demonstrated by learners. Many details of these findings remain to be confirmed and explored, but the experimental research into construction learning, and the roles of type and token frequency in this process, described by Lieven and Tomasello, and Goldberg and Casenhiser raise issues that will be important to pursue in future laboratory studies of implicit and explicit learning of L2s, and the effectiveness of techniques for focusing learner attention on form–meaning relationships, and we identify some of these issues in our proposals for future research.

The amount and perceptual salience of input (Ellis, 2006b; Goldschneider & Dekeyser, 2001) and its conceptual and communicative content both cooperate as important (broadly bottom-up, data-driven, and top-down, conceptually-driven) factors determining which constructions are learned, and how abstract, generalizable, and productive they are. The second area we address concerns *conceptualization and communicative content*, and how differences between languages predispose learners to describe events and window attention to them in different ways. This issue takes up many of the ideas about the attention function of language Talmy (this volume) describes, particularly the notion of cross-linguistic similarities and differences in lexicalization patterns for referring to motion events that Cadierno (this volume) explores, in the broader context of factors constraining and promoting conceptual transfer described by Odlin (this volume). Many of such cross-linguistic differences have been described, but the extent of their influence on transfer, at different levels of proficiency and development, is still unclear (Ringbom, 2006). We also consider what pedagogic activities and interventions may facilitate what Slobin (1996) has called "thinking for speaking," or what could be more properly called re-thinking for speaking and writing in the L2, as suggested in the chapters by Achard and Tyler.

Related to these issues, we describe SLA research into the cognitive/conceptual and procedural/performative demands of L2 learning tasks and consider how these may be manipulated with the aim of systematically promoting awareness of L2 lexicalization patterns, and promoting grammaticization of the morphological and grammatical means to express them in the L2, over the time course of instructional programs. Tasks make different demands on our attention, during both comprehension and production as Lieven and Tomasello describe (this volume), and it is especially important to know whether these attentional demands constrain or promote L2 learning in instructed settings (Robinson, 1995c, 2003a; Schmidt, 2001; Skehan, 1998). L2 instruction provides teachers and materials designers with opportunities to guide attention to and "enhance" constructions in the L2 input, while at the same time demonstrating their conceptual and communicative value. Similarly, it is possible to manipulate

the frequencies with which, for example, verbs and the frames that various complex constructions require—such as those identified by Diessel (2005)—appear in the written or aural input learners process. Classroom settings also provide many opportunities for L2 interaction and both explicit and implicit negative feedback on L2 production (Allwood, 1993; Doughty, 2001; Ellis, 1999; Gass & Mackey, 2006; Long, 1996, 2007; Tomasello & Herron, 1989) as well as a communicative context for "priming" constructions in the input to learners during interaction and feedback episodes (Bremer, Broeder, Roberts, Simonot & Vasseur, 1993; McDonough, 2006; McDonough & Mackey, 2006; Pickering, Branigan, Cleland & Stewart, 2000).

Throughout our summary of these two broad areas, and in the topics and questions we identify for future research into them, we also address the important issue of *individual differences*. Clearly, differences in the frequency, and type of input affect the extent of language learning, in adults and children, as usage-based approaches predict, and as some research has already confirmed (see e.g., Bates, Bretherton & Snyder, 1988; Bybee, 2006, this volume; Dabrowska & Street, 2006; Ellis, this volume; Goldberg, 2006; Goldberg & Casenhiser, this volume). Cognitive abilities, too, which differ across adult second language learners (as they clearly do across child L1 and adult L2 learner populations), also enable and constrain the cognitive processes which give rise to language learning. But specifically what cognitive abilities contribute to usage-based construction learning, or the ability to re-think for speaking in the L2, and under what pedagogic conditions are differentials in these cognitive abilities most influential on L2 learning? How are these cognitive abilities related to apparent age-related differences in the levels of ultimate attainment reachable by learners (DeKeyser, 2000; Hyltenstam & Abrahamsson, 2003)? How can measures of aptitude (Carroll, 1993; Robinson, 2005c; Skehan, 2002) for second language learning be developed to assess individual differences in these potentially enabling and constraining cognitive abilities, and how could such information be used pedagogically? Important questions, all, to which we still seek answers.

3 Learning second language constructions

The chapters by Lieven and Tomasello and Goldberg and Casenhiser illustrate how, using general cognitive abilities, and the interactive skills they are gradually developing, children begin the process of constructing their language. Starting small, producing first words, then two or three word combinations in which verbs are conservatively used with familiar frames, more complex and abstract constructional schemas develop from the particularities of the language they hear in the input, prompted by the child's growing need to engage in and successfully manage increasingly

complex communicative activities at home and at school. Adult expressions typically consist of a number of constructions—conventionalized pairings of form and function: "What did Liza buy Zach?" (Goldberg, 2006, p.10) consists of word level constructions (Liza, Zach, etc.), and others of greater size and complexity (VP, NP constructions; subject auxiliary inversion construction; question construction; ditransitive construction). These are combined freely to form utterances in adult language. In the usage-based model of child language learning, instances of language used in specific contexts are the evidence from which the child develops constructions, and the frequency of instances in the input affects speed of language processing, the extent of automatic recognition and retrieval of instances, generalizations over these instances, and abstraction of the linguistic system.

3.1 Token and type frequency in the input

High-token frequency of a construction (a morpheme, word or larger unit) in the input leads to entrenchment, and automatic recognition and fluent production (see Bybee, this volume). Thus, "Where Daddy gone?" uttered frequently by the mother becomes a frozen form or chunk available for use by the child, but unanalyzed initially. Type frequency concerns the number of distinct items that can occur in any of the "slots" in a constructional frame: "Where's Mummy gone?; Where's baby gone?" are instances of the same construction, with different types of referent, demonstrating how the construction can be used productively.

High-type frequency therefore provides the child with evidence of how to "fission" (Peters, 1983) a formulaic chunk, and so generalize it into an abstract schematic frame. Evidence of high-type frequency is also used to abstract the general "combinatorial privileges" (Braine, 1963; Maratsos, 1982) shared by specific lexical items, out of which emerge prototypical grammatical categories (see Taylor, this volume). Form and function conspire in this process. On the one hand, as Maratsos argues "the child constructs grammatical categories such as noun, verb, gender class by analyzing the groups of grammatical uses or operations that groups of terms tend to take in common, thereby learning how uses in such operations predict each other" (1982, p.247). But semantic and pragmatic meaning also provide information that helps co-predict the emergence of grammatical categories (Bates & MacWhinney, 1982; Ninio & Snow, 1996). Combinatorial privileges groups of words share, supplemented by notions of agency and topic, animacy, intention, cause, and others, form the criterial features around which, for example, the prototypical notion of "subject" is constructed.

Second language learners start with much larger units than words in developing constructional knowledge, but input-driven processes likely

contribute to their segmentation, and so thereby the subsequent availability for recombination and "fusion" (Peters, 1983) of resulting units in learner speech. There are many documented examples of this segmentation process. For example, Wong Fillmore (1979; cf. Wagner-Gough & Hatch, 1976; and Ellis, 1996 and Wray, 2002, for extensive review) gives an example from the L2 speech of Nora in which an initial unit or formula becomes segmented into three units on the basis of type and token variation in the input, commenting ". . . the analytic process carried out on formula yielded formulaic frames with abstract slots representing constituent types which could substitute in them, and it also freed constituent parts of the formula to function in other constructions either as formulaic units or as wholly analyzed items" (1979, p. 213). In Nora's case, "Iwannaplaywidese" appeared first as a single unit, followed by "Iwanna" used separately from "playwidese" (Iwanna +VP), and then by "playwi" used separately from "dese" (playwi+ NP). As each slot in the initial frame becomes available for independent use, they themselves function as frames for further input-driven learning, and so the network (Hudson, 2007, this volume) of relations between the separate units becomes *elaborated* on the evidence of type frequency, and simultaneously *entrenched*, at various levels of schematicity, as constructional knowledge, on the basis of token frequency. Bracketing and chunking in this fashion provide a link between hierarchical structure and string, so allowing phonology, lexis, and syntax to develop hierarchically by repeated cycles of differentiation and integration of chunks of sequences (Ellis, 1996; Studdert-Kennedy, 1991).

As Hudson and O'Grady, this volume, argue, dependency grammars are well suited to characterizing the linear, real-time processing involved in such item-based input-driven learning, and so have been adopted in a number of "lexicalist" descriptions of first and second language learning of item-specific "valency" information, and item-specific formulae (Bates & Goodman, 1999; Ninio, 2006; Robinson, 1986, 1990). Type frequency establishes membership in the different classes of items that can co-occur in a construction—their categorial "valency": token frequency entrenches and makes automatically available preferred and fixed patterns of co-occurrence between specific items in constructional units of variable degrees of fixedness, automaticity, and productivity, such as collocations, colligations, idiomatic, and other formulaic chunks (Ellis, 2001, 2003, this volume; Gries, 2003, this volume; Hoey, 2005; Hunston & Francis, 2000; Myles, Mitchell & Hooper, 1999; Pawley & Syder, 1983; Robinson, 1989, 1993; Schmitt, 2004; Sinclair, 1984; Wray, 2002).

3.2 Consistency and complexity in the input

Combinations of high-type frequency and high-token frequency give rise to the relatively greater *consistency* of some versus other elements provided in the input, and this facilitates acquisition and generalization of a constructional frame (Lieven and Tomasello, Goldberg and Casenhiser, this volume). For example, using pronouns in ditransitive constructions during a training experiment, in which many types of verbs were presented to children (he's kicking/eating/drinking/etc. it) led to acquisition and generalization of the transitive construction to novel verbs. In contrast, children trained using a variety of full NPs (the boy, the dog, the sofa, the water, etc.) showed less, though still some, acquisition and generalization (Childers & Tomasello, 2001). The consistency provided by these pronouns (their high-token frequency, as well as their consistent semantic indeterminacy), together with type variation in the verbs (and their greater semantic specificity) led to better generalization and constructional abstraction. The availability of simplified input helps in part to guarantee this consistency for child language learners (pronoun use is an example of linguistic and lexical simplification, i.e., a preference for high-frequency vocabulary, and a feature of motherese) in contrast, often, to much of the input to L2 learners in adulthood where Foreigner Talk (Ferguson, 1971), if used, is more variable (Gass, 1997), and often dispreferred in favor of interactional modifications (Long, 1983).

Consistency of form–function mappings also make constructions easier to learn (MacWhinney, this volume). When a form is consistently available in the input and a function is understood to be being expressed, and when a function can reliably be inferred on hearing a form, then the resulting "cue validity" means faster form–function mapping, cross-linguistically, in child language acquisition. Despite such consistency, for L2 learners, especially at those lower levels of proficiency and with less exposure, existing L1 knowledge may inhibit the L2 mapping of form and function (as both Ellis and MacWhinney, this volume, point out). For example, where the L1 conflates manner with motion on the verb, and encodes path separately on a satellite as in Danish and English, this lexicalization pattern may persist in the L2 production of verb-framed languages like Spanish and Japanese where path is conflated with the verb, and manner encoded separately (see Cadierno, this volume, and Ringbom, 2006; VanPatten, Williams, Rott & Overstreet, 2004 for general discussion). In such cases, a Focus on Form (Doughty & Williams, 1998; Long, 1991; Long & Robinson, 1998) in communicative context has been argued to facilitate the mapping process between form and function by directing attention to, and promoting "noticing" of (Schmidt, 1990) formal characteristics of the L2 while the meaning they convey is simultaneously being demonstrated.

As children begin to develop more complex constructions—schemas

with larger numbers of slots in coordinated and subordinated clauses (see Diessel, 2004)—these, too, are restricted to a few verbs when language is produced (I think/ know . . . he is coming soon) so initially forming complex constructional islands of only gradually developing schematicity—a process Mellow (2006) describes for L2 learners. Acquisition and production of these complex constructions, too, reflects their frequency in the input at home and at school (Tomasello, 2003, p.266) and establishing gradual control over the use of them is promoted by the need for successful participation in multi-party conversational interactions (involving reference to topics displaced in time and space, of a variety of conceptual content); for organizing and relating events in narrative discourse; and for other complex communicative activities.

Repeated processing of particular constructions facilitates their fluency of subsequent processing, too, and these effects occur whether the learner is conscious of this processing or not. Although you are conscious of words in your visual focus, you definitely did not just now consciously label the word focus as a noun. On reading it, you were surely unaware of its nine alternative meanings, though in a different sentence you would instantly have brought a different meaning to mind. What happens to the other meanings? Psycholinguistic evidence demonstrates that some of them exist unconsciously for a few tenths of a second before your brain decides on the right one. Most words (over 80% in English) have multiple meanings, but only one of these can become conscious at a time. So your reading of focus has primed subsequent reading of that letter string (whatever its interpretation), and your interpretation of focus as a noun has primed that particular subsequent interpretation of it. In this way, particular constructions with high-token frequency are remembered better, recognized faster, produced more readily and otherwise processed with greater facility than low-token frequency constructions (see Ellis, 2002 for review). Each token of use thus strengthens the memory traces of a construction, priming its subsequent use and accessibility following the power law of practice relationship whereby the increase in strength afforded by early increments of experience are greater than those from later additional practice. In these ways language learning involves considerable unconscious "tallying" (Ellis, 2002) of construction frequencies, and native-like fluency and idiomaticity (Pawley & Syder, 1983) in language use requires exploitation of this implicit statistical knowledge (Bod, Hay, & Jannedy, 2003; Bybee & Hopper, 2001; Chater & Manning, 2006; Ellis, in press 2008).

3.3 Skewed input, procedural vocabulary, and argument structure generalization

The consistency that high-token frequency provides works together with the variation that high-type frequency provides to help children abstract

patterns from what they hear. Goldberg and Casenhiser show that parental language naturally *skews* the input to children to provide systematic patterns of consistency and variation, and that such skewed input leads them to learn and *generalize* argument structure constructions. In a corpus of mothers' speech to children (Bates, Bretherton & Snyder, 1988), certain "light," "general purpose" verbs are associated with very high proportions of the use of specific constructions (39% of verbs in Subj V Obl are "go"; 38% in Subj V Obj Obl are "put"; 20% in Subj V Obj Obj2 are "give"). The same trends are mirrored in children's production, where one or another of these verbs is used with its associated construction: their high-token frequency in the input thereby likely establishes a correlation between verb meaning and a constructional form for the child. As vocabulary increases new verbs (with more specific, and so narrower ranges of meaning) are assimilated into the pattern, but the "general purpose" verbs remain the prototypical exemplars.

