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Running title: Key issues in language development

Gestures and some key issues in the study of language development

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Abstract

The purpose of the current paper is to outline how gestures can contribute to the study of some key issues in language development. Specifically, we (1) briefly summarise what is already known about gesture in the domains of first and second language development, and development or changes over the life span more generally; (2) highlight theoretical and empirical issues in these domains where gestures can contribute in important ways to further our understanding; and (3) summarise some common themes in all strands of research on language development that could be the target of concentrated research efforts.

Keywords: first language, second language, development, acquisition, ageing

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Introduction

In recent years the scope of studies on language development has broadened from a fairly narrow focus on lexical and syntactic aspects at the sentence level to an interest in structures and processes at higher levels such as discourse and the interaction with other semiotic systems in communication. In parallel, studies on communication systems across modalities have provided growing empirical evidence supporting the view that gestures are a mode of expression tightly linked to language and speech (e.g. Goldin-Meadow, 2003; Kendon, 2004; McNeill, 1992, 2005). Gestures are spatio-visual phenomena influenced by contextual and socio-psychological factors, and also closely tied to sophisticated speaker-internal, linguistic processes. Under this view of speech and gesture as an inter-connected system, the study of gestures in development and the study of the development of gestures are natural extensions of research on language development, be it phylogenetically, ontogenetically, or during the lifespan of an adult. Moreover, given their properties and dual role as interactive, other-directed vs. internal, speaker-directed phenomena, gestures allow for a fuller picture of the processes of language acquisition in which the learner's individual cognition is situated in a social, interactive context.

The role of gestures in language development can be studied from various perspectives:
(1) Gestures as a medium of language development. We can examine the role gestures play in interaction to mediate the acquisition of spoken language, their general role in communication, in establishing the socio-cognitive prerequisites for the development of language, in conveying and possibly entrenching meaning, and their connection to cognitive capacities such as working memory, etc.
(2) Gestures as a reflection of language development. We can further investigate the way in which gestures develop and change in parallel to spoken language development, and the ways in which they shed light on both the product and process of language acquisition.
(3) Gestures as language development itself. This approach studies the acquisition of gestures as an expressive system in its own right.

Traditionally the term language development has implicitly focused only on the gradual growth or progression of a first or second language towards the (idealised) stable model of an adult or native system. However, phenomena such as decline or regression in

ability are clearly related (see papers in Viberg & Hyltenstam, 1993). For instance, regression as attested in attrition, or language loss, in adoptees, ageing bilinguals, and immigrants who stop using their first language, seems to affect the lexicon and grammar in similar ways as in progression. Not all shifts in ability lead to loss, however. Bilingual speakers may experience a decline in ability in one language when not using it without this leading to ungrammaticality. Moreover, they regain the ability when the language is brought back to use. Shifts in language dominance due to usage highlight the dynamic nature of language abilities. Development can thus usefully be seen not only as a linear process of progression, but as a complex, dynamic process that encompasses growth, decline, and any shift in both in first and second languages (de Bot, 2007; de Bot, Lowie, & Verspoor, 2005). We will use the term development in this more general sense of change throughout.

The purpose of the current paper, then, is to outline how gestures can contribute to the study of some central issues in language development. Specifically, we aim to (1) briefly summarise what is already known about gesture in the domains of first and second language development, and development over the life span more generally; (2) to highlight theoretical and empirical issues in these domains where gestures can contribute to further our understanding; and (3) to summarise some common themes in all strands of research on language development that could be the target of concentrated research efforts.

Gesture and language

In the contemporary gesture literature arguments are made for viewing gestures, language and speech as intimately linked or as forming an 'integrated system', an audiovisual 'ensemble', or a 'composite signal', depending on the theoretical approach (Clark, 1996; Engle, 1998; Kendon, 2004; McNeill, 1998). The arguments for integration come both from studies of language production and comprehension. First, in production, gestures have been found to fill linguistic functions like providing referential content to deictic expressions (*this wide*), filling structural slots in an utterance ("GIVE! [gesture: 'the book'], Slama-Cazacu, 1976: 221), and acting as or modifying speech acts (e.g., Bühler, 1934, Slama-Cazacu, 1976; Kendon, 1995, 2004). Second, the observed semantic-pragmatic and temporal co-ordination between speech and gesture lies at the heart of all theories and models concerning the relationship. Although the precise relationship between the modalities is not entirely

straightforward, particularly with regard to meaning and co-expressivity, there is a general consensus that gesture and speech express closely related meanings selected for expression (see de Ruiter, 2007; Kendon, 2004; Holler & Beattie, 2003 for overviews). A third argument for integration is that speakers deliberately distribute information across both modalities depending on spatial and visual properties of interaction (e.g. Bavelas, Kenwood, Johnson, & Phillips, 2002; Holler & Beattie, 2003; Melinger & Levelt, 2004; Özyürek, 2002a). Finally, a fourth frequent argument is that gestures and speech develop together in (first) language acquisition (e.g. Mayberry & Nicoladis, 2000; Volterra, Caselli, Capirci, & Pizzuto, 2005), and that they break down together in disfluency, in aphasia, etc. (e.g. Feyereisen, 1987; Lott, 1999; McNeill, 1985). This last argument is further discussed in the papers in this volume.

In language comprehension, there is considerable evidence that gestures affect perception, interpretation of and memory for speech (Beattie & Shovelton, 1999; Graham & Argyle, 1975; Kelly, Barr, Breckinridge Church, & Lynch, 1999; Riseborough, 1981). Further to this, recent neurocognitive evidence shows that the brain integrates speech and gesture information, processing the two in similar ways as speech alone (e.g. Bates & Dick, 2002; papers in Özyürek & Kelly, 2007; Wu & Coulson, 2005). Overall, then, there is good reason to consider gestures, language and speech as a closely-knit system.

The models attempting to formalise the relationship between gestures and speech differ in their views of the locus and the nature of the link. As suggested by Kendon (2007) some see speech as primary and gesture as auxiliary. Others regard gestures and speech as equal partners. The first set either considers gestures to facilitate lexical retrieval (*the Lexical Retrieval Hypothesis*, Krauss, Chen, & Gottesman, 2000) or views gestures as instrumental in the process of representing and packaging imagistic thought for verbalisation (*the Information Packaging Hypothesis*, Alibali, Kita, & Young, 2000; Freedman, 1977). The second set of theories regards gestures as an integral part of an utterance. Beyond this starting-point, they differ in focus. Either they concentrate on gestures as a window on (linguistic and non-linguistic) thought (*the Growth Point Theory*, McNeill, 1992, 2005; McNeill & Duncan, 2000), or they target the interplay between imagistic and linguistic thinking (*the Interface Hypothesis*, Kita & Özyürek, 2003), or, finally, they centre on the communicative intention driving both modalities to form a deliberately coherent multimodal utterance (De Ruiter, 2000, 2007;

Kendon, 1994, 2004; Schegloff, 1984). All existing accounts model the adult stable system. No theory has yet undertaken to account for development either in children or in adults.

Gesture and first language development

The field of First Language Development (FLD) has a long-standing interest in gestures. Infants' gestures have traditionally primarily been explored as relevant features of a prelinguistic stage, as behaviours that precede and prepare the emergence of language, identified exclusively with speech. More recently, the view of adult language as a gesture-speech integrated system has prompted the need to understand how the gesture-speech relationship is established in infancy and how it evolves towards the adult system.

The earliest development

Infants begin to communicate intentionally through gestures and vocalisations and later with words (see Lizskowski, Stefanini et al., this volume). Gestures and speech are equal partners – in the majority of cases the communicative signals produced by children are expressed in both modalities, gestural and vocal. A key question is whether the two modalities are integrated from the very beginning, or are initially separate to become an integrated system only with development (McNeill, 1992, 2005). Some studies indicate that the gestural and vocal modalities are semantically and temporally integrated form the earliest stages (Capirci, Contaldo, Caselli, & Volterra, 2005; Iverson & Thelen, 1999; Pizzuto, Capobianco, & Devescovi, 2005), while others report that asynchronous combinations of gestures and words are more frequent than synchronous ones in an initial developmental period (Butcher & Goldin-Meadow, 2000; Goldin-Meadow & Butcher, 2003).

Despite these differences, all agree that deictic gestures appear before the end of the first year and that they fulfil the basic function of drawing the interlocutor's attention to something in the environment. These gestures include REQUESTING (extending the arm toward an object, location or person, sometimes with a repeated opening and closing of the hand), SHOWING (holding up an object in the adult's line of sight), GIVING (transferring an object to another person) and POINTING (index finger or full hand extended towards an object, location, person or event). The referents of these gestures can be identified only in the physical context in which communication takes place.