Such verbs (like the pronouns mentioned above which supply the semantically indeterminate, but positional consistency needed to enable pattern abstraction) while having basic meanings are highly indexical (compare "give him credit" and "give him a dollar") and semantically opaque (e.g., "give" versus "fax"). The consequence is that the meaning contributed by the "construction as a whole" and its specific lexical content is needed to supplement the verb semantics. The constructional meaning "fills in" the verb meaning, and is at least as reliable, consequently, as verb meaning in predicting sentence meaning (Goldberg & Casenhiser, this volume). As Bybee (this volume) notes, such highly indexical, typically reduced and semantically "bleached" words serve many grammatical functions, together with other "closed class" grammatical words, and so are highly frequent, entrenched, and automatized in adult production. They have "procedural" value (Robinson, 1989, 1993; Widdowson, 1983) in syntactically organizing the declarative content of more lexically specific words, and are stored in a distinct "procedural" memory system from "declarative" vocabulary, and the meanings it gives rise to (Ullman, 2001).

Talmy (2000) argues that the grammatical meanings carried by such closed class vocabulary, serves a "concept-structuring" function across languages—providing the language learner with a skeletal frame which scaffolds the mapping of conceptual material to constructions (see the following section). What Childers and Tomasello (2001) and Goldberg and Casenhiser show (see also Goldberg, 2006) is the "construction-structuring" function of these words (the consistency provided by proforms, "it," "him", and similar highly indexical verbs, "give," "put") for children, and how the skewed frequencies with which they appear in different constructions in parental input make that, in part, possible.

3.4 Issues for research

Do second language learners have constructions? We need to know many details concerning this basic issue. What constructions do L2 learners know, how productive are they, and how is constructional knowledge in the target language affected by *cross-linguistic* influences from the L1, or other languages known? How does constructional knowledge develop with level of *proficiency* in the target language, from beginner to advanced and native-like levels of L2 ability? Two experimental procedures for examining the availability of constructional knowledge in guiding performance on primed-production tasks and comprehension-sorting tasks have provided initial evidence in this area, and provide a basis for further research into the questions raised above. Benicini and Goldberg (2000) asked native English speakers to sort 16 sentences into four piles based on "overall" sentence meaning. The 16 sentences crossed four verbs (took, sliced, got, threw) with four constructions (transitive, ditransitive, caused motion, resultative). Subjects were found to be just as likely to sort on the basis of the meaning provided by the construction, as they were to sort on the basis of verb meaning. In a replication of this study, Liang (2002) found that at lower levels of proficiency L1 Chinese learners of L2 English based their sorts on the four verbs used, but intermediate-level learners based sorts on the construction types, and at the advanced level there was an even greater (than for intermediate, or L1 native speakers of English) preference for construction-based sorting, demonstrating not only the availability of constructional knowledge but increasing reliance on it with developing L2 proficiency. No evidence of how different L1 populations differ, or do not, in their preferences for basing L2 sorts on verbs, or construction types was shown—or intended to be—in these studies, but this procedure is clearly suitable for addressing the extent of cross-linguistic influence on the use of constructional knowledge (of a wide variety of levels of schematicity), and whether, and how, this diminishes over time.

Gries and Wulff (2005) found similar results for sorting to Liang (2002), and also addressed the influence of constructional knowledge on L2 production. There is a tendency towards structural repetition in natural unmonitored speech, and the facilitating effect of prior exposure to a structure (either heard or previously produced) has been examined using a variety of experimental methodologies. Gries and Wulff used a sentence-completion task (Pickering & Branigan, 1998), in which L1 German speakers first completed sentences in fragments that biased them to producing and completing them as ditransitive or prepositional dative constructions. Subsequent to completing each production prime, a shorter sentence fragment was completed, and the results showed that ditransitives were produced in higher quantities following ditransitive

construction primes, and vice versa for prepositional datives. As with the sorting procedure for examining the extent of constructional knowledge, further priming studies are also needed to examine the influence of L1, L2 construction type and level of L2 proficiency on the priming effect of prior exposure to L2 constructions on written production (as in Gries & Wulff, 2005) and spoken production, in experimental, and more naturalistic classroom contexts (see McDonough, 2006).

Psycholinguistic techniques can also be brought to bear to investigate second language learner constructions. This is an area of considerable current research activity focusing upon second language learners' sensitivity to the frequency of constructions and the mutual dependency of their elements in processing for recognition, comprehension, and production of collocations (Ellis, Frey, & Jalkanen, 2007a), patterns of semantic prosody (Ellis, Frey, & Jalkanen, 2007b), and formulaic sequences (Ellis & Simpson-Vlach, in preparation; Ellis, Simpson-Vlach & Maynard, in preparation; Schmitt, 2004).

Constructional knowledge, construction use, and cognitive abilities. An interesting question is how related *knowledge* demonstrated by a preference to sort sentences into groups with similar *overall meaning* on the basis of constructions is related to sensitivity to constructional primes, and so *use* of primed constructions in speech and writing. There are two ways to examine this relationship. Developmentally, do priming effects also increase with proficiency, as constructional sorting tendencies seem to do? And at any one point of development do those who show a greater preference for constructional sorting, also show greater sensitivity to, and "uptake" of constructional primes in speech and writing? If so, then it could be argued that there are some learners with a special sensitivity to, and proclivity to use construction knowledge, and the further interesting issue would then be "What cognitive abilities and capacities would predict this 'aptitude' for construction learning and use?"

Analogical mapping, cognitive abilities, and construction learning. Tomasello (2003) and Goldberg (2006) speculate that the abilities drawn on in analogical mapping, together with functional distributional analysis, are likely responsible for childrens' ability to schematize across utterances and develop abstract constructions. In a general sense, analogy is the ability to think about relational patterns, and the structure-mapping or structural alignment it gives rise to is at the heart of many different cognitive processes. What cognitive abilities contribute to analogical mapping across utterances for adult second language learners, and how would they be measured? If they could be measured, would they predict differences in the rate and complexity of construction learning? The words in sentences subtest of the Modern Language Aptitude Test (Carroll & Sapon, 1959)

measures the ability to identify the analogous grammatical role of words in pairs of sentences, but this would seem to heavily implicate explicit metalinguistic knowledge. Are more basic, non-metalinguistic abilities for forming analogies drawn on by adults in developing abstract constructions (as they must be in child L1 learners)? How are these abilities related to others involved in language processing, such as phonological working memory, and capacity limits on it? Models of what these combinations of abilities might be, and of their contribution to "aptitude complexes" for language learning under different conditions of exposure to input are proposed in Robinson (2002, 2007b) and Skehan (2002) which could serve as frameworks for initial research into this area of "aptitude for construction learning" and how it interacts with opportunities to process and learn input in different instructional contexts.

Is the course of acquisition of complex constructions the same for adults and children? The cross-sectional studies and experimental methods used by Benicini and Goldberg (2000) and Gries and Wulff (2005), described above, are useful as supplements to longitudinally gathered data concerning the use of constructions, of various degrees of complexity, over time. Although longitudinal studies of L2 speech production are relatively rare, they are as necessary to understanding the course of construction learning and use in SLA as they are in the studies reported in Lieven and Tomasello, this volume (see also Diessel, 2004; Ellis, Ferreira Junior, & Ke, in prepa ration; Tomasello, 1992). As in child language acquisition research, progress rests upon the acquisition, transcription, and analysis of detailed dense longitudinal corpora (Ortega & Iberri-Shea, 2005).

Diessel (2004) has described the course of acquisition of later learned complex constructions in English, including those consisting of a matrix clause and a subordinate clause, which are of three types: finite and non-finite complement clauses (she said that he would come; she wants him to come); finite and non-finite relative clauses (she bought the bike that was on sale; is that the bike costing 50 dollars?); and finite and non-finite adverbial clauses (he arrived when she was about to leave; she left the door open to hear the baby) and co-ordinate clauses (he tried hard, but he failed). He argues that acquisition of these complex sentences, as Lieven and Tomasello, this volume, also claim, is initially lexically specific, each organized around a few concrete lexical expressions, and so forming complex constructional islands. He also argues that complement and relative clauses emerge by gradually *expanding* simple sentences, and that adverbial and co-ordinate clauses emerge by *integrating* independent constructions into a bi-clausal unit. Mellow (2006) is the first study of the emergence of complex constructions in L2 production, and more studies of this kind are needed to examine the comparability of complex construction learning across child and adult learners.

CONCLUSION

Is constructional knowledge related to traditionally identified acquisition sequences? Related to this issue is how stages in the emergence of complex constructions, once identified, are related to the architecture of the second language speech processor (see the following section), and in particular to Pienemann's Processability Theory (1998, 2003), which describes a hierarchy of processing stages predicting the emergence of more complex structures at different points in development. How do the processes of expansion and integration Diessel describes for childrens' learning of more complex constructions relate to these L2 processing stages, in development, and in theory? Similarly, could information about the constraints on, and sequence of emergence of constructions in L2 use be used as an index of L2 development?

How do type and token frequency interact in learning SL constructions? The effects of type and token frequency, examined in the experimental child language acquisition studies described above, are also worthy of Second Language Acquisition research. Does increasing type variation in the verb *slot* lead to greater abstraction and generalizability of argument structure constructions? Are the effects of type variation increased by consistency of other elements in the construction, as the study reported by Lieven and Tomasello showed, such that proforms in NP positions increase the salience of type frequency in the verb slot in the ditransitive construction?

Frequency effects of sub and supra lexical units on construction learning.- Probabilistic, statistical learning contributes to the effects of manipulating the type and token frequencies of words in constructions in the studies reported by Goldberg and Casenhiser, but cues for generalizing constructions can be at any number of levels, such as phonemes, morphemes, and larger chunks. The same questions raised above can be asked with respect to these sub and supra lexical units, and the effects of their type and token frequency on learning smaller, and complex multi-clausal L2 constructions. What is the effect of manipulating chunks of co-occurring words, and the type and token frequencies contributing to "chunk strength" (Knowlton & Squire, 1996; Robinson, 2005b) on L2 learning and generalization of complex constructions such as pseudo-clefts (Robinson, 1996a) and finite and non finite complement and relative clauses (Mellow, 2006)?

What is the effect of skewing input, and sequencing skewed input on adult SLA of constructions? Does presenting many instances or tokens of a single verb in a constructional frame first, followed by more varied types of verbs, with lower token frequency in the same constructional frame, result in superior generalizability of the learned argument structure,

compared to more balanced input? This was found to be so in the experimental studies reported by Goldberg and Casenhiser (this volume) whereby a skewed experience of exemplars with one exemplar presented much more often that the others led to faster acquisition. So they and others (Bybee, this volume; Ellis, in press 2007; Goldberg, 2006; Morales & Taylor, in press) suggest that the Zipfian structure of natural language presents a usage distribution that optimizes learning.

Zipf's law (1935), describes the distributional properties of the lexicon whereby the frequency of a word decays as a (universal) power function of its rank. The more common words account for many more tokens of our language than do the less common ones (consider *the* at more than 60,000 tokens per million words, *of* 29,000, *and* 27,000, etc.). Goldberg (2006) proposes that Zipf's law applies within individual construction profiles, too, and so the learning of linguistic constructions as categories is optimized because there is one very high-frequency exemplar that is also prototypical of the meaning of the construction, and gives evidence of this for child language acquisition where *put* is the most frequent exemplar of the caused motion construction, *give* of the double object ditransitive, etc. Recent work by Ellis, Ferreira Junior, and Ke (in preparation) has shown this also to apply to naturalistic second language learners of English in the ESF corpus (Perdue, 1993)—the type-token frequency profiles of these constructions in the input to these learners followed a Zipfian distribution and the learners' acquisition of each pattern was seeded by the highest-frequency exemplar which was also prototypical in its meaning.

More research on this topic is needed both in analyses of longitudinal corpora of Second Language Acquisition and in experimental studies investigating the effects of different frequency profiles of construction exemplars upon L2 acquisition. There are clear implications for adult L2 learners—for delivering "floods" of enhanced input (White, 1998), implicit negative feedback via recasts (Doughty, 2001), or other techniques for focus on form during classroom interaction—suggesting that skewing input floods or recasts, by initially presenting high-token frequencies of an important positional element in a flooded or recast constructional frame, should have an advantage over more balanced input floods and recasting (Bybee, this volume; Ellis, in press 2008).

What are the patterns that are present in the input? Proper description of usage-based acquisition and its component constructions requires the proper description and analysis of usage. As Gries (this volume) explains, Corpus Linguistics and Cognitive Linguistics are natural partners in this enterprise. We need dense longitudinal corpora of learner input and of their acquisition (Ellis, 1999; MacWhinney, 1995; Ortega & Iberri-Shea, 2005; Tomasello & Stahl, 2004), we need representative corpora for

specific genres, e.g., academic speech (e.g., MICASE, 2004), and we need detailed means of marking up these corpora and performing constructional and collostructional analyses (Gries, this volume; Goldberg, 2006).

What are the details of the acquisition process? Usage-based theories of acquisition are exquisitely "bottom-up." They have turned upside down the traditional generative assumptions of innate language acquisition devices, the continuity hypothesis, and top-down, rule-governed, processing, replacing these with data-driven, emergent accounts of linguistic systematicities. Constructionist analyses chart the ways in which children's creative linguistic ability, their language system, emerges from their analyses, using general cognitive abilities, of the utterances in their usage history, and from their abstraction of regularities within them. In these views, language acquisition is a sampling problem, involving the estimation of the population norms from the learner's limited sample of experience as perceived through the constraints and affordances of their cognitive apparatus, their human embodiment, and the dynamics of social interaction. There is too much complexity here for researchers simply to "think through." If language emerges from the learners' sample of usage, and all of the types of constructions therein properly represented in terms of token frequencies, then the only way to properly get a handle on these processes is through computer modeling. Recent developments in emergentism, dynamic systems theory, and chaos complexity/complex systems theory inform issues of emergence from usage, from the interactions of agents who communicate, of language form and language function, of signals and perceptual systems, of prior knowledge, learned attention, and working memory in processing, of language representations upon signals, of multiple languages in contact, of language aptitude, of networks of social interaction (Ellis & Larsen Freeman, 2006; Holland, 1992, 1998; MacWhinney, 1999; de Bot, Lowie, & Verspoor, 2007). We cannot understand the whole without realizing that it is more than the sum of its parts, or the parts without understanding the whole. We will only fully understand these processes by exploring some of the interactions using connectionist simulations of the learning of linguistic constructions in models exposed to representative samples of usage and in agent-based simulations of language change. Agent-based models are used to study how a population develops and changes, the transient behaviors of a system before it reaches equilibrium. They consider the different social structures in finite populations because recent network studies show that these have a profound influence on system dynamics (Newman 2003). Moreover, agents in a population are not homogenous but often differ in their properties or behaviors. This heterogeneity is particular true in considering language learning and language use. Children show different trajectories of their language development, and people in different

social class and of different ages differ a lot in their language use. Neural networks, in contrast, are better known for their use in simulating learners characteristics are they are exposed to a problem space of many learning trials representative in content and statistical distributions to experience in quasi-regular domains. Learning in a neural network is accomplished by changing weights on the inputs to a neuron, using some measure of the usefulness of the neuron's output signal. Categorization and prediction is the forte of neural networks. Because the output of a neuron depends upon the weighted sum of its inputs, it nicely implements conditional actions, hence the tradition of connectionist research in language acquisition and psycholinguistics (Chater & Manning, 2006; Christiansen & Chater, 2001; Elman et al., 1996).

4 Language and conceptualization, thinking for speaking, and L2 production

In Cognitive Grammar, as Langacker and Achard, this volume, describe it, meaning is associated with conceptualization, and constructions are conventionalized linguistic means for presenting different conceptualizations and construals of an event. Achard illustrates this by comparing two causative constructions into which the verb "laisser" (let) can enter in French: the VV construction as in "Marie a laissé (V) partir (V) les enfants," structures the action scene as the main subject's (Marie) agentive responsibility and the causee (les enfants) coded as direct object reflects its non-agentive role. In contrast the VOV construction reflects a different construal of the scene "Maria a laissé (V) les enfants (O) partir (V)," in which the causee (les enfants) is conceptualized as the energy force initiating an action, and its position prior to the verb coding the process it is responsible for reflects its agentive role. The same scene, in other words, can be construed as one in which the causee's role is non-agentive (VV) or one in which the causee is an agentive energy force initiating an action (VOV). Languages make available different constructions for representing these alternative speaker construals of the scene, and the roles of participants in them. The central role of the speaker in selecting constructions which represent alternative construals of events is not captured in purely formal descriptions of pedagogic, structural rules (such as the "structural meanings" of sentence patterns that Fries, 1952, described). Achard argues that learners benefit most from actual exposure to real instances of "use" in "situations" where they can match the choice of construction with the speaker's intended construal of events (so understanding the constructional meaning) and receive opportunities to participate in, and share constructional construals of events with others (this, in contrast to learning the formal properties of constructions in isolation, via decontextualized instruction in grammatical "rules").

In their discussion of L2 spatial language, and prepositions, Tyler, and Coventry and Guijarro-Fuentes (this volume) similarly emphasize the necessity of participation in *situated action* to learners' full understanding of their meaning, and communicatively effective L2 use of them. The meaning of spatial language does not simply derive from the addition of fixed meanings prepositions have for "where" an object is to the meanings of other elements in the sentence describing "what" is being located (e.g., nouns and verb) which can be taught by L2 rule and learned by rote. Rather, Coventry and Guijarro-Fuentes argue, meaning is flexibly constructed on-line as a function of multiple constraints involving object knowledge, dynamic-kinematic routines, and functional geometric analyses which come together in contexts that "embody" meaning for language users. Such situations naturally, therefore, involve not only understanding the speaker's intention, and learning how it motivates a particular choice of linguistic expression for referring to spatial location (comprehending the input), but also opportunities for communication which may require reciprocal use of such expressions (output) to convey meaning to others through speech production.

In what follows we take up some of these and other issues involved in understanding how different languages map conceptualization to constructions that are of especial interest to SLA research and language instruction. These include the extent to which these differences may require the learner to "rethink" for L2 speaking in making these mappings; of how structured exposure to "L2 tasks" making different communicative and conceptual demands may facilitate the mapping processes and promote more accurate and complex L2 speech; and of the consequences of this for models of the "psycholinguistic processes" involved in L2 speech production. These are issues, then, of how usage-based *learning* leads to development in productive L2 *use*, and of the mechanisms, and pedagogic interventions that enable and facilitate it.

4.1 Conceptualization, construal, and speech production

Choice of one or another construction for describing an entity or situation in the L1 are the result of our unconscious structuring of the aspects of experience we wish to convey. Alternative construals of entities or situations are achieved by a variety of cognitive operations, and constructions are the linguistic reflex of these operations. In terms of Levelt's (1989) model of speech production constructions represent a mapping from the first stage in message formulation, in what Levelt calls the "Conceptualiser" to later stages of lemma activation, and lexical and syntactic encoding. At the conceptualization stage units of content are prepared for expression, drawing on the episodic and semantic memory stores. There is a thought, for example, about a currently observed event scene, or one

recently observed and stored in episodic memory. Preparation of this thoughtful content, in Levelt's terms, includes macroplanning, of the communicative intention to be conveyed, and the appropriate discourse mode, and microplanning of the perspective to be taken in conveying the message. In theory one could assume that these preverbal construal processes and cognitive operations are language-independent. But there has been much recent debate about this, and evidence reported to support the claim that in a number of domains languages influence the way events are conceptualized and prepared for verbal expression. There is Talmy's work on how language structures concepts and windows attention to aspects of experience through the options specific language make available to speakers (see Talmy, 2000, this volume), and Berman and Slobin's (1994: Stromqvist & Verhoeven, 2004) cross-linguistic research into how different languages lead speakers to prioritize different aspects of events in narrative discourse. Levinson's (2003) and Coventry and Guijarro-Fuentes' research (this volume) into language and spatial cognition, also suggests this, as does the research into L2 conceptual transfer described by Odlin (this volume).

An example of research in this area is that of Carroll and colleagues (Carroll, von Stutterheim & Nuese, 2004; see also Becker & Carroll, 1997; Perdue, 1993a, 1993b; von Stutterheim & Nuese, 2003) who have investigated the extent to which macro and microstructural planning processes in the conceptualiser contributing to narrative performance are language-specific, and guided by the meanings which specific languages grammaticize or do not. These conceptual planning processes include *segmenting* static situations into a number of states and property predications, or dynamic situations into events or processes; *selecting* from among the conceptual building blocks (entities, spaces, times, actions, etc.) from which propositions are formed; *structuring* these components with regard to spatial and temporal anchoring, topic, and focus assignment, etc.; and then *linearizing* the selected units. Comparing English L1 and German L1 narrations, Carroll et al. (2004) describe significant cross-linguistic differences in the events selected for mention and in temporal framing at the macrostructural level of conceptualization. Narration in German is based on a temporal sequence of bounded events, which are each related to an endpoint. Narration proceeds by linearly relating succeeding to preceding bounded events through the use of lexical adverbials (he walks and then . . . he sees and then . . . he thinks). In contrast, narrators in English frame events with respect to a deictic point of reference "now," and events are not related to an endpoint but are represented as ongoing (he is walking, and he sees, and he is thinking). They argue this is largely because German has no grammaticized progressive aspect, whereas English does. Consequently English narrators' conceptual planning processes are heavily influenced by the grammaticized means for describing ongoingness of

events available in English. "The results . . . show that speakers of different languages prefer one pattern of conceptualization over another in language production" (p. 204), and "processes at this level are language-specific and grammatically driven" (p. 213). The abstract principles of perspective-taking that narrators of different L1s implicitly adopt when conceptualizing and construing the events to be verbalized are rooted in language-specific patterns of grammaticization. There is also evidence, Carroll et al. (2004) report, that L1 speakers of German continue to make use of the L1 preferred pattern of temporally framing events when giving narratives in L2 English. But can these preferences change, and if so, how can second language instruction facilitate such change?

4.2 Lexicalization patterns, focus on form, and thinking for speaking

These are issues, of course, of what Slobin (1996, 2003) calls "thinking-for-speaking," the notion that we access the conceptual contents of our experience of the world in a very "special" way when we access them online for the purposes of verbalizing them, in either speech or writing. "Thinking for speaking involves picking those characteristics of objects and events that (a) fit some conceptualization of the event, and (b) are readily encodable in the language . . . In acquiring a native language, the child learns particular ways of thinking for speaking" (1996, p.76). In L2 speech production these conditions of access change because different languages make available not only different word forms (lexemes) for concepts, and clusters of syntactic and morphological features (lemmas) attached to them in the mental lexicon, during *lexical encoding*, but also preferred ways, or schemata, for assembling these into phrases and clauses during the subsequent stage of message formulation, i.e., *syntactic encoding*.

Slobin argues that "restructuring" the mapping of formal expression and conceptual content while producing L2 utterances may, even if possible, be a prolonged process: "Each native language has trained its speakers to pay different kinds of attention to events and experiences when talking about them. This training is carried out in childhood and is exceptionally resistant to restructuring in adult second-language acquisition" (1996, p. 89). The extent to which this is true, and of the effect of pedagogic interventions in facilitating this remapping and restructuring, are issues for SLA research with theoretical, and important practical consequences. An extreme version of linguistic relativity (see Odlin, this volume) claims the training L1 acquisition involves (see, e.g., the L1 construction learning processes described in section 3) leads to a mapping of language forms to concepts which makes conceptual distinctions not encoded in the L1 unavailable for thought, and so communicative expression, in an L2 in

later adulthood. One consequence of this extreme version of linguistic relativity is that native-like ability for adult L2 learners is not attainable. On the whole Odlin (this volume) rejects this pessimistic conclusion as premature, in the absence of basic and needed important research into "conceptual" transfer and its permeability—not the least in response to instructional interventions which aim to make both forms, and the meanings they map to in adult second language learning, clear during second language instruction (see Cadierno, in press; Ellis, this volume; Doughty & Williams, 1998; VanPatten, 2004). Slobin's (1996) own slightly less pessimistic position is that, while concepts evoked by events and human experience remain available for prelinguistic thought, whatever the L1, the on-line process of speaking in an L2 heavily implicates only the *dispositions* to map forms to preferred patterns of conceptualization for linguistic expression, and so communicative effect, developed in the L1.

Typological differences between satellite-framed (S-framed), and verb-framed (V-framed) languages identified by Talmy (2000) have been influential in examining these claims (see Cadierno, Gullberg, this volume), and are a clear example of the issues involved. It has been shown that typologically different lexicalization patterns for referring to motion events do have consequences for the way narratives are performed throughout development in the L1 (Berman & Slobin, 1994). First language speakers of S-framed languages produce narratives which are often richer in descriptions of manner, conflated with a great variety of verbs of motion (e.g., in English, rushed; fled; staggered) and with more elaborate coding of path in separate satellites (out of and into; from and down; through and along), compared to V-framed language speakers who encode path on a smaller number of motion verb types (e.g., in Japanese, haitta (went in); detta (went out), and deemphasize descriptions of manner in separate adverbials (isoide (hurriedly) haitta; yukkuri (slowly) detta) due to their reduced "codability" and so increased processing "cost" to the language user (two words for expressing the same motion and manner event, in Japanese, versus one in English). Consequently, in English "manner comes for free" in construing motions events, and but is dispreferred in construing them in Japanese (see Slobin, 2004, p. 237). Examining results of the studies to date researching the L2 expression of motion events, and Slobin's claim that speakers of L2s may be highly resistant to attempts to retrain L1 patterns of thinking for speaking that, encoding options in the L1 lead them to prefer in construing events, Cadierno (this volume) reports that, although there are persistent effects of these L1 lexicalization patterns on L2 production (e.g., a tendency by Danish L1 S-framed learners of V-framed Spanish L2 to use fewer verbs conflating path and motion, and to use more elaborative coding of path in external satellites), there is nonetheless evidence that restructuring appears to be

possible. Acquisition of L2 constructions for describing motion events, though delayed in the early stages of L2 learning and exposure, becomes increasingly native-like over time in speech production.

4.3 Grammaticization, conceptual domains, and cross-linguistic differences

Another aspect of Talmy's work that has been influential in first language acquisition research into the acquisition of form–function relations, as well as adult SLA in naturalistic settings, is his cross-linguistic analysis of grammaticizable notions. Distinguishing between two universal subsystems of meaning-bearing forms in language, the *open-class*, lexical and the *closed-class*, grammatical subsystems, Talmy (2000; this volume; cf. Coventry and Guijarro-Fuentes, this volume) notes that whereas the meanings that open-class forms (e.g., nouns, verbs, and adjectives) can express are very wide, the meanings of closed-class forms (e.g., verbal inflections, prepositions, determiners) are highly constrained, both with respect to the conceptual domain they can refer to, and as to member notions within any domain. For example, grammaticizable conceptual domains typically marked on verbs include tense, aspect, and person, but never spatial setting (indoors, outside), or speaker's state of mind (bored, interested), etc. And, whereas many languages have closed-class forms indicating the number of a noun referent *within* that conceptual domain, forms can refer to notions such as singular, dual, or plural, but never to even, odd, a dozen, etc. Languages differ in the extent to which they grammaticize forms within this constrained inventory of conceptual domains and individual concepts, and this inventory, Talmy argues, amounts to the fundamental conceptual-structuring system used by language.

Drawing on this work Slobin has argued that "such notions must constitute a privileged set for the child, and that they are embodied in the child's conceptions of 'prototypical events' that are mapped onto the first grammatical forms universally" (1985, p. 1,173). Whether this prelinguistic conceptual basis for form-meaning mappings remains available into adult Second Language Acquisition is an interesting question. However, even if it does, as Slobin again notes, the adult's language-learning task is clearly different from the child's: "For the child, the construction of the grammar and the construction of semantic/pragmatic concepts go hand-in-hand. For the adult, construction of the grammar often requires a revision of semantic/pragmatic concepts, along with what may well be a more difficult task of perceptual identification of the relevant morphological elements" (1993, p. 242). In cases where L2 morphology lacks perceptual salience for learners, or where the semantic/pragmatic concepts contributing to constructional meaning are unfamiliar, additional attention to form in communicative context is likely to be needed in order

help learners map forms to meaning. Tyler and Achard, in their chapters in this volume, make various suggestions about how and when cognitive linguistic-motivated interventions can successfully be managed during classroom L2 learning to achieve this.