Around 12 months children start to produce other more content-loaded types of gestures, referring, like first words, to action schemes usually performed at this age with or without objects (e.g. bringing the handset or an empty fist to the ear for TELEPHONE/PHONING. Some gestures refer to action schemes that are non-object-related (e.g. moving the body rhythmically without music for DANCING to request that music be turned on) or to conventional actions (waving the hand for BYE-BYE) with forms more arbitrarily related to their meaning. The terminology used for these gestures ("conventional", "referential," "symbolic", "iconic", "characterising", "representational") is variable, and has changed considerably over the years, even in the work of the same author(s), reflecting changes both in methodology and theoretical perspectives. The communicative function of such gestures appears to develop within routines similar to those considered to be fundamental for the emergence of spoken language. Their forms and meanings are established in the context of child–adult interaction. The first gestures and the first words involve the same set of concerns: eating, dressing, exchange games, etc, and they are initially acquired with prototypical objects, in highly stereotyped routines or scripts. At roughly parallel rates, they gradually "decontextualise" or extend out to a wider and more flexible range of objects and events.

The role of input

The remarkable similarities between production in the gestural and the vocal modalities during the first stages of language acquisition raise interesting issues regarding the communicative and linguistic role of early words and gestures. Symbolic actions produced in the gestural modality have often been seen as communicative and referential irrespective of the contexts of use (for a discussion, see Caselli, 1994). Around 13 months there is a basic equipotentiality between the vocal and the gestural channels (Erting & Volterra, 1990). Differences in the type of input to which children are exposed influences the extent to which the manual or spoken modality is used for representational purposes and assumes linguistic properties. For example, children systematically exposed to sign language input acquire and develop a complete language in the visual gestural modality (see Schick, Marschark, & Spencer, 2006). Comparisons between deaf and hearing children suggest that all children, regardless of whether their primary linguistic input is spoken or signed, use gestures to

communicate, in particular in the transition stage to symbolic communication (Volterra, Iverson, & Castrataro, 2006). Although the relationship between gesture and sign language in general and in development has received little attention to date, recent research suggests that gesture is as an essential part of sign language as it is of spoken communication (Emmorey, 1999, Liddell, 2003).

Typically developing children are clearly encouraged by parents to rely much more on vocal symbols for communication. However, it has been suggested that gestural input may facilitate the acquisition of spoken words, as in the case of “baby signs” or 'enhanced gestures' used in conjunction with speech (Goodwyn & Acredolo, 1998; Goodwyn, Acredolo, & Brown, 2000). A possible explanation for this effect, found also in children with developmental disorders, is that exposure to enhanced gesturing provides children with opportunities to master new forms in both the vocal and manual modalities (Abrahamsen, 2000).

Culture and adult input may influence both the form and the frequency of representational gestures. Many studies have reported more frequent production of representational gestures by Italian children who are immersed in a 'gesture-rich' culture (see the discussion in Kendon 2004, Ch. 16). In particular, the representational gestures produced by Italian children include numerous object/action gestures (e.g., EATING, PHONING) and attributive gestures (e.g., BIG, HOT), whereas American children almost exclusively produce conventional gestures (e.g., HI, YES, ALL GONE) (Iverson, Capirci, Volterra, & Goldin-Meadow, in press). Cross-cultural longitudinal studies of spontaneous interaction should reveal how similarities and differences in the way object/action gestures versus more conventional social gestures develop.

The relationship between speech and gesture

Interesting findings on the relationship between children’s production of action and gestures and early (receptive and expressive) word repertoires have been collected through the MacArthur Bates Communicative Development Inventory (MBCDI). This is an instrument designed to explore and assess typically developing children’s early communicative and linguistic development (Fenson et al., 1993). In particular, it has been shown that there is a

complex relationship between early lexical development in comprehension and production, and action-gestures (Caselli & Casadio, 1995). Around 11-13 months, the productive repertoire of action-gestures appears to be larger than the vocal repertoire, but in the following months the mean number of words and action-gestures are more similar. More interestingly, at this early age there is a significant correlation between words comprehended and action-gestures produced (Fenson et al., 1994). These findings suggest that the link between real actions, actions represented via gestures, and children's vocal representational skills may be stronger than has been assumed thus far.

Another important finding is that in all cultures investigated to date the first utterances (combinations of two or more meaningful communicative elements) are crossmodal. Various studies highlight that deictic gestures (notably POINTING) play a special role in two-element utterances. Combinations of a POINTING gesture with a representational word are the most productive types of child utterances. These gesture-speech combinations can refer to a single element or to two distinct elements. Complementary and supplementary gesture-speech combinations reliably predict the onset of two-word combinations, underscoring the robustness of gesture as a harbinger of linguistic development (Butcher & Goldin-Meadow, 2000; Capirci, Iverson, Pizzuto, & Volterra, 1996; Iverson et al., in press; Iverson & Goldin-Meadow, 2005). Many constructions (e.g., predicate+argument like "POINT (to chair) saying "mommy" to ask mommy to sit on the chair) appear in supplementary gesture-speech combinations several months before the same construction appears in speech (e.g., "sit mommy" or "mommy sit"). The production of a supplementary *deictic* gesture-word combination appears early, whereas supplementary *representational* gesture-word or two-word combinations, which require the child to retrieve two symbols each conveying a different piece of semantic content, appear later. The production of a single word and identification of another referent in the context through a deictic gesture supposedly places fewer cognitive demands on the child than the combination of two representational elements and presumably fit the child's current cognitive capacities (Özcaliskan & Goldin-Meadow, 2005).

The study of children with atypical input or development can further illustrate how gesture appears to be related to cognitive and linguistic development in infancy. An example of how gesture may compensate for specific impairments of the spoken abilities is children

with Down syndrome (DS). The neuropsychological profile of DS children is characterised by a lack of developmental homogeneity between cognitive and linguistic abilities. The linguistic abilities of DS children are poorer than expected based on their overall cognitive level (e.g. Chapman & Hesketh, 2000). These children appear to compensate for poor productive language abilities through greater production of gestures. There is ample evidence that the gap between cognition and productive language skills becomes progressively wider with development among DS children (Chapman, 1995; Franco & Wishart, 1995). However, with increasing cognitive skills and social experience these children also develop relatively large repertoires of gestures (Caselli et al., 1998; Stefanini, Caselli, & Volterra, 2007, Stefanini, Recchia & Caselli, this volume). The compensatory use of gesture can be enhanced, particularly if children are encouraged through the provision of signed language input (cf. Abrahamsen, 2000). Higher gesture rates associated with speech difficulties have also been reported for other clinical populations such as children with specific language impairment (Evans, Alibali, & McNeil, 2001; Fex & Månsson, 1998).

Later development

Given that gestures usage appears to be related both to the general cognitive level and to phono-articulartory abilities, it is important to examine children in later childhood and at different stages of linguistic development. The development whereby children's gestures become organised into the adult speech-gesture system have not been fully described. Very few studies have explored the development of this system after the two-word stage when other types of gestures, such as 'rhythmic' or 'emphatic' gestures, start to appear. Mayberry & Nicoladis (2000) followed 5 French-English bilingual boys longitudinally (from 2 years to 3;6 years), showing that children from age 2 onwards largely gesture like adults with regard to gesture rate and meaning. Interestingly, different gesture types developed differently such that the use of iconic and beat gestures correlated with language development, whereas the use of pointing gestures did not. Children between 16 and 36 months use gestures and speech in agreement and refusal constructions with their mothers somewhat differently from adults (e.g. Guidetti, 2005). Looking at more sophisticated language use, children from 4 to 5 years productively use idiosyncratic, content-loaded gestures during narratives (McNeill,

1992). Colletta (2004), recording adult-child spontaneous interactions, has described the development of conversational abilities in school-age children. Younger children produce very few metaphoric, abstract deictic gestures and beats, which become more frequent in the production of older children.

Finally, research investigating gesture production in school-aged children in problem-solving tasks, reasoning about balance or mathematical equivalence, indicates that children convey a substantial proportion of their knowledge through speech-accompanying gestures (Alibali & Goldin-Meadow, 1993; Church & Goldin-Meadow, 1986; Pine, Lufkin, & Messer, 2004). In some cases children's gesture-speech 'mis-matches' predict learning. Children whose speech and gestures 'mis-match' are more likely to benefit from instruction than children whose speech and gestures match. These studies indicate that gestures can reveal not only what children are thinking about but also their learning potential.