4.4 Conceptualization, developmental sequences, and L2 task demands

Divergence from target language norms in L2 speech production can be explained by many of the factors influencing "transfer" described by Coventry and Guijarro-Fuentes, MacWhinney and Odlin (this volume). The extent of this divergence, and the conceptual, processing, and cross-linguistic coordinates of why it occurs, are important to explain in theory and to address in pedagogic practice. But parallels between the order of linguistic emergence of available grammaticizable notions do exist in child and naturalistic adult SLA and are described in detail in Perdue, (1993a, 1993b), Becker and Carroll (1997) and Dietrich, Klein, and Noyau (1995). Slobin (1993), in discussing one of these cases, i.e., the order of emergence of prepositions for marking first topological relations of neighborhood and containment, and later, axis-based projective relations of above/below, front/back, in the European Science Foundation (ESF) project data (Perdue, 1993b), comments as follows:

> The parallels, though, cannot be attributed to the same underlying factors. In the case of FLA (first language acquisition) one appeals to cognitive development: the projective notions simply are not available to very young children. But in the case of ALA (adult language acquisition) all of the relevant cognitive machinery is in place. Why, then, should learners have difficulty in discovering the necessary prepositions for spatial relations that they already command in the L1. There are at least two possibilities: (1) adult learners retain a scale of conceptual complexity, based on their own cognitive development, and at first search the TL (target language) for the grammatical marking of those notions which represent some primordial core of basicness or simplicity; and/or (2) these most basic notions are also used with relatively greater frequency in the TL . . . It is likely that speakers, generally, have less recourse to the encoding of complex notions, and that learners are simply reflecting the relative frequency of occurrence of various prepositions in the input . . . Or it may be that the complex relations are, indeed, communicated above some threshold of frequency, but that learners "gate them out" due to their complexity. In this case cognitive factors play a role in both FLA and ALA, but for different reasons: the complex notions are not

> available to very young children, while they are available but not accessed in early stages of ALA.
>
> Slobin, 1993, p. 243

If either of one of these possibilities raised by Slobin is true, then this suggests a pedagogically feasible and potentially useful intervention for promoting L2 acquisition of *some* form-function mappings. This is that pedagogic tasks for L2 learners be designed and sequenced, over time, in such a way as to increase in the complexity of the communicative demands they make in conceptual domains that Talmy has shown to be available for grammaticization processes to operate on. Increasing complexity of task demands in these domains has the potential to direct learners' attentional and memory resources to the way the L2 structures and codes concepts, so leading to interlanguage *development* (see Robinson, 2003b, 2005a, 2007a). For example, tasks which differ along the Here-and-Now/There-and-Then dimension clearly require the learner to distinguish between the temporality of reference (present versus past), and to use distinct deictic expressions (this, that, here, there) to indicate immediately present versus absent objects. As Cromer (1974) and others have noted, this sequence of conceptual and linguistic development takes place in L1 acquisition of English. Children first make reference to the Here-and-Now, and at a later point to the There-and-Then, and a similar sequence of linguistic development has been observed in L2 acquisition (see Behrens, 2001; Meisel, 1987; von Stutterheim & Klein, 1987).

Similarly, tasks which require no causal reasoning to establish event relations, and simple transmission of facts, compared to tasks which require the speaker to justify beliefs, and support interpretations of why events follow each other by giving reasons, also require, in the latter case, expressions, such as logical subordinators (so, because, therefore, etc.). In the case of reasoning about other people's intentions and beliefs, use of psychological and cognitive state verbs (e.g., know, believe, suppose, think) is required. Both of these introduce complex syntactic finite and non-finite clause complementation and prompt the development of complex constructions described by Diessel (2004), Tomasello (2003), and Lieven and Tomasello (this volume). This sequence of conceptual and linguistic development, too, has been observed in L1 acquisition, with psychological state terms emerging in the order, physiological, emotional, and desire terms, and then later, cognitive state terms (Bartsch & Wellman, 2005; Lee & Rescorla 2002; Nixon, 2005). The later emergence of cognitive state terms (and the complex syntactic predication that accompanies them) is associated with the child's development of a "theory of mind" (see Baron-Cohen, 1995; Schneider, Schumann-Hengsteller, & Sodian, 2005; Tomasello, 1999, 2003; Wellman 1990).

Thirdly, in developing the ability to navigate through a complex spatial

location, containing many elements which have to be referred to and distinguished, it has been observed that during childhood a basic *topological* network of landmarks is first constructed and referred to, in which a landmark is connected only with the few landmarks that can be seen from it. This has been called an egocentric, ground level *route map* (see Carassa, Aprigliano & Geminiani, 2000; Chown, Kaplan, & Kortenkamp, 1995; Cornell, Heth, & Alberts, 1994; Taylor & Tsversky, 1996). At a later stage, *survey maps* are developed and used in navigation that make use of many landmarks, allowing the speaker/child to take multiple perspectives on a location using *axis-based* relations of betweeness and front/backness. This same sequence of development, from topological to axis-based reference to spatial location, has been documented during naturalistic adult SLA as well, in which axis-based referring expressions themselves emerge in the L2 in the order vertical axis< lateral axis< sagittal axis (see Becker & Carroll, 1997; Perdue, 1993b).

In each of these three cases it appears that increasing task complexity during L2 performance involves some recapitulation of a sequence of conceptual development in childhood, and that the increasingly complex demands that tasks impose along these dimensions *can* be met by use of specific aspects of the L2 which code these "familiar" adult concepts. Increases in cognitive complexity along these dimensions should therefore represent a "natural order" for sequencing the conceptual and linguistic demands of L2 tasks. As von Stutterheim has argued, "such conceptual categories provide an important guideline for the course of acquisition in a particular domain" (1991, p. 388). Whether such ontogenetically motivated, incremental changes in task complexity also provide "optimum" contexts for the development of needed (task relevant) function–form mappings in the L2 is an interesting question in need of research. The Cognition Hypothesis of adult task-based language learning and task sequencing (Robinson, 2001b, 2003b, 2005a, in press b) proposes that they do, and Slobin's speculation (above) that "adult learners retain a scale of conceptual complexity, based on their own cognitive development, and at first search the TL (target language) for the grammatical marking of those notions which represent some primordial core of basicness or simplicity" also suggests that this may be so.

Sequencing the cognitive demands of L2 tasks from simple to complex along conceptual dimensions requiring grammaticized linguistic expression (such as those described above) would therefore be complementary to adult learners' own initial dispositions, and also helpful in prompting them to move beyond them. That is, increasingly complex, cognitively demanding tasks in these conceptual domains should *orient* learners to their lexical and syntactic encoding L2 prerequisites for communicatively effective speech, thereby promoting not only greater grammaticization, and so accuracy, but also greater complexity of production. While *general*

measures of L2 task-based speech production, such as percent error-free T- or C-units, or S nodes or clauses per T- or C-unit (see Bardovi-Harlig, 1992; Ellis & Barkhuizen, 2005; Ortega, 2003; Larson Freeman, 2006; Robinson, 1995a, 2001a; Skehan, 1998; Skehan & Foster, 2001), may capture *global* changes in orientations to accuracy and complexity of speech across one cycle of simple to complex task performance, *specific* measures, as captured by Cognitive Linguistic descriptions of the *language and conceptualization* interface, may produce equally relevant results over much longer cycles of increasing task demands (i.e., weeks or months of such cycles). These task demands should also lead—the Cognition Hypothesis claims—not only to greater amounts of interaction but also to heightened attention to input and output, causing more noticing (of problematic forms in the output, and forms made salient in the input). Consequently, the conceptual and communicative effort they induce in the learner should additionally cause the formulator to expand, adjust, and reorganize L2 lexical and syntactic encoding processes in line with the conceptual demands of the task and the target L2 system.

4.5 Formulation and the L2 formulator: Cognition, conceptualization, and "rethinking-for-speaking"

An issue of considerable theoretical importance is therefore *how* the adjustment and reorganization of L2 *lexical and syntactic encoding* procedures that follow from "rethinking-for-speaking" (stimulated by attempts to meet complex L2 task demands) become established in the L2 user during development, and how these are related to the prior stage in message formulation, i.e., L2 *lexical encoding* and lemma activation. There are two positions which have been proposed. Firstly, Truscott and Sharwood Smith (2004) propose that during development, where L1 syntactic encoding procedures are highly activated, they are selected to serve L2 production purposes. In this sense the L1 formulator is initially piggybacked to serve the additional demands of L2 production. Secondly, and in some contrast, De Bot (1992) and Pienemann (1998, 2003) argue syntactic encoding processes are language-specific, and that L2 lemmas do not trigger L1 syntactic encoding processes. In this sense the syntactic encoding procedures followed by the L2 formulator are separately constructed, from scratch as it were, and are not piggybacked on the L1 formulator.

A third possibility is that perhaps *both* of these options are drawn on in tandem by the L2 learner, with the second of these, i.e., the L2-formulator-built-from-scratch option winning out in the later advanced stages of fluent L2 speech production over the first of these, the L1-formulator-coopted option. On the one hand, in this dual developmental-process view, consciously learned, and effortfully managed L2 declarative

rules at first co-exist with highly automatized L1 production rules which consequently have a much lower activation threshold level, leading them to be selected for L2 syntactic encoding early in development. These have to be inhibited or suppressed if accurate L2 production is to occur, but often this does not occur—as Truscott and Sharwood Smith's model suggests. Krashen (1982) laid some well-known constraints on when this successful inhibition of L1 syntactic encoding procedures, and accurate use of L2 syntactic encoding procedures, might happen, i.e., having time, knowing the L2 rules, and being focused on form. One could also add that individuals differ in their ability to inhibit the L1, and control attention, as work on the bilingual lexicon (e.g., Lee & Williams, 2001; Meuter, 2005; Michael & Gollan, 2005) and the L2 processing of relational terms for referring to spatial location (Taube-Schiff & Segalowitz, 2005) has shown, and this would contribute to the variability not only within but also across individuals in their successful syntactic encoding of L2 lemmas.

In tandem with this, on the other hand—in the view being proposed—a new set of syntactic encoding procedures would be being built (or rather, circuits supporting it would be being established) from scratch, resulting at first in utterances that conform, variously, say, to the basic variety, as Klein and Perdue (1997) have described it, or the pragmatic mode that Givon (1995) describes, or, of course, the early stages of speech production described in Pienemann's (1998, 2003) model of L2 development. Since this L2 formulator does not recruit L1 syntactic encoding processes, nothing need be inhibited, and so speech production across learners from a variety of L1s would show a similar developmental trajectory, with little within-learner variation in its use at any one developmental point. Eventually, this becomes the preferred L2 syntactic encoding option, and the early used L2-co-existing-with-L1 syntactic encoding option is abandoned, and the L1 formulator left to do its originally dedicated job. If this were true, then, it would mean that the L2 is much more likely to influence the workings of the L1 formulator in the earlier stages of L2 acquisition, when the two co-operate, than in the later, advanced stages, when the two sets of syntactic encoding procedures are independent. Evidence for this would be L2 intrusions into the L1 speech of early, in contrast to advanced and highly proficient L2 learners. Interestingly, Pavlenko and Jarvis (2002) have found just such evidence of bi-directional transfer, and L2 influence on L1 production for post-puberty Russian L1 learners of L2 English living in the USA for between three and eight years. Clearly these are not learners in the early stages of L2 acquisition, but it is not clear that they are very advanced either. The position just described would predict that very advanced learners would show little or no L2 transfer to L1 speech production. These issues considered, research into the development of L2 speech production ability, and claims about the mechanisms

supporting it, needs to look not just at L2 speech production data but also at the reciprocal influence (and of what kind) learning to speak an L2 (at early versus later and very advanced stages) has on L1 speech production, for some of the reasons just given (see also Cook, 2003; Meuter, 2005 for relevant discussion and findings).

4.6 Issues for research

Cross-linguistic influences on language, thought, and L2 development. The research projects described in Berman and Slobin (1994) and Stromqvist and Verhoeven (2004, and in Purdue, 1993a, 1993b) have addressed many of the issues raised above, and produced findings which are an important foundation for future Cognitive Linguistic, SLA research into language, thought, and L2 development. Berman and Slobin describe the similar developmental trajectories for L1 acquisition of narrative ability, and the ways in which typological, cross-linguistic differences between L1s, and constructions at various levels of specificity they make available for performing narratives, lead L1 speakers to filter experience for speaking about it in different ways, with regard to the expression of temporality, motion event conflation, and perspective taking. As children develop cognitively, older established grammaticized forms become the means for expressing new conceptual distinctions and communicative functions that require narrative expression and integration. Carroll et al.'s (2004) findings (described above) are one example of how the L1 predispositions for thinking about and construing events in narratives, developed in child L1 acquisition, persist in adult use of the L2. Cadierno shows (this volume) that L2 transfer of these L1-based ways of thinking for speaking, however, is variable and suggests that instruction may be able to lead adult L2 learners to refilter experience by focusing on form–meaning connections (specifically, lexicalization patterns) in ways the L2 makes available to speakers and listeners. Purdue (1993a), and the work of the European Science Foundation (ESF) project, similarly focuses on the role of cross-linguistic differences between a variety of L1s and L2s in influencing the course of SLA in the domains of reference to space, time, causation, and other conceptual domains, finding evidence for similar developmental trajectories across different L1–L2 pairings (as described earlier in this section). These two research projects have resulted in cumulative, interpretable findings as a result of *consistency* in the research questions addressed and their operationalization, both in measures of language *learning*, and the *tasks* chosen to elicit language *use* across the range of ages, and language learned, in the populations studied. Further research into these issues needs to address two questions with regard to the use, consistency, and reliability of elicitation tasks.

Task construal: How do we ensure learners are construing task demands in the way researcher intends? Berman and Slobin (1994, p. 17) claim that a serious weakness of their research project was that it was not possible to control learners' definition of the narrative task they were set, and that in telling the *Frog Story* some learners—especially younger ones—described individual pictures in isolation without attempting to "relate" them in narrative, which was the cognitive, conceptual, and discourse operation of interest. Berman and Slobin (p. 17) claim "our texts show us" this, but the text cannot show that conclusively. On-line measures of what learners are actually attempting to do, such as protocols (Jourdenais, 2001) are one way of ensuring that intended task demands, and efforts at conceptualization and its integration with language, are being met by learners, though there are acknowledged problems with this methodology in that protocols may interfere with and impede the cognitive processes of interest, disrupting concerted effort at conceptualization and linguistic expression. Post-task questionnaires are less intrusive but less faithful to choices learners make in construing task demands on-line. These have been adopted in SLA research into task performance where "difficulty-rating" questionnaires have been used following simple and complex task performance (along dimensions of conceptual complexity), and have shown, to date, that in all cases perceived "difficulty" of the research task performed by the learners, and the researchers' intended-to-be-construed task "complexity," co-vary systematically in the intended and predicted ways (Gilabert, 2004, 2007; Robinson, 2001a, 2005a, in press b). Variance in production data irrelevant to addressing intended research questions (concerning, in these cases, the relationship of language to conceptualization during task performance) could be minimized by using such measures, and also large group designs. The issue of task "purity" and unintended participant construal of task demands has been addressed extensively in cognitive psychology, where laboratory tasks (e.g., those used in studies of language and spatial cognition by Levinson, 2003, and Majid et al., 2004) make demands which are often under much more researcher control (see, e.g., Stanovitch, 1999 for discussion). The issue is also important to address in assessing the extent to which learners are attempting to make, and articulate through language, conceptual distinctions during tasks requiring language production so as to examine the L2-thought interface during development.