In sum, even if differences in data sets (e.g. ages considered, gesture types described), in methodology and terminology make it challenging to compare findings across studies, the available data suggest that the role of gesture in spoken language acquisition and development changes according to different stages and communicative/interactional contexts. Around one year of age gesture plays a crucial role in the construction and expression of meaning. In the following stages gesture production develops together with speech. At later stages still, gesture production appears to decrease in some linguistic contexts (e.g. naming tasks) although it is frequent with speech in others (e.g. narratives). These findings together indicate that any study on the development of language should include and pay particular attention to gestures.

Gesture and second language development

In recent years the interest in the relationship between gestures and Second Language Development (SLD or L2D) has grown considerably. Studies suggest that gestures play an important role in SLD and should be seen both as a resource in learning and as a component of language proficiency in its own right (cf. Gullberg, 2006b, 2008; Gullberg & McCafferty, in press). Again, if gestures and speech are seen as an integrated system, then factors that play a role in SLD in general may also play a role in the development of gesture, and conversely, gestures may provide further information on the effects of such factors. Therefore, a large

part of the SLD research agenda is also relevant for gesture where a number of traditional topics can fruitfully be addressed taking gestures into account.

Cross-linguistic influences (CLI) or transfer

One of the most widely studied aspects of SLD is cross-linguistic influence, that is, the impact of existing languages on the acquisition and use of new ones. Traditionally this research has been concerned with the effect of the first language (L1) on later learned languages, but research on lexical processing in bilinguals and research on language attrition and language loss has shown that later learned languages may influence the first language (Cook, 2003; Costa, 2005; de Bot & Clyne, 1994; Köpke, Keijzer, & Weilemar, 2004; van Hell & Dijkstra, 2002). Recent studies have also demonstrated an impact of the L2 on the L1 in gestures (e.g. Brown, 2007; this volume; Brown & Gullberg, in press; Pika, Nicoladis, & Marentette, 2006).

A growing body of work suggests that native speakers of typologically different languages, such as English on the one hand, and Spanish and Turkish on the other, gesture differently, both in terms of gestural form and timing, as a reflection of how these languages encode and express meaning components of motion like path and manner (e.g. Duncan, 1994; Kita & Özyürek, 2003; McNeill, 1997; McNeill & Duncan, 2000; Özyürek, Kita, Allen, Furman, & Brown, 2005). Further studies have also shown that L2 learners of these languages do not necessarily gesture like target language speakers, but display traces of their L1s in their gesture production either in terms of timing, aligning their gestures with different elements in speech than native speakers (e.g. Choi & Lantolf, in press; Kellerman & van Hoof, 2003; Negueruela, Lantolf, Rehn Jordan, & Gelabert, 2004; Stam, 2006), or in terms of gestural forms, expressing different semantic content in gestures than native speakers (e.g. Brown, 2007; Brown & Gullberg, in press; Gullberg, submitted; Negueruela et al., 2004; Özyürek, 2002b; Yoshioka & Kellerman, 2006). Such findings are often discussed in terms of Slobin's notion of 'thinking for speaking' (e.g. Slobin, 1996), that is to say, ways in which linguistic categories influence what information you attend to and select for expression when speaking. The argument for L2 is that L1-like gesture patterns may reveal whether L2 speakers continue to think for speaking in the L1 rather than in L2-like ways.

A number of questions need to be addressed in this domain. A crucial issue concerns how to identify and study gestural practices typical of a given language and culture. It is a real difficulty that so little is known about language-specific gesture patterns in terms of frequency, gestural forms, use of gesture space, and semantic expression. An absolute prerequisite for the study of CLI in gestures in L2 is therefore a better understanding of gestural practices across languages in native performance. Currently, any study on L2 behaviour is a triple study where the native behaviour in both source and target language needs to be described before learner behaviour can be considered. If gestures and L2 studies are to follow in the steps of general SLD research, effects of other known languages (L3, Ln) should also be taken into account, pushing the boundaries even further.

It is equally important to point out that in contrast to the traditional focus on 'errors' in SLD (see papers in Richards, 1974; van Els, Extra, van Os, & Janssen van Dieten, 1984), a different approach is necessary when considering gestures in L2 production. Since there can be no absolute 'grammaticality' of gesture performance, preferential usage patterns must instead be established with corresponding gradient native scales of appropriateness or acceptability. For instance, Duncan (2005) examined 20 native English speakers retelling a cartoon and found that 64% of the manner gestures coincided with manner verbs, while 33% of the manner gestures were linked to other elements such as ground or path. In contrast, 20 Spanish speakers engaged in the same task aligned only 23% of their manner gestures with manner verbs, while 58% coincided with ground or path elements. The range of variation defines what is 'nativelike' and allows for an equal range of possible behaviours for L2 learners that would still qualify as 'nativelike'. This opens for a more gradient and sophisticated view of L2 performance in general beyond the narrow domain of target-like gestures.

CLI effects have mainly been studied looking at representational (iconic) gestures. It is unknown whether effects of CLI can be found for other types of gesture practices. For instance, given that gestures supposedly align with speech rhythms and language-specific prosodic patterns, it seems plausible that rhythmic patterns of gesturing will transfer into an L2 along with a foreign accent. Similarly, it is possible that cross-linguistic differences in ways of managing interaction might transfer into an L2 in the use of interactive and 'pragmatic'

gestures (e.g. Bavelas, Chovil, Lawrie, & Wade, 1992; Kendon, 2004). To date, no study has examined these issues.

The studies of L2 gestures occasionally display dissociation between surface form and gesture whereby L2 learners say one thing (in L2-like fashion) and gesture another (in L1-like fashion) (e.g. Özyürek, 2002b; Stam, 2006). In most studies gesture is more conservative than speech, such that speech seems to change more readily towards the L2 target than gestures. This phenomenon is mainly interpreted as indicating transfer of L1 representations, perspectives, or *thinking for speaking*. However, similarly to the study of CLI in spoken language, to determine whether a particular phenomenon is caused by CLI/transfer, or whether it is a general learner phenomenon, requires methodological triangulation (cf. Jarvis, 2000). At the very least, it is necessary to examine learners from two different source languages learning the same target language to tease apart such effects.

Further, very few attempts have been made to theoretically account for the fact that L2 speakers do and say different things, an L2-specific form of speech-gesture discrepancy. A question that arises is what representations actually underpin L2 surface forms, especially when these look target-like but gesture does not, and why it should be that speech changes before gesture. Do gestures have a privileged link to conceptual representations relative to speech? How dissociated can speech and gestures be and still be said to reflect the same representation?

A different set of questions pertains to how gestures that seem not quite target-like from a native speaker's point of view are perceived by native speakers. The inclusion of gesture in assessments of L2 speakers expands the number of dimensions along which learners' production can vary relative to native speakers. In this sense, gesture data raise important questions concerning the 'native speaker standard' (cf. Davies, 2003), crucial in many studies of SLD. The discussion of critical periods for language learning and the degree to which adult learners can become nativelike is central to theories of adult L2 acquisition (cf. Birdsong, 2005). Gestures definitely raise the stakes for learners. However, no studies have systematically examined native perception of 'foreign gesture', nor its potential interactional consequences. Although a number of studies show that learners' gesture production affect assessments positively such that learners are deemed more proficient if they gesture than if

they do not (Gullberg, 1998; Jenkins & Parra, 2003; Jungheim, 2001; McCafferty, 2002), no studies so far have directly tested for effects of 'foreign gesture'.

Gesture and learner-general phenomena

SLD research does not restrict explanations of properties of the L2 to effects of the L1 or other languages learned. SLD studies also look at learner behaviour as a systematic and regular variety in its own right, as an *interlanguage* (Selinker, 1972), with properties determined both by general learning mechanisms and by the specific languages involved. Again, in such a perspective, a number of issues arise where gestures might provide important insights. One such issue concerns how language learners handle different types of difficulties at a given proficiency level, such as managing lexical, grammatical, and discourse related problems at the same time in real time. The analysis of gestures and speech in conjunction provides a fuller picture of such problem-solving. For instance, studies of Moroccan and Japanese learners of French show how learners move from using mainly representational gestures, complementing the content of speech, towards more emphatic or rhythmic gestures related to discourse (Kida, 2005; Taranger & Coupier, 1984). This suggests a transition from essentially lexical difficulties and lexically based production to more grammatical problems related to discourse. More careful charting of what gestures are produced by learners with particular proficiency profiles has potential pedagogical and diagnostic applications.