Conceptual demands: How do we design tasks, which differ in the demands on reasoning, reference to time, space, and causation, and perspective-taking? If we want to examine how L2 learner production reflects different efforts at conceptualization (given any one cross-linguistically, typologically similar, or different L1), how do we design tasks that promote, for example, no versus causal reasoning, or reference to events happening in the

present versus the past, or to events requiring just one perspective to be taken on an event, versus multiple second- and third-party perspectives? These are design issues that have been addressed in research into the effects of increasing the conceptual demands of tasks, and their relevant dimensions for increasing pedagogic task complexity (see Robinson, 2007a, for a taxonomy and operational definitions). Some of these conceptual dimensions of task demands on speech production (e.g., here-and-now versus there-and-then, Gilabert, 2007; Ishikawa, 2007; Robinson, 1995a) are fairly unproblematic to manipulate, but others (e.g., reasoning demands) will require more careful, theoretically informed and coordinated design decisions.

SLA research into these issues should at the least be cumulative, and so operationally consistent in choice of task to examine a particular language, conceptualization influence on speech production and comprehension, as was the work of Slobin and Berman (1994) and the ESF project described by Purdue (1993a, 1993b). But narrating the *Frog Story*, while illuminating, is limited, and not exhaustive of adult second language learners' narrative dispositions or abilities, or complementary to their age-related interests and motivations. Arguing acquisition is "pushed by the communicative demands of the tasks of the discourse activities which the learner takes part in" Purdue (1993a, p. 53) describes how the communicative tasks targeting adult L2 learners' acquisitional processes in conceptual and communicative domains were chosen in the ESF project. Continuity with both the above (Berman & Slobin, 1999; Purdue, 1993a) operational choices for elicitation tasks, and as well as with those suggested for application to pedagogy and materials and syllabus design (e.g., Robinson, 2007a, in press a; Robinson & Gilabert, in press) is advisable if future SLA research findings in this area are to be cumulative and also of relevance to possible pedagogic application.

Motion, causation, lexicalization patterns, and L2 task demands. Research needs to motivate not only "choice" of elicitation or comprehension task but also directional hypotheses for how differences in task demands along a conceptual dimension will affect speech production and comprehension. Greater effort at conceptualization, pushed by the communicative demands of tasks that L2 learners undertake, should lead to qualitatively different efforts at encoding these different conceptualizations and communicative demands in speech. Greater functional complexity in discourse, leads to greater structural and "constructional" complexity in speech, Givon (1985) and Rohdenburg (2002) have both claimed, and the cognitive development which leads children to attempt a wider range of more complex functions in communicative interaction is responsible, at least in part, for the changes that take place in first language development (see Slobin, 1973, 1985; Tomasello, 2003).

In what ways, then, does increasing the conceptual complexity of tasks in one of the domains described above lead learners to attempt greater grammaticization and syntacticization of speech, with regard, for example, to lexicalization patterns (Cadierno, this volume) for expressing motion events in the case of reference to space and progress through it in narrative description? Robinson and Nakamura (in press) have found that more complex L2 tasks, requiring reference to motion events in English by speakers of both V-framed and S-framed L1s, do lead to greater target-like lexicalization patterns, and more conflation of manner with motion verbs (as is typical in English) compared to performance on less conceptually and communicatively demanding tasks in the same domain. The extent to which increasing the conceptual and communicative demands on this and other dimensions, such as those requiring the use of lexicalization patterns for expressing causation (see Odlin's discussion of causative constructions, this volume), leads learners to attempt increasingly complex and more target-like forms of L2 expression is an area in much need of research, and with many pedagogic implications for the design of developmentally motivated language learning materials, tasks, and task sequences.

Tense, aspect, developmental sequences, and task demands. How might tasks be designed to elicit developmental changes in the ability to code reference to time and duration of activity in the L2, so as to research the influence of conceptualization on language production in this area, and its susceptibility (or not) to L1 influence? Following the reasoning above, one might expect that on simple versions of tasks low in their conceptual and communicative demands in this domain, learners initially restrict past or perfective marking on verbs to achievement and accomplishment verbs, but on more complex versions, over time, they would progressively extend this marking to activities and then states, as the Aspect Hypothesis predicts happens in development (Bardovi-Harlig, 2000; Comajoan, 2006; Li & Shirai, 2000). The measures used to capture this developmental shift, pushed by the complexity of task demands, would be different from the currently used accuracy measures, or measures of complexity such as clauses per C-unit. They would be developmentally motivated measures of the increasing attempt to extend past or perfective marking on verbs, particularly as complex tasks may encourage this. These issues lead to a further issue for future research.

Assessing the accuracy, fluency, and complexity of L2 learner speech. A great deal of current research uses general measures of complexity (T-units, C-units), accuracy (e.g., % error-free C- or T-units) and fluency (ratio measures of pauses per T- or C-unit, see Ellis & Barkhuizen, 2005, for an extensive overview) when assessing classroom L2 learner language, and

the influence of tasks or other demands on it. But following the rationale given above, specific measures relevant to the particular conceptual demands tasks make (such as lexicalization patterns for reference to motion events) also need to be used if the effects of these (and not other demands) on speech production are to be assessed. To what extent do such general and specific indices of speech production relate to each other? To what extent do the coding procedures for establishing each differ (if at all) in reliability, and to what extent do they co-predict changes in speech performance under different task conditions?

Individual differences, cognitive and conceptual abilities, and rethinking for speaking. Cadierno (this volume), summarizing her own findings, and those others on the acquisition of L2 lexicalization patterns for describing motion events, concludes that there seems to be "a rather limited role of the L1 thinking for speaking patterns in advanced second language acquisition." In the select population of second language learners who reach advanced levels, what cognitive abilities could contribute to the capacity for "rethinking for speaking" that learners at lower levels must exercise in order to progress in this area of L2 attainment? It seems unlikely that these capacities are related in any obvious way to the abilities measured by subtests of currently available aptitude tests (e.g., Carroll & Sapon's, 1959, MLAT). The abilities nominated as contributing to the aptitude factor "deep semantic processing" in the *aptitude complex/ability differentiation* model of aptitude (Robinson, 2002, 2007b), i.e., analogizing concepts, and inferring word meaning, may be related to this. The capacity to rethink for speaking may also be related to the ability to break set, as measured by a wide variety of tasks that assess insight into problem-solving (see Sternberg & Davidson, 1994).

Typological differences, relative difficulty, and L2 transfer. As Odlin (this volume) argues, the relative difficulty experienced by speakers from typologically different, versus similar L1 and L2s is important to explore for the light it can cast on whether "conceptual" transfer persists in L2 learners, what late-learned associations between language and L2 conceptualization are, and what the levels of ultimate attainment L2 learners can reach in "rethinking for speaking." The issue of identifying to what extent conceptual transfer accompanies meaning transfer—as Odlin describes it—is important but problematic since, as Odlin notes, investigating conceptual transfer involves having tasks with a non-verbal component, in contrast to the tasks described above, to assess language-specific effects on cognitive abilities, such as orienting to spatial location, categorization, and recall. This will involve using a number of the experimental procedures and methodologies for investigating these issues adopted outside those typically used in SLA research (see, e.g., Majid, Bowerman, Kita,

Haun & Levinson, 2004; Levinson, 2003), as well as the development of new ones.

5 Summary and conclusion

Many other issues remain but must go untreated here. Enough issues, and directions for future research, have been described in this, and throughout the preceding chapters, however, to guide research connections between Cognitive Linguistics, SLA and language instruction. Cognitive Linguistics provides a wide overview of language and its cognitive, social, psychological, and pragmatic dimensions, and an opportunity for interdisciplinary collaboration in research into all of these. We trust this volume, and its individual contributions, will contribute to that interdisplinary inquiry, benefiting deeper theoretical understanding of issues connecting these areas, and useful applications of relevant research into them, alike.

Bibliography

Ackerman, P. (2003). Aptitude complexes and trait complexes. *Educational Psychologist*, *38*, 85–93.

Allwood, J. (1993). Feedback in second language acquisition. In C. Perdue (Ed.), *Adult language acquisition: Cross-linguistic perspectives, Vol. 2: The results* (pp. 196–235). Cambridge: Cambridge University Press.

Andersen, R. (1984). The one-to-one principle of interlanguage construction. *Language Learning*, *34*, 77–95.

Anderson, J. R., & Lebriere, C. (1998). *The atomic components of thought*. Mahwah, NJ: Erlbaum.

Anderson, J., Rennie, C., Gordon, E., Howson, A., et al. (1991). Measurement of maximum variability within event-related potentials in schizophrenia. *Psychiatry Research*, *39*(1), 33–44.

Baker, C., & McCarthy, J. (1981). *The logical problem of language acquisition*. Cambridge, MA: MIT Press.

Bardovi-Harlig, K. (1992). A second look at T-unit analysis: Reconsidering the sentence. *TESOL Quarterly*, *26*, 390–395.

Bardovi-Harlig, K. (2000). *Tense and aspect in second language acquisition: Form, meaning and use*. Oxford: Blackwell.

Baron-Cohen, S. (1995). *Mindblindness*. Cambridge, MA: MIT Press.

Bartsch, K., & Wellman, H. (1995). *Children talk about the mind*. Oxford: Oxford University Press.

Bates, E. (1976). *Language and context: The acquisition of pragmatics*. New York: Academic Press.

Bates, E., & Goodman, J. (1999). On the emergence of grammar from the lexicon. In B. MacWhinney (Ed.), *The emergence of language* (pp. 115–152). Mahwah, NJ: Erlbaum.

Bates, E. & MacWhinney, B. (1982). Functionalist approaches to grammar. In

E. Wanner & L. Gleitman (Eds.), *Language acquisition: the state of the art* (pp. 173–218). New York: Cambridge University Press.

Bates, E., Bretherton, I., & Snyder, L. (1988). *From first words to grammar: Individual differences and dissociable mechanisms*. Cambridge: Cambridge University Press.

Becker, A., & Carroll, M. (1997) (Eds.). *The acquisition of spatial relations in a second language*. Amsterdam: John Benjamins.

Behrens, H. (2001). Cognitive-conceptual development and the acquisition of grammatical morphemes: The development of time concepts and verb tense. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 450–474). Cambridge: Cambridge University Press.

Benicini, G., & Goldberg, A. (2000). The contribution of argument structure constructions to sentence meaning. *Journal of Memory and Language*, *43*, 650–661.

Berman, R. (1987). Cognitive components of language development. In C. Pfaff (Ed.), *First and second language acquisition processes* (pp. 3–27). Cambridge, MA: Newbury House.

Berman, R., & Slobin, D. (1994) (Eds.). *Relating events in narrative: A crosslinguistic developmental study*. Mahwah, NJ: Erlbaum.

Bloom, L. (1970). *Language development: Form and function in emerging grammars*. Cambridge, MA: MIT Press.

Bod, R., Hay, J., & Jannedy, S. (Eds.) (2003). *Probabilistic linguistics*. Cambridge, MA: MIT Press.

Braine, M. D. S (1963). The ontogeny of English phrase structure: The first phase. *Language*, *39*, 1–3.

Breen, M., & Candlin, C. (1980). The essentials of a communicative curriculum in language teaching. *Applied Linguistics*, *1*, 89–112.

Bremer, K., Broeder, P., Roberts, C., Simonot, M., & Vasseur, M. (1993). Ways of acheiving understanding. In C. Perdue (Ed.), *Adult language acquisition: Cross-linguistic perspectives, Vol. 2: The results* (pp. 154–195). Cambridge: Cambridge University Press.

Brinton, D., Snow, M., & Wesche, M. (1989). *Content-based second language instruction*. Rowley, MA: Newbury House.

Brown, R. (1973). *A first language*. Cambridge, MA: Harvard University Press.

Bruner, J. (1960). *The process of education*. New York: Random House.

Bybee, J. (2006). *Frequency of use and the organization of language*. Oxford: Oxford University Press.

Bybee, J., & Hopper, P. (Eds.) (2001). *Frequency and the emergence of linguistic structure*. Amsterdam: Benjamins.

Bygate, M., Skehan, P., and Swain, M. (2001) (Eds.). *Researching pedagogic tasks: Second language learning, teaching and testing*. London: Longman.

Cameron, L. (2001). *Teaching languages to young learners*. Cambridge: Cambridge University Press.

Candlin, C. (1987). Towards task-based language learning. In C. Candlin & D. Murphy (Eds.), *Language learning tasks* (pp. 5–22). London: Prentice-Hall.

Carassa, A., Aprigliano, A., & Geminiani, G. (2000). Describers and explorers: A method for investigating cognitive maps. In S. O'Nuallain (Ed.), *Spatial cognition* (pp. 33–43). Amsterdam: John Benjamins.

Carlson, R. (1997). *Experienced cognition*. Mahwah, NJ: Erlbaum.
Carroll, J. B. (1993). *Human cognitive abilities: A factor analytic survey*. New York: Cambridge University Press.
Carroll, J. B., & Sapon, S. M. (1959). *Modern language aptitude test*. Washington, DC: Second Language Testing Incorporated.
Carroll, M., von Stutterheim, C., & Nuese, R. (2004). The language and thought debate: A psycholinguistic perspective. In T. Pechman & C. Habel (Eds.), *Multidisciplinary approaches to language production*. Berlin: Mouton de Gruyter.
Carroll, S. (2001). *Input and evidence: The raw material of second language acquisition*. Amsterdam: John Benjamins.
Ceci, S. (1996) *On intelligence: A bioecological treatise on intellectual development*. Cambridge, MA: Harvard University Press.
Chater, N., & Manning, C. (2006). Probabilistic models of language processing and acquisition. *Trends in Cognitive Science*, *10*, 335–344.
Chaudron, C. (1988). *Second language classrooms*. New York: Cambridge University Press.
Childers, J., & Tomasello, M. (2001). The role of pronouns in young children's acquisition of the English transitive construction. *Developmental Psychology*, *37*, 739–748.
Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
Chown, E., Kaplan, S., & Kortenkamp, D. (1995). Prototypes, Location and Associative Networks (PLAN): Towards a unified theory of cognitive mapping. *Cognitive Science*, *19*, 1–51.
Christiansen, M. H., & Chater, N. (Eds.) (2001). *Connectionist psycholinguistics*. Westport, CO: Ablex.
Comajoan, L. (2006). The Aspect Hypothesis: Development of morphology and appropriateness of use. *Language Learning*, *56*, 201–268.
Cook, V. (2003) (Ed.). *Effects of the second language on the first*. Clevedon: Multilingual Matters.
Cornell, E., Heth, D., & Alberts, D. (1994). Place recognition and way finding by children and adults. *Memory and Cognition*, *22*, 633–643.
Corno, L., Cronbach, L. J., Kupermintz, H., Lohman, D. F., Mandinach, E. B., Porteus, A. W., & Talbert, J. E. (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow*. Mahwah, NJ: Erlbaum.
Crombie, W. (1985). *Process and relation in discourse and language learning*. Oxford: Oxford University Press.
Cromer, R. (1974). The development of language and cognition: The cognition hypothesis. In B. Foss (Ed.), *New perspectives in child development*, (pp. 184–252). Harmondsworth: Penguin.
Cromer, R. (1991). *Language and thought in normal and handicappped children*. Oxford: Blackwell.
Crookes, G. & Gass, S. (1993). *Tasks in language learning: Integrating theory and practice*. Clevedon: Multilingual Matters.
Cummins, J. (1988). Bilingualism and second language learning. *Annual Review of Applied Linguistics*, *13*, 51–70.
Cummins, R. (1983). *The nature of psychological explanation*. Cambridge, MA: MIT Press.
Dabrowska, E., & Street, J. (2006). Individual differences in language attainment:

Comprehension of passive sentences in native and non-native English speakers. *Language Sciences*, *28*, 604–615.

Dai, D., & Sternberg, R. J. (2004). *Motivation, emotion and cognition: Integrative perspectives on intellectual functioning and development*. New York: Cambridge University Press.

Day, E., & Shapson, S. (1991). Integrating formal and functional approaches in language teaching: An experimental study. *Language Learning*, *41*, 25–58.

de Bot, K. (1992). A bilingual production model: Levelt's "speaking" model adapted. *Applied Linguistics*, *13*, 1–24.

de Bot, K., Lowie, W., & Verspoor, M. (2007). A dynamic systems theory to second language acquisition. *Bilingualism: Language and Cognition*, *10*, 7–21.

de Graaff, R. (1997). *Differential effects of explicit instruction on second language acquisition*. The Hague: Holland Institute of Generative Linguistics.

DeKeyser, R. M. (1995). Learning second language grammar rules: An experiment with a miniature linguistic system. *Studies in Second Language Acquisition*, *17*, 379–410.

DeKeyser, R. M. (1997). Beyond explicit rule learning: Automatizing second language syntax. *Studies in Second Language Acquisition*, *19*, 195–222.

DeKeyser, R. M. (2000). The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition*, *22*, 499–533.

DeKeyser, R. M. (2001). Automaticity and automatization. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 125–151). Cambridge: Cambridge University Press.

DeKeyser, R. M. (2007) (Ed.). *Practicing in a second language: perspectives from applied linguistics and cognitive psychology*. New York: Cambridge University Press.

Dewey, J. (1916). *Democracy and education*. New York: MacMillan.

Diessel, H. (2004). *The acquisition of complex sentences*. Cambridge: Cambridge University Press.

Dietrich, R., Klein, W., & Noyau, C. (1995). *The acquisition of temporality in a second language*. Amsterdam: John Benjamins.

Dipper, L., Black, M., & Bryan, K. (2005). Thinking for speaking and thinking for listening: The interaction of thought and language in typical and non-fluent comprehension and production. *Language and Cognitive Processes*, *20*, 417–441.

Dornyei, Z. (2002). The motivational basis of language learning tasks. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 137–158). Amsterdam: John Benjamins.

Dornyei, Z. (2005). *The psychology of the language learner*. Mahwah, NJ: Erlbaum.

Dornyei, Z., & Skehan, P. (2003). Individual differences in second language learning. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 589–630). Oxford: Blackwell.

Doughty, C. (2001). Cognitive underpinnings of focus on form. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 206–257). Cambridge: Cambridge University Press.

Doughty, C. (2003). Instructed SLA: Constraints, compensation and enhancement. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 256–310). Oxford: Blackwell.

Doughty, C., & Williams, J. (1998). Pedagogical choices in focus on form. In

C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition*, (pp. 197–262). New York: Cambridge University Press.

Dulay, H., & Burt, M. (1974). Natural sequences in child second language acquisition. *Language Learning*, *24*, 37–53.

Dulay, H., Burt, M., & Krashen, S. (1982). *Language two*. New York: Cambridge University Press.

Ehret, B., Gray, W., & Kirschenbaum, S. (2000). Contending with complexity: Developing and using a scaled world in applied cognitive research. *Human Factors*, *2*, 8–23.

Ellis, N. C. (1993). Rules and instances in foreign language learning: Interactions of explicit and implicit knowledge. *European Journal of Cognitive Psychology*, *5*, 289–318.

Ellis, N. C. (1994) (Ed.). *Implicit and explicit learning of languages*. New York: Academic Press.

Ellis, N. C. (1995). Consciousness in second language acquisition: A review of field studies and laboratory experiments. *Language Awareness*, *4*(3), 123–146.

Ellis, N. C. (1996). Sequencing in SLA: Phonological memory, chunking, and points of order. *Studies in Second Language Acquisition*, *18*(1), 91–126.

Ellis, N.C. (1998). Emergentism, connectionism and second language learning. *Language Learning*, *48*, 631–664.

Ellis, N. C. (1999). Cognitive Approaches to SLA. *Annual Review of Applied Linguistics*, *19*, 22–42.

Ellis, N. C. (2001). Memory for language. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 33–68). Cambridge: Cambridge University Press.

Ellis, N. C. (2002). Frequency effects in language acquisition: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, *24*, 143–188.

Ellis, N. C. (2003). Constructions, chunking, and connectionism: The emergence of second language structure. In C. Doughty & M. Long (Eds.), *Handbook of second language acquisition* (pp. 63–103). Oxford: Blackwell.

Ellis, N. C. (2005). At the interface: Interactions of implicit and explicit learning. *Studies in Second Language Acquisition*, *27*, 294–356.

Ellis, N. C. (2006a). Language acquisition as rational contingency learning. *Applied Linguistics*, *27*, 1–24.

Ellis, N. C. (2006b). Selective attention and transfer phenomena in SLA: Contingency, cue competition, salience, interference, overshadowing, blocking and perceptual learning. *Applied Linguistics*, *27*, 164–194.

Ellis, N. C. (in press). Implicit and explicit knowledge about language. In J. Cenoz (Ed.), *Knowledge about language* (Vol. 6, Encyclopedia of Language and Education). Heidelberg: Springer Scientific.

Ellis, N. C. (in press 2008). Optimizing the input: Frequency and sampling in usage-based and form-focused learning. In M. H. Long & C. Doughty (Eds.), *Handbook of second and foreign language teaching*. Oxford: Blackwell.

Ellis, N. C., Ferreira Junior, F., & Ke, J.-Y. (in preparation). Form, function, and frequency: Zipfian family construction profiles in SLA.

Ellis, N. C., Frey, E., & Jalkanen, I. (2007a). *The Psycholinguistic Reality of Collocation and Semantic Prosody—Neighbourhoods of Knowing (1): Lexical Access*. Paper presented at the Exploring the Lexis-Grammar interface, Hanover.

Ellis, N. C., Frey, E., & Jalkanen, I. (2007b). *The Psycholinguistic Reality of Collocation and Semantic Prosody—Neighbourhoods of Knowing (2): Semantic Access*. Paper presented at the Formulaic language, University of Wisconsin Milwaukee.

Ellis, N. C., & Larsen Freeman, D. (2006). Language emergence: Implications for applied linguistics—Introduction to the special issue. *Applied Linguistics*, *27*, 558–589.

Ellis, N. C., & Schmidt, R. (1998). Rules or associations in the acquisition of morphology? The frequency by regularity interaction in human and PDP learning of morphosyntax. *Language and Cognitive Processes*, *13*, 307–336.

Ellis, N. C., & Simpson-Vlach, R. (in preparation). Native and non-native processing of formulas and collocations: Psycholinguistic analyses.

Ellis, N. C., Simpson-Vlach, R., & Maynard, C. (in preparation). The processing of formulas in native and second-language speakers: Psycholinguistic and corpus determinants. *TESOL Quarterly*.

Ellis, R. (1999) (Ed.). *Learning a second language through interaction*. Amsterdam: John Benjamins.

Ellis, R. (2003). *Task-based language teaching and learning*. Oxford: Oxford University Press.

Ellis, R., & Barkhuizen, G. (2005). *Analyzing learner language*. Oxford: Oxford University Press.

Elman, J. (2004). An alternative view of the mental lexicon. *Trends in Cognitive Sciences*, 8, 301–306.

Elman, J. L., Bates, E. A., Johnson, M. H., Karmiloff-Smith, A., Parisi, D., & Plunkett, K. (1996). *Rethinking innateness: A connectionist perspective on development*. Cambridge, MA: MIT Press.

Engestrom, Y., & Middleton, D. (1996). *Cognition and communication at work*. New York: Cambridge University Press.

Felix, S. (1981). The effect of formal instruction on second language acquisition. *Language Learning*, *31*, 87–112.

Ferguson, C. (1971). Absence of copula and the notion of simplicity: a study of normal speech, baby talk, foreigner talk and pidgins. In D. Hymes (Ed.), *Pidginization and creolization of languages* (pp. 141–150). Cambridge: Cambridge University Press.

Fillmore, C. (1985). Frames and the semantics of understanding. *Quaderni di Semantica*, *6*, 222–254.

Fries, C. C. (1952). *The structure of English*. New York: Harcourt Brace and Company.

Fries, C. C. (1957). Foreword. In R. Lado, *Linguistics across cultures: Applied linguistics for language teachers*. Michigan, MI: Michigan University Press..

García Mayo, M. P. (2006). (Ed.), *Investigating tasks in formal language learning*. Clevedon: Multilingual Matters.

Gass, S. (1997). *Input, interaction and the second language learner*. Mahwah, NJ: Erlbaum.

Gass, S. (2003). Input and interaction. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 224–255). Oxford: Blackwell.

Gentner, D., Holyoak, K., & Kokinov, B. (2001) (Eds.). *The analogical mind*. Cambridge, MA: MIT Press.

Gilabert, R. (2004). *Task complexity and L2 oral narrative production*. Unpublished

Ph.D. dissertation. Department of Applied Linguistics, University of Barcelona, Spain.

Gilabert, R. (2007). The simultaneous manipulation along the planning time and +/– Here-and-Now dimensions: Effects on oral L2 production. In M. P. Garcia Mayo (Ed.), I*nvestigating tasks in formal language learning* (pp. 44–68). Clevedon: Multilingual Matters.

Givon, T. (1985). Function, structure, and language acquisition. In D. Slobin (Ed.), *The crosslinguistic study of language acquisition: Vol 1* (pp. 1,008–1,025). Hillsdale, NJ: Erlbaum.

Givon, T. (1995). *Functionalism and language*. Amsterdam: John Benjamins.

Goffman, E. (1974). *Frame analysis: An essay on the organization of experience*. New York: Harper & Row.

Goldberg, A. (2006). *Constructions at work: The nature of argument structure generalizations*. Oxford: Oxford University Press.

Goldschneider, J. M., & DeKeyser, R. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: A meta-analysis of multiple determinants. *Language Learning*, *51*, 1–50.

Greenfield, P., & Smith, J. (1976). *The structure of communication in early language development*. New York: Academic Press.

Gregg, K. (2001). Learnability and second language acquisition theory. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 152–182). Cambridge: Cambridge University Press.

Gries, S. (2003). Towards a corpus-based identification of prototypical instances of constructions. *Annual Review of Cognitive Linguistics*, *1*, 1–27.

Gries, S., & Wulff, S. (2005). Do foreign language learners have constructions? Evidence from priming, sorting and corpora. *Annual Review of Cognitive Linguistics*, *3*, 182–200.

Gullberg, M. (2006) (Ed.). *Gestures and second language acquisition*. Guest-edited special issue *International Review of Applied Linguistics, 44, (2)*. Berlin: Mouton DeGruyter.

Halliday, M. A. K., MacIntosh, A., & Strevens, P. (1964). *The linguistic sciences and language teaching*. London: Longman.

Harley, B., Allen, P., Cummins, J., & Swain, M. (1990). *The development of second language proficiency*. Cambridge: Cambridge University Press.

Harley, B., & Swain, M. (1984). The interlanguage of immersion students and its implications for language teaching. In A. Davies, C. Criper & A. Howatt (Eds.), *Interlanguage* (pp. 291–311). Edinburgh: Edinburgh University Press.

Hatch, E. (1978). Discourse analysis and second language acquisition. In E. Hatch (Ed.), *Second language acquisition: A book of readings*. Rowley, MA: Newbury House.

Hickman, M. (2003). *Children's discourse: Person, space and time across languages*. Cambridge: Cambridge University Press.

Hoey, M. (2005). *Lexical priming*. London: Routledge.

Holland, J. H. (1992). *Hidden order: How adaption builds complexity*. Reading: Addison-Wesley.

Holland, J. H. (1998). *Emergence: From chaos to order*. Oxford: Oxford University Press.

Holland, J. H., Holyoak, K., Nisbett, R., & Thagard, R. (1989). *Induction: Processes of inference, learning and discovery*. Cambridge, MA: MIT Press.

Howatt, A. P., & Widdowson, H. G. (2004). *A history of English language teaching*. Oxford: Oxford University Press.

Hudson, R. (2007). *Language networks*. Oxford: Oxford University Press.

Hulstijn, J. (2001). Intentional and incidental second language vocabulary learning: A reappraisal of rehearsal, elaboration and automaticity. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 258–286). Cambridge: Cambridge University Press.