The acquisition of gestures can and should also be studied in its own right. Just as we need to find out how children come to gesture in adult-like and culture-specific ways, so we need to know whether L2 learners ever come to like native speakers. Although some attention has been given to L2 users' comprehension of conventional or quotable gestures ('emblems) (e.g. Jungheim, 1991; Mohan & Helmer, 1988; Wolfgang & Wolofsky, 1991), nothing is known about whether L2 learners ever produce such culture-specific gestures, which may show the same acquisition difficulties as idiomatic expressions (e.g. Irujo, 1993). For instance, do L2 learners learn to produce appropriate gestural forms such as distinguishing the HEAD TOSS from the HEADSHAKE (Morris, Collett, Marsh, & O'Shaughnessy, 1979), do they learn to POINT in culturally appropriate ways (see papers in Kita, 2003), and do

they learn to respect handedness taboos (e.g. Kita, 2001)? Even less is known about whether L2 learners acquire and produce language-specific non-conventionalised gestural practices. If they do, this raises important questions about implicit learning of both form and meaning, crucial to the domain of SLD. If they do not, it raises familiar SLD issues about why learners do not notice or 'take in' certain aspects of the input despite extended exposure (e.g. Robinson, 2003). It is perhaps particularly interesting to consider visual phenomena like gestures since they are often assumed to be inherently 'salient', and to have an attention-directing, enhancing effect in their own right. If they did, they should be easy to acquire. Again, next to nothing is known about this question.

A closely related issue is what might be learnable and indeed teachable (and therefore assessable) in terms of gesturing. While it may be possible to teach forms and meanings of emblems, it is much less clear that other aspects of gestural practices are teachable. Even when gestures are on the classroom agenda, an explicit link is seldom made between language and gesture. Furthermore, research in this domain should consider the possible differences and similarities between spontaneously produced gestures and gestures explicitly deployed for teaching purposes (e.g. Lazaraton & Ishihara, 2005; Tellier, 2006). It is possible that features noted for 'instructional discourse' like child- or foreigner-directed gestures share properties with gestures employed in language classrooms. A further step is to consider learners' interpretations of teachers' gestures rather than examining teachers' gestures in social isolation (cf. Sime, 2006). Answers to questions concerning learnability and teachability are wide-open.

Gesture across the lifespan

Under the view that language development encompasses all shifts, a number of further domains become relevant such as the development of rhetorical styles and registers, but also language attrition in bilinguals, and changes in language related to ageing. Changes in language can of course also be related to disease, as in aphasia, split-brain surgery, etc., but we leave those changes aside in this overview (but see e.g. Feyereisen & de Lannoy, 1991; Goodwin, 2002; Lausberg, Zaidel, Cruz, & Ptito, 2007; Lott, 1999; Rose, 2006).

With regard to the development of rhetorical styles and gestures, something is known about the development of narrative skills and concomitant changes to gesture in later

childhood (cf. section 3). For instance, Cassell (1988) demonstrated that children's production of beats becomes adult-like only with increasing development of narrative skills, specifically when children can alternate between different narrative levels. Very little is known, however, about the development of other rhetorical skills such as gestures in different registers, sermons, public speeches, etc. Although a small literature explores politicians' gesture practices (e.g. Calbris, 2003), the focus is typically on the accomplished speaker, not on the development of the speech-gesture repertoire.

In the domain of language attrition due to immigration or bilingualism, nothing at all is known about gesture practices. Assuming that gesture and speech are connected, it seems plausible that the gesture practices might also be affected if skills in the spoken first language are lost. However, given that gestures can also be recruited for other purposes, it is an empirical question whether this happens or not.

Gestures and ageing

A recent overview of research on gestures over the lifespan suggests that there is very little research on gestures in older age groups (Tellier, to appear). There is a substantial body of research on non-verbal communication and ageing, and some of these studies have also considered gesture use and interpretation (Montepare & Tucker, 1999). The perspective taken is often a compensatory one. That is, communication problems emerge with age due to a decline in speech-motor skills and hearing. The assumption is that these problems are compensated for by gesturing (e.g. Cohen & Borsoi, 1996; Feyereisen & Havard, 1999). There are several problems with this approach. First, the decline of speech production in ageing is not well-established. Second, any decline seems to be co-affected by variables such as continuous use of the language and level of education. Third, the groups considered are typically fairly young (60s and early 70s) and comparisons between age groups are cross-sectional. Age-related language problems are more likely in the 75+ age group, in particular when there are other health problems and the level of education is low (de Bot & Makoni, 2005). Finally, there is considerable variation within and between age groups. So a simple young/old comparison may not be informative.

It is possible that there are specific age-related types of gesturing, probably more due to specific motor patterns than to language issues. For instance, the control of small movements may be reduced, leading to larger movements. It is also possible that with decreasing flexibility of joints, changes in spinal curvature, etc., there is a reduction in gesture size, gesture speed, etc. (cf. Laver & Mackenzie Beck, 2001). Both changes may be given (un-intended) semiotic importance by onlookers. The field of gestural practices in ageing is desperately under-researched.

Common themes

The preceding sections have briefly outlined some of what is known about gestures and language development, with some emphasis on questions that remain open to investigation in each domain. There are, however, clearly general themes that are common to all studies of language development and gesture.

The role of gestures in the input

In studies on language development the precise role of input, that is, what language users hear and see, is hotly debated. Both in studies of FLD and SLD a familiar debate concerns whether input is simply a trigger of innate knowledge and structures (Pinker, 1989; Wexler & Culicover, 1980; White, 2003), or whether language development is based on detailed properties of the input such as frequencies and on usage (Ellis & Larsen-Freeman, 2006; Tomasello, 2003, and cf. section 3). In SLD the role of input is debated partly because L2 learners seem not to attend to what is in the input, namely 'correct' pronunciation, grammar, etc., as seen in their tendency to maintain foreign accents and grammatical peculiarities even after many years of teaching and exposure.

A well-known hypothesis states that a prerequisite for input to be useful to learning is that it is comprehensible (e.g. the Comprehensible Input Hypothesis, Krashen, 1994).[1] In this perspective, gestures seem to play an important role. Interlocutors are known to attend to and make use of gestural information, for instance, to improve comprehension in noise (Rogers, 1978). It is also clear that gestures in the input can improve learning in general such as the learning of maths and symmetry (Singer & Goldin-Meadow, 2005; Valenzeno, Alibali, & Klatzky, 2002). A natural assumption is therefore that gestures that convey speech-related

meaning should improve language learners' *comprehension* and possibly also *learning* of language. Indeed, adults, teachers and other 'competent' speakers seem to think so. All forms of didactic talk or 'instructional communication' studied - whether by adults to children ('motherese') or by adult native speakers to adult L2 users ('foreigner/teacher talk', Ferguson, 1971) - is characterised by an increased use of representational and rhythmic gestures (e.g. Adams, 1998; Allen, 2000; Iverson, Capirci, Longobardi, & Caselli, 1999; Lazaraton, 2004). However, few studies test actual effects of *language* learning. There is some evidence that gestures improve the learning of new adjectives in English children (O'Neill, Topolovec, & Stern-Cavalcante, 2002). Very few studies empirically test the connection between gestural input and learning outcomes in SLD (for exceptions, see Allen, 1995; Sueyoshi & Hardison, 2005; Tellier, this volume). Moreover, facilitative effects of gestures may differ depending on the linguistic units tested and be more evident for lexical than grammatical material (e.g. Musumeci, 1989). Different types of gesturing may also have different effects. Again, all these issues remain wide open. It is also an empirical question to what extent children and adult learners mirror the gesture input in their own gesture production.

A related question is to what extent learners affect their own input by their spoken and gestural practices in interaction. It has been suggested that learners' gestures might help promote positive affect between learner and adult/native speaker, which might ultimately promote learning (e.g. Goldin-Meadow, 2003; McCafferty, 2002). It has also been suggested that adult and native listeners in general tailor their production to learners based on the learners' gestures (e.g. Goldin-Meadow, 2003). This is in line with the well documented observation that interlocutors synchronise or accommodate to each other in interaction also as regards gestures (Bavelas, Black, Chovil, Lemery, & Mullett, 1988; Condon & Ogston, 1971; Kimbara, 2006; Wallbott, 1995). It is an open question to what extent such synchronisation might affect language learning (cf. discussions of structural priming as a means of learning, e.g. Bock & Griffin, 2000; Branigan, Pickering, & Cleland, 2000).