Hulstijn, J., & Ellis, R. (2005) (Eds.). *Theoretical and empirical issues in the study of implicit and explicit second-language learning*. Guest edited special issue. *Studies in Second Language Acquisition, 27, (2)*. New York: Cambridge University Press.

Hulstijn, J., & Schmidt, R. (1994) (Eds.). Consciousness and second language learning, *AILA Review*, *11*.

Hutchinson, T., & Waters, A. (1978). *English for specific purposes: A learning centered approach*. Cambridge: Cambridge University Press.

Hunston, S., & Francis, G. (2000). *Pattern grammar: A corpus-driven approach to the lexical grammar of English*. Amsterdam: John Benjamins.

Hyltenstam, K., & Abrahamsson, P. (2003). Maturational constraints in SLA. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 539–588). Oxford: Blackwell.

Johnson, K. (1996). *Language teaching and skill learning*. Oxford: Blackwell.

Johnson, K. (2004). *Designing second language learning tasks*. Oxford: Blackwell.

Jonassen, D. (1999). Designing constructivist learning environments. In C. Reigeluth (Ed.), *Instructional-design theories and models* (pp. 215–239). Mahwah, NJ: Erlbaum.

Jourdenais, R. (2001). Cognition, instruction and protocol analysis. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 354–376). Cambridge: Cambridge University Press.

Karmiloff-Smith, A. (1979). *A functional approach to child language*. Cambridge: Cambridge University Press.

Klein, W. (1989). *Second language acquisition*. Cambridge: Cambridge University Press.

Klein, W., & Perdue, C. (1997). The basic variety (or: Couldn't natural languages be much simpler?). *Second Language Research*, *13*, 301–347.

Knowlton, B., & Squire, L. (1996). Artificial grammar learning depends on acquisition of both abstract and exemplar-specific information. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *22*, 169–181.

Kormos, J. (2006). *Speech production and second language acquisition*. Mahwah, NJ: Erlbaum.

Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Oxford: Pergamon.

Krashen, S., & Terrell, T. (1983). *The Natural Approach*. Oxford: Pergamon.

Kuiken, F., & Vedder, I. (2007). Cognitive task complexity and linguistic performance in French L2 writing. In M. P. García Mayo (Ed.), I*nvestigating tasks in formal language learning* (pp. 117–135). Clevedon: Multilingual Matters.

Kuiken, F., Mos, M., & Vedder, I. (2005). Cognitive task complexity and second language writing performance. In S. Foster-Cohen, M. P. García Mayo &

J. Cenoz (Eds.), *Eurosla Yearbook*, Vol. 5 (pp. 195–222). Amsterdam: John Benjamins.

Lado, R. (1957). *Linguistics across cultures: Applied linguistics for language teachers*. Michigan, MI: Michigan University Press.

Lakoff, G., & Johnson, M. (1998). *Philosophy in the flesh*. New York: Basic Books.

Langacker, R. (1999). *Grammar and conceptualization*. Berlin: Mouton DeGruyter.

Larson Freeman, D. (1976). An explanation for the morpheme acquisition order of second language earners. *Language Learning*, *26*, 125–134.

Larson Freeman, D. (2006). The emergence of accuracy, fluency and complexity in the oral and written production of five Chinese learners of English. *Applied Linguistics*, *27*, 590–619.

Lave, J., & Wenger, E. (1991). *Situated learning*. Cambridge: Cambridge University Press.

Lee, C. E., & Rescorla, L. (2002). The use of psychological state terms by late talkers at age 3. *Applied Psycholinguistics*, *23*, 623–641.

Lee, M., & Williams, J. (2001). Lexical access in spoken word production by bilinguals: Evidence from the semantic competitor priming paradigm. *Bilingualism: Language and Cognition*, *4*, 233–248.

Levelt, W. (1989). *Speaking: From intention to articulation*. Cambridge, MA: MIT Press.

Levinson, S. (2003). *Space in language and cognition*. Cambridge: Cambridge University Press.

Li, P., & Shirai, Y. (2000). *The acquisition of lexical and grammatical aspect*. Berlin: Mouton de Gruyter.

Liang, J. (2002). Sentence comprehension by Chinese learners of English: Verb-centered or construction-centered (cited in Goldberg, 2006).

Lightbown, P. (1983). Exploring relationships between developmental and instructional sequences. In H. G. Seliger & M. H. Long (Eds.), *Classroom-oriented research in second language acquisition* (pp. 217–243). Rowley, MA: Newbury House.

Lightbown, P. (2000). Classroom SLA and second language teaching. *Applied Linguistics*, *21*, 431–462.

Logan, G. D. (1988). Toward an instance theory of automatization. *Psychological Review*, *95*, 492–527.

Long, M. H. (1983). Native speaker/non-native speaker conversation and the negotiation of comprehensible input. *Applied Linguistics*, *4*, 126–141.

Long, M. H. (1985). A role for instruction in second language acquisition: task-based language teaching. In K. Hyltenstam & M. Pienemann (Eds.), *Modeling and assessing second language acquisition* (pp. 77–99). Clevedon: Multilingual Matters.

Long, M. H. (1989). Task, group, and task-group interactions. *University of Hawaii Working Papers in ESL*, *8*, 1–25.

Long, M. H. (1991). Focus on form: A design feature in language teaching methodology. In K. de Bot, R. Ginsberg, & C. Kramsch (Eds.), *Foreign language research in cross-cultural perspectives* (pp. 39–52). Amsterdam: John Benjamins.

Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In W. Ritchie & T. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 413–463). San Diego, CA: Academic Press.

Long, M. H. (2006) (Ed.), *Second language needs analysis*. New York: Cambridge University Press.

Long, M. H. (2007). *Problems in SLA*. Mahwah, NJ: Erlbaum.

Long, M. H., & Crookes, G. (1992). Three approaches to task-based syllabus design. *TESOL Quarterly*, *26*, 27–56.

Long, M. H. & Doughty, C. (in press). *Handbook of second and foreign language teaching*. Oxford: Blackwell.

Long, M. H., & Norris, J. (2000). Task-based teaching and assessment. In M. Byron (Ed.), *Encyclopedia of language teaching* (pp. 597–603). London: Routledge.

Long, M. H., & Robinson, P. (1998). Focus on form: Theory, research, and practice. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 15–41). New York: Cambridge University Press.

Mackey, A., & Gass, S. (2006) (Eds.). *Interaction research: Extending the methodological boundaries*. Guest-edited special issue, *Studies in Second Language Acquisition*, *28*, (2). New York: Cambridge University Press.

MacWhinney, B. (1995). *The CHILDES project: Tools for analyzing talk (2nd ed.)*: (1995). xii, 458pp.

MacWhinney, B. (1999) (Ed.). *The emergence of language*. Mahwah, NJ: Erlbaum.

Majid, A., Bowerman, M., Kita, S., Haun, D., & Levinson, S. (2004). Can language restructure cognition?: The case for space. *Trends in Cognitive Sciences*, 8, 108–114.

Mandler, J. (2004a). *The foundations of mind: Origins of conceptual thought*. Oxford: Oxford University Press.

Mandler, J. (2004b). Thought before language. *Trends in Cognitive Sciences*, 8, 508–513.

Maratsos, M. (1982). The child's construction of grammatical categories. In E. Wanner & L. Gleirman (Eds.), *Language acquisition: the state of the art* (pp. 240–262). New York: Cambridge University Press.

McDonough, K. (2006). Interaction and syntactic priming: English L2 speakers' production of dative constructions. *Studies in Second Language Acquisition*, *28*, 179–207.

McDonough, K., & Mackey, A. (2006). Responses to recasts: Repetitions, primed production, and linguistic development. *Language Learning*, *57*, 457–481.

Meisel, J. (1987). Reference to past events and actions in the development of natural second language acquisition. In C. Pfaff (Ed.), *First and second language acquisition processes* (pp. 206–224). Cambridge, MA: Newbury House.

Mellow, D. (2006). The emergence of second language syntax: A case study of the acquisition of relative clauses. *Applied Linguistics*, *27*, 645–670.

Meuter, R. (2005). Language selection in bilinguals. In J. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 349–370). Oxford: Oxford University Press.

MICASE (2004). from *http://www.hti.umich.edu/m/micase/*

Michael, E. & Gollan, T. (2005). Being and becoming bilingual: Individual differences and consequences for language production. In J. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 389–407). Oxford: Oxford University Press.

Milanoic, M., & Saville, N. (1996). *Performance testing, cognition and assessment*. Cambridge: Cambridge University Press.

Morales, F., & Taylor, J. R. (in press). Learning and relative frequency. In C. Zelinski (Ed.), *Memory and language*.

Munby, J. (1978). *Communicative syllabus design*. Cambridge: Cambridge University Press.

Murphy, G., & Ross, B. (2005). The two faces of typicality in category-based induction. *Cognition*, *95*, 175–200.

Nelson, K. (1996). *Language in cognitive development*. New York: Cambridge University Press.

Ninio, A. (2006). *Language and the learning curve*. Oxford: Oxford University Press.

Ninio, A., & Snow, C. (1996). *Pragmatic development*. Boulder, CO: Westview Press.

Nixon, S. (2005). Mental state verb production and sentential complements in four-year-old children. *First Language*, *25*, 19–39.

Norris, J., Brown, J. D., Hudson, T., & Yoshioka, J. (1998). *Designing second language performance assessments*. Honolulu, HI: University of Hawaii Press.

Norris, J., & Ortega, L. (2000). Effectiveness of L2 instruction; A research synthesis and quantitative meta-analysis. *Language Learning*, *50*, 417–528.

Nunan, D. (2004). *Task-based language teaching*. Cambridge: Cambridge University Press.

Odlin, T. (2005). Crosslinguistic influence and conceptual transfer: What are the concepts? *Annual Review of Applied Linguistics*, *25*, 3–25.

O'Grady, W. (2005). *Syntactic carpentry: An emergentist theory of syntax*. Mahwah, NJ: Erlbaum.

Ortega, L. (2003). Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level L2 writing. *Applied Linguistics*, *24*, 492–512.

Ortega, L., & Iberri-Shea, G. (2005). Longitudinal research in second language acquisition: Recent trends and future directions. *Annual Review of Applied Linguistics*, *25*, 26–45.

Palmeri, T. (1997). Exemplar similarity and the development of automaticity. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *23*, 324–347.

Parker, K. & Chaudron, C. (1987). The effects of linguistic simplification and elaborative modification on L2 comprehension. *University of Hawaii Working Papers in ESL*, *6*, 102–133.

Pavlenko, A. (2005). Bilingualism and thought. In In J. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 433–553). Oxford: Oxford University Press.

Pavlenko, A., & Jarvis, S. (2002). Biderectional transfer. *Applied Linguistics*, *23*, 190–214.

Pawley, A., & Syder, F. (1983). Two problems for linguistic theory: Nativelike selection and nativelike fluency. In J. Richards & R. Schmidt (Eds.), *Language and communication*. London: Longman.

Perdue, C. (Ed.) (1993a). *Adult language acquisition: Cross-linguistic perspectives, Vol. 1: Field methods*. Cambridge: Cambridge University Press.

Perdue, C. (Ed.) (1993b). *Adult language acquisition: Cross-linguistic perspectives, Vol. 2: The results*. Cambridge: Cambridge University Press.

Perruchet, P., & Vintner, A. (2002). The self-organizing consciousness. *Behavioral and Brain Sciences*, *25*, 297–388.

Peters, A. (1983). *The units of language acquisition*. New York: Cambridge University Press.

Pickering, M., & Branigan, H. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory and Language*, *39*, 633–651.

Pickering, M. J., Branigan, H. P., Cleland, A. A., & Stewart, A. J. (2000). Activation of syntactic information during language production. *Journal of Psycholinguistic Research*, *29*, 205–216.

Pienemann, M. (1998). *Language processing and second language development; Processability theory*. Amsterdam: John Benjamins.

Pienemann, M. (2003). Language processing capacity. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 679–714). Oxford: Blackwell.

Pinker, S. (1994). *The language instinct*. Harmondsworth: Penguin.

Pothos, E. (2005). The rules versus similarity distinction. *Behavioral and Brain Sciences*, *28*, 1–49.

Prabhu, N. S. (1987). *Second language pedagogy*. Oxford: Oxford University Press.

Rahimpour, M. (1999). Task complexity and variation in interlanguage. In N. O. Jungheim & P. Robinson (Eds.), *Pragmatics and pedagogy: Proceedings of the 3rd Pacific Second Language Research Forum, Vol. 2* (pp. 115–134). Tokyo: PacSLRF.

Reber, A. S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. Oxford: Clarendon Press.

Reber, A. S., & Allen, R. (1978). Analogy and abstraction strategies in artificial grammar learning: A functionalist interpretation. *Cognition*, *6*, 189–221.

Reber, A. S., & Allen, R. (2000). Individual differences in implicit learning: Implications for the evolution of consciousness. In R. Kunzendorf & B. Wallace (Eds.), *Individual differences in conscious experience* (pp. 227–250). Amsterdam: John Benjamins.

Ringbom, H. (2006). *Cross-linguistic similarity in foreign language learning*. Clevedon: Multilingual Matters.

Ritchie, W., & Bhatia, T. (1996). Second language acquisition: Introduction, foundations and overview. In W. Ritchie & T. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 1–49). San Diego, CA: Academic Press.

Robinson, P. (1986). Constituency or dependency in the units of language acquisition? An approach to describing the learner's analysis of formulae. *Linguisticae Investigationes*, *10*, 417–438.

Robinson, P. (1989). Procedural vocabulary and language learning. *Journal of Pragmatics*, *13*, 523–546.

Robinson, P. (1990). Metaphors for the description of acquisition data: From constituency "trees" to dependency "frames". *International Review of Applied Linguistics*, *28*, 273–292.

Robinson, P. (1993). Procedural and declarative knowledge in vocabulary learning: Communication and the language learner's lexicon. In T. Huckin & J. Coady (Eds.), *Second language reading and vocabulary learning* (pp. 223–259). New York: Ablex.

Robinson, P. (1994). Implicit knowledge, second language learning and syllabus construction: Comments on Rod Ellis' "The structural syllabus and second language acquisition". *TESOL Quarterly*, *28*, 161–166.

Robinson, P. (1995a). Task complexity and second language narrative discourse. *Language Learning*, *45*, 99–140.