The role of gestures in the output

The complementary notion also plays a role in development, namely that production is crucial to acquisition. Bruner (1983) suggested that (first) language is learned through use and a

similar notion is present in the 'output hypothesis' in SLD. This states that new language knowledge only becomes automatised if used for production (Gass & Mackey, 2006; Swain, 2000). In a parallel fashion, it has been shown that the production of gestures promotes learning of other skills, such that adults and children who gesture while learning about maths and science do better than those who do not (Alibali & DiRusso, 1999). General recall also improves when participants enact events (e.g. Frick-Horbury, 2002). Evidence for an effect of gesturing on the acquisition of *language* is again much scarcer. Although it has been suggested that gesturing might help L2 learners internalise new knowledge on theoretical grounds (Lee, in press; McCafferty, 2004; Negueruela et al., 2004), and although teaching methods relying on embodiment exist (e.g. *Total Physical Respons*e, Asher, 1977), it remains an empirical question whether any real, long-term learning effects can be demonstrated for gesture production in L1 or L2 (for short-term effects in L2, see Tellier, 2006).

Variation and individual differences

All language development is characterised by individual variation. First language development is relatively uniform - at least regarding final outcome - in comparison to SLD, which is characterised by highly variable outcome. In SLD the effect of a range of psycho-social factors have been explored, such as intelligence, language aptitude, memory capacity, attitudes, motivation, personality traits, and cognitive style (e.g. de Bot et al., 2005: 65-75; Dörnyei, 2006; Verspoor, Lowie, & van Dijk, 2008). For instance, intelligence matters more in tutored than in untutored SLD, and more in grammar learning than in other skills. The correlations between language aptitude tests and free oral production and general communicative skills are generally low. Working memory capacity seems to be lower generally in L2 than in L1 (Miyake & Friedman, 1999), etc. No study of such factors in SLD has to date considered gestures either as a co-variable or as a measure of any of the factors despite the fact that the influence of some of these factors on gestures has been extensively studied. For instance, effects of personality and psychological types (e.g. introvert vs. extrovert) on nonverbal behaviour has received a lot of attention (see Feyereisen & de Lannoy, 1991 for an overview), verbal vs. spatial fluency (Hostetter & Alibali, 2007), etc., have

been documented. However, no studies have combined these perspectives although a number of possible links can be hypothesised.

Recent studies have suggested that gestures help reduce cognitive load (e.g. Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001; Wagner, Nusbaum, & Goldin-Meadow, 2004). Such an effect would be important in L2 production (cf. Gullberg, 2003, 2006a) where individual differences in working memory and proficiency might conspire to make such effects more important. A key expansion on the hitherto rather uninformative observations that L2 learners gesture more in the L2 than in the L1 would be to examine the relationship between fluency, processing units, and gesture production more closely in these terms. For instance, at stages where L2 learners are not very fluent and proceed almost word by word, they seem to produce one gesture for every unit/word. Once they start stringing together more material in chunks, the gesture rate also goes down (Gullberg, 1998, 2006a; Nobe, 2001). This suggests a possible link between working memory, fluency and gesture production.

Similarly, individual differences in cognitive style and personality affect interaction patterns and thereby the extent to which L1 and L2 learners create situations of rich input for themselves (cf. Goldin-Meadow, 2003). While this has been examined in FLD, no studies to date have explored such issues in SLD.

Finally, there is inter- and intra-individual variation in adult, native gesturing, depending on social setting, degree of formality, shared knowledge, ambiguity, expertise, the content of speech, etc. Many aspects of individual variation in adult, native gesturing are not well understood, such as why some speakers gesture more than others, and why the same speaker sometimes chooses to gesture and sometimes not (Kendon, 1994). To qualify the possible range of behaviours in adult native speakers while allowing for variation is crucial to studies of language development and gesture. Rather than looking at behaviour outside of the 'typical' as 'noise' in the data, a more productive approach is to look at variation as a meaningful source of information. This is not to say that we need to explain every single instance of a deviation from a general pattern. As in other areas of language development, variation is a reflection of the developmental process resulting from the interaction of many internal variables that cannot be taken apart to study the impact of each individual factor (van Dijk & van Geert, 2005; Verspoor et al., 2008). Studies of gestures and language

development will have to be methodologically creative to find ways of taking variation into account.

Gesture as compensation

In many parts of the language development literature, a general and often tacit assumption is that children and adults alike produce gestures mainly to overcome the gap between their communicative intentions and the expressive means at their disposal. That is to say, gestures are viewed as a compensatory mode of expression. However, the theoretical issues underlying such a view are rarely discussed. First, compensation as a notion is often ill- or undefined. For instance, spoken language acquisition research shows that not all learner behaviour is best characterised as strategic problem-solving. Children and adult learners all over-generalise, not as a means of compensation, but as part of the developmental process. Furthermore, adult learners are often communicatively fluent in an L2 even though their systems do not look like those of native speakers. Conversely, not all difficulties are overt. Learners may avoid difficulties by changing their intention when the expressive means do not match. The general difficulties involved in identifying and defining compensatory behaviour has received attention in SLD studies (see papers in Kasper & Kellerman, 1997), but much less so in studies of FLD, and are virtually absent from studies considering gesture as compensation.

A related issue relevant both to acquisition and gesture studies is the question whether compensation is intended for the speaker or for the addressee. That is, is it a speaker-internal solution to a problem, an interactional solution, or both? These questions echo familiar debates in the gesture literature regarding gesture production (cf. the input/output distinction above), but they are equally relevant for developmental, compensatory issues (e.g. Gullberg, 1998).

A third question concerns what parts of spoken language gestures can compensate for. The focus has traditionally been on lexis and meaning, but lexical access, grammar, discourse, conceptualisation, and problems of linearising global information have all been implicated in gestural compensation (Alibali et al., 2000; Gullberg, 1999, 2006a; Hostetter, Alibali, & Kita, 2007; Pine, Bird, & Kirk, 2007).

Finally, of theoretical relevance for gesture studies is the question how gestures can compensate for linguistic expressions, and how compensatory gestures are defined and function. In adult, 'competent' users, the speech-gesture integration is multifaceted and may not be obligatory and automatic. 'Competent' speakers can choose to decouple speech and gesture. This raises important questions about co-expressivity, however that is defined. Gestures that express non-redundant meaning from speech are not typically considered 'compensatory' in cases of mature, adult native speakers, whereas such instances are often seen as compensatory in developing speakers. Further, a number of familiar questions in the debate on gesture production could be cast in terms of compensation, such as whether gestures help lexical retrieval (activate word forms) (Krauss et al., 2000), or help with conceptualisation or information packaging (Goldin-Meadow, 2003; Kita, 2000), However, surprisingly, these theoretical notions are rarely touched upon in discussions of 'compensatory' gestures in development (for notable exceptions, see Nicoladis, 2007; Nicoladis, Mayberry & Genesee, 1999). Although there are exceptions in the literature on children's development, notably the literature on 'mis-matches' (e.g. Goldin-Meadow, 2003) and on lexical access in children (e.g. Pine et al., 2007), even these studies do not typically discuss explicitly what defines some gestures as compensatory. In studies of adult L2 users' gestural behaviours, theoretical discussions of gestural compensation are almost entirely absent. The properties that make some gestures compensatory and others not need to be discussed and elucidated if we are to form a better understanding of the role of gesture in language development.

In sum, the notion of compensation raises important theoretical issues both for studies of language development and for gesture studies. We need to consider how and when to view the function of gesture as mainly compensatory, to formulate independent defining criteria, etc. (e.g. Goodwin & Goodwin, 1986). Developmental data that raise important issues for compensation are to be seen in the context of theories concerning the relationship between speech and gesture. Conversely, developmental studies may need to be more specific about their view of how gestures can serve compensatory functions.

Conclusions and introduction to this issue

The issues regarding language development and gesture raised in this review are far from exhaustive. A range of other questions can be asked, with regard to methodology, to interaction, and concerning the relationship between language, gestures, and culture. Are some types of gesture related to characteristics of the language system while others are more cultural (e.g. gesticulation vs. emblems) and if so, what does that mean for the parallel development of the two modalities? Is there anything in culture-specific communication that affects the emergence and use of gestures, such as the presence of semi-conventionalised, recurrent hand shapes (see Kendon, 2004)? How does lack of contact with a language and culture affect gesture use? Are there differences in gesture practices between tutored and untutored learners? What is the gestural behaviour of early simultaneous bilinguals? How might learners use gestures to express group affiliation (e.g. Efron, 1972[1941])? Can language development and gesture be modelled together?

The papers in this special issue span both first and second language development. They all exemplify how studies of language development can gain insights from taking gestures into account. The first two papers focus on first language development. Lizskowski's paper examines the gestures of pre-linguistic infants who have not yet developed their first language. He reviews and assesses what is known about pointing and other representational gestures. The paper re-evaluates current findings and takes a new stance, upgrading the role of pointing and downgrading the role of representational gestures in infants, thereby re-assessing the role of such gestures for the emergence of human communication.

The second paper by Stefanini, Recchia, & Caselli focuses on the relationship between gesture production and spoken lexical capacity in children with Down syndrome compared to typically developing children. Drawing on data from a naming task, the authors show that, although children with Down syndrome do not differ quantitatively in gesture production from developmentally-matched controls, they do differ qualitatively in the distribution of information across the modalities. The study sheds important light on the ways in which gestures come into play when cognitive abilities outstrip productive spoken language skills.

In the transition between first and second language studies, Tellier's paper investigates the popular assumption that gestures improve the acquisition of a new word in a foreign language by looking at French children who are taught English. The study compares the effect of seeing vs. both seeing and producing gestures. The results indicate that (producing) gestures affects the productive retention of new vocabulary. The study thus lends support to the notion that gestures are implicated in learning language specifically, not only learning in general.

In the domain of adult second language development, the paper by Yoshioka examines how adult Dutch learners of Japanese construct narrative discourse in speech and gesture. In particular, the paper investigates how learners deal with crosslinguistic differences in how entities are referred to, for instance by lexical means (e.g. *the frog, it*) or by ellipsis. The results show that learners display both general and target language-specific means of structuring information in discourse in the two modalities. In this sense, the study adds to the evidence suggesting that gestures reflect language-specific speech patterns. It also contributes to the study of crosslinguistic influence in SLD.

Brown investigates the interaction between first and second languages in adult speakers, specifically comparing the use of character- and observer-viewpoint in English and Japanese. Japanese speakers with some knowledge of English gesture differently in their native language from Japanese speakers without any knowledge of English, showing patterns similar to those of monolingual English speakers. Although traditionally only the effect of the L1 on the L2 has been considered in studies of SLD, this paper interestingly suggests that the L2 might also affect the L1. This perspective has important implications for what is considered the native standard in studies of language development.

References

Abrahamsen, Adele (2000). Explorations of enhanced gestural input to children in the bimodal period. In Karen Emmorey & Harlan Lane (Eds.), *The Signs of Language revisited: An antology to honor Ursula Bellugi and Edward Klima* (pp. 357-399). Mahwah: Erlbaum.

Adams, Thomas W. (1998). *Gesture in foreigner talk.* Unpublished PhD diss, University of Pennsylvania.

Alibali, Martha W. & Alyssa A. DiRusso (1999). The function of gestures in learning to count: More than keeping track. *Cognitive Development, 14*(1), 37-56.

Alibali, Martha W. & Susan Goldin-Meadow (1993). Gesture-speech mismatch and mechanisms of learning: What the hands reveal about a child's state of mind. *Cognitive Psychology, 25*, 468-523.

Alibali, Martha W., Sotaro Kita, & Amanda J. Young (2000). Gesture and the process of speech production: We think, therefore we gesture. *Language and Cognitive Processes, 15*(6), 593-613.

Allen, Linda Q. (1995). The effect of emblematic gestures on the development and access of mental representations of French expressions. *Modern Language Journal, 79*(4), 521-529.

Allen, Linda Q. (2000). Nonverbal accommodations in foreign language teacher talk. *Applied Language Learning, 11*, 155-176.

Asher, James (1977). *Learning another language through actions*. Los Gatos: Sky Oaks Productions, Inc.

Bates, Elizabeth & Frederic Dick (2002). Language, gesture, and the developing brain. *Developmental psychobiology, 40*, 293-310.

Bavelas, Janet B., Alex Black, Nicole Chovil, Charles R. Lemery, & Jennifer Mullett (1988). Form and function in motor mimicry. Topographic evidence that the primary function is communicative. *Human Communication Research, 14*(3), 275-299.

Bavelas, J. B., Chovil, N., Lawrie, D. A., & Wade, A. (1992). Interactive gestures. *Discourse Processes, 15*(4), 469-489.

Bavelas, Janet B., Christine Kenwood, Trudy Johnson, & Bruce Phillips (2002). An experimental study of when and how speakers use gestures to communicate. *Gesture, 2*(1), 1-17.

Beattie, Geoffrey & Heather Shovelton (1999). Mapping the range of information contained in the iconic hand gestures that accompany spontaneous speech. *Journal of Language and Social Psychology, 18*(4), 438-462.

Birdsong, David (2005). Nativelikeness and non-nativelikeness in L2A research. *International Review of Applied Linguistics, 43*(4), 319-328.

Bock, Katherine & Zensi Griffin (2000). The persistence of structural priming: Transient activation or implicit learning. *Journal of Experimental Psychology: General, 129*(2), 177-192.

Branigan, Holly P., Martin J. Pickering, & Alexandra A. Cleland (2000). Syntactic co-ordination in dialogue. *Cognition, 75*(2), B13-B25.

Brown, Amanda (2007). *Crosslinguistic influence in first and second languages: Convergence in speech and gesture.* Unpublished PhD, Boston University, Boston, and MPI for Psycholinguistics, Nijmegen.

Brown, Amanda & Marianne Gullberg (in press). Bidirectional crosslinguistic influence in L1-L2 encoding of Manner in speech and gesture: A study of Japanese speakers of English. *Studies in Second Language Acquisition, 30*(2).

Bruner, Jerome (1983). *Child's talk: Learning to use language*. Oxford: Oxford University Press.

Bühler, Karl (1934). *Sprachtheorie*. Iena: Fischer.

Butcher, Cynthia & Susan Goldin-Meadow (2000). Gesture and the transition from one- to two-word speech: When hand and mouth come together. In D. McNeill (Ed.), *Language and gesture* (pp. 235-257). Cambridge: Cambridge University Press.

Calbris, Geneviève (2003). *L'expression gestuelle de la pensée d'un homme politique*. Paris: CNRS Editions.

Capirci, Olga, Annarita Contaldo, Maria Cristina Caselli, & Virginia Volterra (2005). From action to language through gesture: A longitudinal perspective. *Gesture, 5*(1-2), 155-177.

Capirci, Olga, Jana M. Iverson, Elena Pizzuto, & Virginia Volterra (1996). Gestures and words during the transition to two-word speech. *Journal of Child Language, 3*, 645-675.

Caselli, Maria Cristina (1990). Communicative gestures and first words. In Virginia Volterra & Carol J. Erting (Eds.), *From gesture to language in hearing and deaf children*. (pp. 56-67). Washington, D.C.: Gallaudet University Press.

Caselli, Maria Cristina & Paola Casadio (1995). *Il primo vocabulario del bambino: Guida all'uso del questionario MacArthur per la valutazione della comunicazione e del linguaggio nei primi anni di vita*. Milan: Franco Angeli.

Caselli, Maria Cristina, Stefano Vicari, Emiddia Longobardi, Laura Lami, Claudia Pizzoli, & Giacomo Stella (1998). Gestures and words in early development of children with Down Syndrome. *Journal of Speech, Language and Hearing Research, 41*, 1125-1135.

Cassell, Justine (1988). Metapragmatics in language development: Evidence from speech and gesture. *Acta Linguistica Hungarica, 38*(1-4), 3-18.

Chapman, Robin S. (1995). Language development in children and adolescents with Down Syndrome. In Paul Fletcher & Brian MacWhinney (Eds.), *The handbook of child language* (pp. 641-663). Oxford: Blackwell Publishers.

Chapman, Robin S. & Linda Hesketh (2000). The behavioral phenotype of Down syndrome. *Mental Retardation and Developmental Disabilities Research Review, 6*, 84-95.

Choi, Soojung & James P. Lantolf (in press). The representation and embodiment of meaning in L2 communication. Motion events in the speech and gesture of advanced L2 Korean and L2 English speakers. *Studies in Second Language Acquisition, 30*(2).

Church, Ruth B. & Susan Goldin-Meadow (1986). The mismatch between gesture and speech as an index of transitional knowledge. *Cognition, 23*(1), 43-71.

Clark, Herbert H. (1996). *Using language*. Cambridge: Cambridge University Press.

Cohen, Ronald L. & Diane Borsoi (1996). The role of gestures in description-communication: A cross study of ageing. *Journal of Nonverbal Behavior, 20*(1), 45-63.

Colletta, Jean-Marc (2004). *Le développment de la parole chez l'enfant agé de 6 à 11 ans. Corps, language et cognition*. Sprimont: Mardaga.

Condon, William S. & William D. Ogston (1971). Speech and body motion synchrony in the speaker-hearer. In David L. Horton & James J. Jenkins (Eds.), *Perception of language* (pp. 150-173). Columbus, OH: Merrill.

Cook, Vivian (Ed.) (2003). *Effects of the second language on the first*. Clevedon: Multilingual Matters.