Robinson, P. (1995b). Aptitude, awareness and the fundamental similarity of implicit and explicit second language learning. In R. Schmidt (Ed.), *Attention and awareness in second language learning* (pp. 303–357). Honolulu, HI: University of Hawaii Press.

Robinson, P. (1995c). Attention, memory and the "noticing" hypothesis. *Language Learning*, *45*, 283–331.

Robinson, P. (1996a). *Consciousness, rules and instructed second language acquisition*. New York: Lang.

Robinson, P. (Ed.) (1996b). *Task complexity and second language syllabus design: Data-based studies and speculations*. University of Queensland Working Papers in Language and Linguistics (Special issue).

Robinson, P. (1997). Generalizability and automaticity of second language learning under implicit, incidental, enhanced and rule-search conditions. *Studies in Second Language Acquisition*, *19*, 223–247.

Robinson, P. (2001a). Task complexity, task difficulty, and task production: Exploring interactions in a componential framework. *Applied Linguistics*, *22*, 27–57.

Robinson, P. (2001b). Task complexity, cognitive resources, and syllabus design: A triadic framework for investigating task influences on SLA. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 287–318). Cambridge: Cambridge University Press.

Robinson, P. (2001c). Individual differences, cognitive abilities, aptitude complexes, and learning conditions in SLA. *Second Language Research*, *17*, 368–392.

Robinson, P. (2002). Learning conditions, aptitude complexes and SLA: A framework for research and pedagogy. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 113–133). Amsterdam: John Benjamins.

Robinson, P. (2003a). Attention and memory during SLA. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 631–678). Oxford: Blackwell.

Robinson, P. (2003b). The Cognition Hypothesis, task design and adult task-based language learning. *Second Language Studies*, *21*, (2), 45–107.

Robinson, P. (2004). Rules and similarity processes in Artificial Grammar and natural second language learning: What is the "default"? *Behavioral and Brain Sciences*, *28*, 33–34.

Robinson, P. (2005a). Cognitive complexity and task sequencing: A review of studies in a Componential Framework for second language task design. *International Review of Applied Linguistics*, *43*, 1–32.

Robinson, P. (2005b). Cognitive abilities, chunk-strength and frequency effects in implicit Artificial Grammar and incidental L2 learning: Replications of Reber, Walkenfeld and Hernstadt (1991) and Knowlton and Squire (1996) and their relevance for SLA. *Studies in Second Language Acquisition*, *27*, 235–268.

Robinson, P. (2005c). Aptitude and second language acquisition. *Annual Review of Applied Linguistics*, *25*, 46–73.

Robinson, P. (2007a). Criteria for classifying and sequencing pedagogic tasks. In M. P. García Mayo (Ed.), *Investigating tasks in formal language learning* (pp. 7–27). Clevedon: Multilingual Matters.

Robinson, P. (2007b). Aptitudes, abilities, contexts and practice. In R. M. DeKeyser (Ed.), *Practice in second language learning: Perspectives from applied linguistics and cognitive psychology* (pp. 256–286). Cambridge: Cambridge University Press.

Robinson, P. (in press a). Syllabus design. In M. H. Long & C. Doughty (Eds.), *Handbook of second and foreign language teaching*. Oxford: Blackwell.

Robinson, P. (in press b). Task complexity, theory of mind, and intentional reasoning: Effects on speech production, interaction, uptake and perceptions of task difficulty. In P. Robinson & R. Gilabert (Eds.) (in press), *Task complexity, the Cognition Hypothesis and second language instruction*. Guest-edited special issue *International Review of Applied Linguistics*. Berlin: Mouton DeGruyter.

Robinson, P., & Gilabert, R. (Eds.) (in press). *Task complexity, the Cognition Hypothesis and second language instruction*. Guest-edited special issue *International Review of Applied Linguistics*. Berlin: Mouton DeGruyter.

Robinson, P., & Ha, M. (1993). Instance theory and second language rule-learning under explicit conditions. *Studies in Second Language Acquisition*, *15*, 413–438.

Robinson, P., & Nakamura, D. (under submission). Construing motion and referring to time on simple and complex second language tasks: Lexicalization patterns, the Aspect Hypothesis and task performance in the Here-and-Now and There-and-Then.

Robinson, P., Ting, S. C.-C., & Urwin, J. (1995). Investigating second language task complexity. *RELC Journal*, *26*, 62–79.

Rohdenburg, G. (2002). Processing complexity and the variable use of prepositions in English. In H. Ballerman (Ed.), *Perspectives on prepositions* (pp. 79–101). Tubingen: Gunter Narr.

Rosch, E. (1975). Cognitive representations of semantic categories. *Journal of Experimental Psychology: General*, *104*, 192–233.

Rutherford, W., & Sharwood Smith, M. (1988). *Grammar and language teaching: A book of readings*. Rowley, MA: Newbury House.

Sato, C. (1990). *The syntax of conversation in interlanguage development*. Tubingen: Gunter Narr.

Schank, R. (1999). *Dynamic memory revisited*. New York: Cambridge University Press.

Schank, R., & Abelson, R. (1977). *Scripts, plans, goals and understanding*. Hillsdale, NJ: Erlbaum.

Schlesinger, I. M. (1982). *Steps to language*. Hillsdale, NJ: Erlbaum.

Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, *11*, 127–158.

Schmidt, R. (1992). Psychological mechanisms underlying second language fluency. *Studies in Second Language Acquisition*, *14*, 357–385.

Schmidt, R. (1993). Awareness and second language acquisition. *Annual Review of Applied Linguistics*, *13*, 206–226.

Schmidt, R. (1995). A tutorial on the role of attention and awareness in second language learning. In R. Schmidt (Ed.), *Attention and awareness in second language learning* (pp. 1–56). Honolulu, HI: University of Hawaii Press.

Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 1–32). Cambridge: Cambridge University Press.

Schmitt, N. (2004) (Ed.). *Formulaic sequences: Acquisition, processing and use*. Amsterdam: John Benjamins.

Schneider, W., Schumann-Hengsteler, R., & Sodian, B. (2005) (Eds.). *Young children's cognitive development: Interrelationships among executive functioning, working memory, verbal ability and theory of mind*. Mahwah, NJ: Erlbaum.

Schumann, J. (1978). *The pidginization process: A model for second language acquisition*. Rowley, MA: Newbury House.

Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, *10*, 209–231.

Siegel, J. (2003). Social context. C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 178–223). Oxford: Blackwell.

Sinclair, J. McH. (1984). Naturalness in language. In J. Aarts & W. Meijs (Eds.), *Corpus linguistics* (pp. 203–210). Amsterdam: Rodopi.

Skehan, P. (1989). *Individual differences in second language acquisition*. London: Arnold.

Skehan, P. (1996). A framework for task-based approaches to instruction. *Applied Linguistics*, *17*, 34–59.

Skehan, P. (1998). *A cognitive approach to language learning*. Oxford: Oxford University Press.

Skehan, P. (2002). Theorizing and updating aptitude. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 69–94). Amsterdam: John Benjamins.

Skehan, P., & Foster, P. (2001). Cognition and tasks. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 183–205). Cambridge: Cambridge University Press.

Slobin, D. (1973). Cognitive prerequisites for the development of grammar. In C. Ferguson & D. Slobin (Eds.), *Studies of child language development* (pp. 175–208). New York: Holt, Rhinehart & Winston.

Slobin, D. (1985). *The crosslinguistic study of language acquisition, Vol 1*. Hillsdale, NJ: Erlbaum.

Slobin, D. (1993). Adult language acquisition: A view from child language study. In C. Perdue (Ed.), *Adult language acquisition: Crosslinguistic perspectives, Vol. 2: The results* (pp. 239–252). Cambridge: Cambridge 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: Cambridge University Press.

Slobin, D. (2003). Language and thought online: Some cognitive consequences of linguistic relativity. In D. Gentner & S. Godlin Meadow (Eds.), *Language in mind: Advances in the investigation of language and thought* (pp. 157–191). Cambridge, MA: MIT Press.

Sloman, S., & Rips, L. (1998). Similarity as an explanatory construct. *Cognition*, *65*, 87–101.

Smith, E. E., & Medin, D. L. (1981). *Categories and concepts*. Cambridge, MA: Harvard University Press.

Snow, R. E. (1987). Aptitude complexes. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning and instruction, Vol. 3: Cognitive and affective process analysis* (pp. 11–34). Hillsdale, NJ: Erlbaum.

Snow, R. E. (1994). Abilities in academic tasks. In R. J. Sternberg & R. K. Wagner (Eds.), *Mind in context: Interactionist perspectives on human intelligence* (pp. 3–37). New York: Cambridge University Press.

Snow, C., & Ferguson, C. (1977). *Talking to children*. Cambridge: Cambridge University Press.

Speelman, C., & Kirsner, K. (2005). *Beyond the learning curve: The construction of mind*. Oxford: Oxford University Press.

Stanovitch, K. (1999). *Who is rational? Individual differences in reasoning*. Mahwah, NJ: Erlbaum.

Sternberg, R. J. (2002). The theory of successful intelligence and its implications for language aptitude testing. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 13–44). Amsterdam: John Benjamins.

Sternberg, R. J., & Wagner, R. (1994) (Eds.). *Mind in context: Interactionist perspectives on human intelligence*. New York: Cambridge University Press.

Stromqvist, S., Nordqvist, A., & Wengelin, A. (2004). Writing the Frog Story: Developmental and cross-modal perspectives. In S. Stromqvist & L. Verhoeven, (Eds.), *Relating events in narrative, Vol. 2: Typological and contextual perspectives* (pp. 359–396). Mahwah, NJ: Erlbaum.

Stromqvist, S., & Verhoeven, L. (2004) (Eds.). *Relating events in narrative, Vol. 2: Typological and contextual perspectives*. Mahwah, NJ: Erlbaum.

Studdert-Kennedy, M. (1991). Language development from an evolutionary perspective. In N. A. Krasnegor, D. M. Rumbaugh, R. L. Schiefelbusch, & M. Studdert-Kennedy (Eds.), *Biological and behavioral determinants of language development* (pp. 5–28). Mahwah, NJ: Erlbaum.

Suchman, L. (1987). *Plans and situated action*. New York: Cambridge University Press.

Swain, M. (1985). Communicative competence: some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 235–253). Rowley, MA: Newbury House.

Swales, J. (1990). *Genre analysis: English in academic and research settings*. Cambridge: Cambridge University Press.

Talmy, L. (2000). *Towards a cognitive semantics, Vol. 1: Concept structuring systems*. Cambridge, MA: MIT Press.

Taube-Schiff, M., & Segalowitz, N. (2005). Within-language attention control in second language processing. *Bilingualism: Language and Cognition*, 8, (3), 195–206.

Taylor, H., & Tversky, B. (1996). Perspective in spatial description. *Journal of Memory and Language*, *35*, 371–391.

Taylor, J. (1995). *Linguistic categorization: Prototypes in linguistic theory* (2nd edition). Oxford: Oxford University Press.

Thelen, E., & Smith, L. B. (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge, MA: MIT Press.

Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.

Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.

Tomasello, M., & Herron, C. (1989). Feedback for language transfer errors: The garden path technique. *Studies in Second Language Acquisition*, *11*, 385–395.

Tomasello, M., Kruger, A., & Ratner, H. (1993). Cultural learning. *Behavioral and Brain Sciences*, *16*, 495–552.

Tomasello, M., & Stahl, D. (2004). Sampling children's spontaneous speech: How much is enough? *Journal of Child Language*, *31*, 101–121.

Tomlin, R. (1990). Functionalism in second language acquisition. *Studies in Second Language Acquisition*, *12*, 155–177.

Truscott, J., & Sharwood Smith, M. (2004). Acquisition by processing: A modular perspective on language development. *Bilingualism: Language and Cognition*, *7*, 1–20.

Ullman, M. (2001). The neural basis of lexicon and grammar in first and second language acquisition: The declarative/procedural model. *Bilingualism: Language and Cognition*, *4*, 105–112.

Van den Branden, K. (2006). *Task-based language education: From theory to practice*. Cambridge: Cambridge University Press.

VanPatten, B. (2004) (Ed.). *Processing instruction: Theory, research and commentary*. Mahwah, NJ: Erlbaum.

VanPatten, B., Williams, J., & Overstreet, M. (2004). *Form-meaning connections in second language acquisition*. Mahwah, NJ: Erlbaum.

von Stutterheim, C. (1991). Narrative and description: Temporal reference in second language acquisition. In T. Heubner & C. Ferguson (Eds.), *Crosscurrents in second language acquisition and linguistic theories* (pp. 385–403). Amsterdam: John Benjamins.

von Stutterheim, C., & Klein, W. (1987). A concept-oriented approach to second language studies. In C. Pfaff (Ed.), *First and second language acquisition processes* (pp. 191–205). Rowley, MA: Newbury House.

von Stutterheim, C., & Nuese, R. (2003). Processes of conceptualisation in language production: Language-specific perspectives and event construal. *Linguistics*, *41*, 851–888.

Wagner-Gough, J., & Hatch, E. (1976). The importance of input data in language acquisition studies. *Language Learning*, *25*, 297–308.

Wellman, H. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.

White, J. (1998). Getting the learners' attention: A typographical input enhancement study. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition*, (pp. 85–113). New York: Cambridge University Press.

White, R. (1988). *The ELT curriculum: Design, management, innovation*. Oxford: Blackwell.

Widdowson, H. G. (1978). *Teaching language as communication*. Oxford: Oxford University Press.

Widdowson, H. G. (1990). *Aspects of language teaching*. Oxford: Oxford University Press.

Wilkins, D. (1976). *Notional syllabuses*. Oxford: Oxford University Press.

Williams, J. N. (1999). Memory, attention, and inductive learning. *Studies in Second Language Acquisition*, *21*, 1–48.

Williams, J. (2005). Learning without awareness. *Studies in Second Language Acquisition*, *27*, 269–304.

Wong-Fillmore, L. (1979). Individual differences in second language acquisition. In C. Fillmore, D. Kempler, & S.-W. Wang (Eds.), *Individual differences in language ability and language behavior* (pp. 203–228). New York: Academic Press.

Wray, A. (2002). *Formulaic language and the lexicon*. Cambridge: Cambridge University Press.

Yano, Y., Long, M. H., & Ross, S. (1994). The effects of simplified and elaborated texts on foreign language reading comprehension. *Language Learning*, *44*, 189–219.

Zipf, G. K. (1935). *The psycho-biology of language: An introduction to dynamic philology*. Cambridge, MA: MIT Press.