Costa, Albert (2005). Lexical access in bilingual production. In Judith F. Kroll & Annette M. De Groot (Eds.), *Handbook of bilingualism. Psycholinguistic approaches* (pp. 308-325). Oxford: Oxford University Press.

Davies, Allan (2003). *The native speaker: myth and reality*. Clevedon: Multilingual Matters.

de Bot, Kees (2007). Dynamic systems theory, life span development and language attrition. In Barbara Köpke, Monika Schmid, Merel Keijzer & Susan Dostert (Eds.), *Language attrition: Theoretical perspectives* (pp. 53-68). Amsterdam: Benjamins.

De Bot, Kees & Clyne, Michael (1994). A 16-year longitudinal study of language attrition in Dutch immigrants in Australia. *Journal of Multilingual and Multicultural Development, 15*(1), 17-28.

De Bot, Kees, Lowie, Wander, & Verspoor, Marjolijn (2005). *Second language acquisition: An advanced resource book*. London: Routledge.

De Bot, Kees & Sinfree B. Makoni (2005). *Language and ageing in multilingual contexts*. Clevedon: Multilingual Matters.

De Ruiter, Jan-Peter (2000). The production of gesture and speech. In David McNeill (Ed.), *Language and gesture: Window into thought and action* (pp. 284-311). Cambridge: Cambridge University Press.

De Ruiter, Jan-Peter (2007). Postcards from the mind: The relationship between speech, gesture and thought. *Gesture, 7*(1), 21-38.

Dörnyei, Zoltan (2006). Individual differences in second language acquisition. *AILA Review, 19*, 42-68.

Duncan, Susan D. (1994). *Grammatical form and 'thinking-for-speaking' in Mandarin Chinese and English: An analysis based on speech-accompanying gesture.* Unpublished PhD diss., University of Chicago, Chicago.

Duncan, Susan D. (2005). Co-expressivity of speech and gesture: Manner of motion in Spanish, English, and Chinese. In Charles Chang, et al. (Eds.), *Proceedings of the 27th Annual Meeting of the Berkeley Linguistic Society,* (pp. 353-370). Berkeley, CA: Berkeley Linguistics Society.

Efron, David (1972[1941]). *Gestures, race and culture.* The Huague: Mouton. (first ed. 1941 as *Gestures and environment*. New York: King's Crown Press.)

Ellis, Nick C. & Diane Larsen-Freeman (2006). Language emergence: Implications for Applied Linguistics. *Applied Linguistics, 27*(4), 558-589.

Ellis, Rod (1994). *The study of second language acquisition*. Oxford: Oxford University Press

Emmorey, Karen (1999). Do signers gesture? In Lynn L. Messing & Ruth Campbell (Eds.), *Gesture, speech and sign* (pp. 133-159). Oxford: Oxford University Press.

Engle, Randi A. (1998). Not channels but composite signals: Speech, gesture, diagrams, and object demonstrations are integrated in multimodal explanations. In Morton Ann Gernsbacher & Sharon J. Derry (Eds.), *Proceedings of the 20th Annual Conference of the Cognitive Science Society* (pp. 321-326). Mahwah, NJ: Erlbaum.

Erting, Carol J., & Virginia Volterra (1990). Conclusion. In Virginia Volterra & Carol J. Erting (Eds.), *From gesture to language in hearing and deaf children* (pp. 278-298). Berlin: Springer-Verlag.

Evans, Julia L., Martha W. Alibali, & Nicole M. McNeil (2001). Divergence of verbal expression and embodied knowledge: Evidence from speech and gesture in children with specific language impairment. *Language and Cognitive Processes, 16*(2), 309-331.

Fenson, Larry, Philip S. Dale, J. Steven Reznick, Elizabeth Bates, Donna Thal, & Stephen Pethick (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development, 59*(5).

Fenson, Larry, et al. (1993). *The MacArthur Communicative Development Inventories: User's Guide and Technical Manual*. San Diego: Singular Publishing Group.

Ferguson, Charles A. (1971). Absence of copula and the notion of simplicity: A study of normal speech, baby talk, foreigner talk and pidgins. In Dell Hymes (Ed.),

Pidginization and creolization of languages (pp. 141-150). Cambridge: Cambridge University Press.

Fex, Barbara & Månsson, Ann-Christine (1998). The use of gestures as a compensatory strategy in adults with acquired aphasia compared to children with specific language impairment (SLI). *Journal of Neurolinguistics, 11*(1-2), 191-206.

Feyereisen, Pierre (1987). Gestures and speech, interactions and separations: A reply to McNeill (1985). *Psychological Review, 94*(4), 493-498.

Feyereisen, Pierre & Jacques-Dominique de Lannoy (1991). *Gestures and speech: Psychological investigations*. Cambridge: Cambridge University Press.

Feyereisen, Pierre & Isabelle Havard (1999). Mental imagery and production of hand gestures while speaking in younger and older adults. *Journal of Nonverbal Behavior, 23*(2), 153-171.

Franco, Fabia & Jennifer Wishart (1995). The use of pointing and other gestures by young children with children with Down syndrome. *American Journal of Mental Retardation*, 160-182.

Freedman, Norbert (1977). Hands, words, and mind: On the structuralization of body movements during discourse and the capacity for verbal representation. In Norbert Freedman & Stanley Grand (Eds.), *Communicative structures and psychic structures: A psychoanalytic approach* (pp. 109-132). New York: Plenum Press.

Frick-Horbury, Donna (2002). The use of hand gestures as self-generated cues for recall of verbally associated targets. *American Journal of Psychology, 115*(1), 1-20.

Gass, Susan M. & Alison Mackey (2006). Input, interaction and output: An overview. *AILA Review, 19*, 3-17.

Goldin-Meadow, Susan (2003). *Hearing gesture: How our hands help us think*. Cambridge, MA: The Belknap Press.

Goldin-Meadow, Susan & Cynthia Butcher (2003). Pointing toward two-word speech in young children. In Sotaro Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 85-107). Mahwah, NJ: Erlbaum.

Goldin-Meadow, Susan, Howard Nusbaum, Spencer D. Kelly, & Susan Wagner (2001). Explaining math: Gesturing lightens the load. *Psychological Science, 12*(6), 516-522.

Goodwin, Charles (Ed.). (2002). *Conversation and brain damage*. Oxford: Oxford University Press.

Goodwin, Marjorie H. & Charles Goodwin (1986). Gesture and coparticipation in the activity of searching for a word. *Semiotica, 62*(1/2), 51-75.

Goodwyn, Susan W. & Linda P. Acredolo (1998). Encouraging symbolic gestures: A new perspective on the relationship between gesture and speech. In Jana M. Iverson & Susan Goldin-Meadows (Eds.), *The nature and functions of gesture in children's communication* (pp. 61-73). San Francisco: Jossey-Bass.

Goodwyn, Susan W., Linda P. Acredolo, & Catherine A. Brown (2000). Impact of symbolic gesturing on early language development. *Journal of Nonverbal Behavior, 24*(2), 81-103.

Graham, Jean Ann & Michael Argyle (1975). A cross-cultural study of the communication of extra-verbal meaning by gestures. *International Journal of Psychology, 10*(1), 56-67.

Guidetti, Michèle (2005). Yes or no? How young French children combine gestures and speech to agree and refuse. *Journal of Child Language, 32*(4), 911-924.

Gullberg, Marianne (1998). *Gesture as a communication strategy in second language discourse. A study of learners of French and Swedish*. Lund: Lund University Press.

Gullberg, Marianne (1999). Communication strategies, gestures, and grammar. *Acquisition et Interaction en Langue Etrangère, 8*(2), 61-71.

Gullberg, Marianne (2003). Gestures, referents, and anaphoric linkage in learner varieties. In Christine Dimroth & Marianne Starren (Eds.), *Information structure and the dynamics of language acquisition* (pp. 311-328). Amsterdam: Benjamins.

Gullberg, Marianne (2006a). Handling discourse: Gestures, reference tracking, and communication strategies in early L2. *Language Learning, 56*(1), 155-196.

Gullberg, Marianne (2006b). Some reasons for studying gesture and second language acquisition (Hommage à Adam Kendon). *International Review of Applied Linguistics, 44*(2), 103-124.

Gullberg, Marianne (2008). Gestures and second language acquisition. In Nick C. Ellis & Peter Robinson (Eds.), *Handbook of cognitive linguistics and second language acquisition* (pp. 276-305). London: Routledge.

Gullberg, Marianne (submitted). What learners mean. What gestures reveal about semantic reorganisation of placement verbs in advanced L2.

Gullberg, Marianne & Stephen G. McCafferty (in press). Introduction: Gesture and SLA - Towards an integrated approach. *Studies in Second Language Acquisition, 30*(2).

Holler, Judith & Geoffrey Beattie (2003). Pragmatic aspects of representational gestures. Do speakers use them to clarify verbal ambiguity for the listener? *Gesture, 3*(2), 127-154.

Hostetter, Autumn B. & Martha W. Alibali (2007). Raise your hand if you're spatial: Relations between verbal and spatial skills and gesture production. *Gesture, 7*(1), 73-95.

Hostetter, Autumn B., Martha W. Alibali, & Sotaro Kita (2007). I see it in my hand's eye: Representational gestures are sensitive to conceptual demands. *Language and Cognitive Processes, 22*(3), 313-336.

Irujo, S. (1993). Steering clear: avoidance in the production of idioms. *International Review of Applied Linguistics, 21*, Steering clear: avoidance in the production of idioms.

Iverson, Jana M., Olga Capirci, Elena Longobardi, & Maria Cristina Caselli (1999). Gesturing in mother-child interactions. *Cognitive Development, 14*(1), 57-75.

Iverson, Jana M., Olga Capirci, Virginia Volterra, & Susan Goldin-Meadow (in press). Learning to talk in a gesture-rich world: Early communication of Italian vs. American children. *First Language*.

Iverson, Jana M. & Susan Goldin-Meadow (2005). Gesture paves the way for language development. *Psychological Science, 16*, 367-371.

Iverson, Jana M. & Esther Thelen (1999). Hand, mouth and brain. The dynamic emergence of speech and gesture. *Journal of Consciousness Studies, 6*(11/12), 19-40.

Jarvis, Scott (2000). Methodological rigor in the study of transfer: Identifying L1 influence in the interlanguage lexicon. *Language Learning, 50*(2), 245-309.

Jenkins, Susan & Isabel Parra (2003). Multiple layers of meaning in an oral proficiency test: The complementary roles of nonverbal, paralinguistic, and verbal behaviors in assessment decisions. *Modern Language Journal, 87*(1), 90-107.

Jungheim, Nicholas O. (1991). A study on the classroom acquisition of gestures in Japan. *Ryutsukeizaidaigaku Ronshu, 26*(2), 61-68.

Jungheim, Nicholas O. (2001). The unspoken element of communicative competence: Evaluating language learners' nonverbal behavior. In Thom Hudson & James D. Brown (Eds.), *A focus on language test development: Expanding the language proficiency construct across a variety of tests* (pp. 1-34). Honolulu: University of Hawai'i.

Kasper, Gabriele & Eric Kellerman (Eds.). (1997). *Communication strategies: Psycholinguistic and sociolinguistic perspectives*. London: Longman.

Kellerman, Eric & Anne-Marie van Hoof (2003). Manual accents. *International Review of Applied Linguistics, 41*(3), 251-269.

Kelly, Spencer D., Dale J. Barr, Ruth Breckinridge Church, & Katherine Lynch (1999). Offering a hand to pragmatic understanding: The role of speech and gesture in comprehension and memory. *Journal of Memory and Language, 40*(4), 577-592.

Kendon, Adam (1994). Do gestures communicate?: A review. *Research on Language and Social Interaction, 27*(3), 175-200.

Kendon, Adam (1995). Gestures as illocutionary and discourse structure markers in Southern Italian conversation. *Journal of Pragmatics, 23*(3), 247-279.

Kendon, Adam (2004). *Gesture. Visible action as utterance*. Cambridge: Cambridge University Press.

Kendon, Adam (2007) Some topics in gesture studies. In Anna Esposito, Maja Bratanic, Eric Keller and Maria Marinaro (Eds.), *Fundamentals of verbal and nonverbal communication and the biometric issue* (pp. 3-19). Amsterdam: IOS Press.

Kida, Tsuyoshi (2005). *Appropriation du geste par les étrangers: Le cas d'étudiants japonais apprenant le français.* Unpublished PhD. diss., Université de Provence, Aix-en-Provence.

Kimbara, Irene (2006). On gestural mimicry. *Gesture, 6*(1), 39-61.

Kita, Sotaro (2000). How representational gestures help speaking. In D. McNeill (Ed.), *Language and gesture* (pp. 162-185). Cambridge: Cambridge University Press.

Kita, Sotaro (2001). Pointing left in Ghana: How a taboo on the use of the left hand influences gestural practice. *Gesture, 1*(1), 73-95.

Kita, Sotaro (Ed.). (2003). *Pointing: Where language, culture, and cognition meet*. Mahwah, NJ: Erlbaum.

Kita, Sotaro & Asli Özyürek (2003). What does cross-linguistic variation in semantic coordination of speech and gesture reveal?: Evidence for an interface representation of spatial thinking and speaking. *Journal of Memory and Language, 48*(1), 16-32.

Krashen, Stephen D. (1994). The input hypothesis and its rivals. In Nick C. Ellis (Ed.), *Implicit and explicit learning of languages* (pp. 45-78). London: Academic Press.

Krauss, Robert K., Yihsiu Chen, & Rebecca F. Gottesman (2000). Lexical gestures and lexical access: a process model. In David McNeill (Ed.), *Language and gesture* (pp. 261-283). Cambridge: Cambridge University Press.

Lausberg, Hedda, Eran Zaidel, Robyn F. Cruz, & Alain Ptito (2007). Speech-independent production of communicative gestures: Evidence from patients with complete callosal disconnection. *Neuropsychologia, 45*(13), 3092-3104.

Laver, John & Janet Mackenzie Beck (2001). Unifying principles in the description of voice, posture and gesture. In Christian Cavé, Isabella Guaïtella & Serge Santi (Eds.), *Oralité et gestualité* (pp. 15-24). Paris: l'Harmattan.

Lazaraton, Anne (2004). Gesture and speech in the vocabulary explanations of one ESL teacher: A microanalytic inquiry. *Language Learning, 54*(1), 79-117.

Lazaraton, Anne & Noriko Ishihara (2005). Understanding second language teacher practice using microanalysis and self-reflection: A collaborative case study. *Modern Language Journal, 89*(4), 529-542.

Lee, Jina (in press). Gesture and private speech in second language acquisition. *Studies in Second Language Acquisition, 30*(2).

Liddell, Scott (2003). Gr*ammar, gesture and meaning in American Sign Language*. Cambridge: Cambridge University Press.

Lott, Petra (1999). *Gesture and aphasia*. Bern: Peter Lang.

Mayberry, Rachel I. & Elena Nicoladis (2000). Gesture reflects language development: Evidence from bilingual children. *Current Directions in Psychological Science, 9*(6), 192-196.

McCafferty, Stephen G. (2002). Gesture and creating zones of proximal development for second language learning. *Modern Language Journal, 86*(2), 192-203.

McCafferty, Stephen G. (2004). Space for cognition: Gesture and second language learning. *International Journal of Applied Linguistics, 14*(1), 148-165.

McNeill, David (1985). So you think gestures are nonverbal? *Psychological Review, 92*(3), 271-295.

McNeill, David (1992). *Hand and mind. What the hands reveal about thought*. Chicago: University of Chicago Press.

McNeill, David (1997). Growth points cross-linguistically. In J. Nuyts & E. Pederson (Eds.), *Language and conceptualization* (pp. 190-212). Cambridge: Cambridge University Press.

McNeill, David (1998). Speech and gesture integration. In J. M. Iverson & S. Goldin-Meadow (Eds.), *The nature and functions of gesture in children's communication* (pp. 11-27). San Francisco: Jossey-Bass.

McNeill, David (2005). *Gesture and thought*. Chicago: University of Chicago Press.

McNeill, David & Susan D. Duncan (2000). Growth points in thinking-for-speaking. In David McNeill (Ed.), *Language and gesture* (pp. 141-161). Cambridge: Cambridge University Press.

Melinger, Alissa & Willem J. M. Levelt (2004). Gesture and the communicative intention of the speaker. *Gesture, 4*(2), 119-141.

Miyake, Akira & Naomi Friedman (1999). Individual differences in second language proficiency: Working memory as language aptitude. In Alice Healy & Lyle Bourne (Eds.), *Foreign language learning: Psycholinguistic experiments on training and retention* (pp. 339-362). Mahwah, NJ: Erlbaum.

Mohan, Bernard & Sylvia Helmer (1988). Context and second language development: Preschoolers' comprehension of gestures. *Applied Linguistics, 9*(3), 275-292.

Montepare, Joann M. & Joan S. Tucker (1999). Aging and non-verbal behavior: Current perspectives and future directions. *Journal of Nonverbal Behavior, 23*(2), 105-109.

Morris, Desmond, Peter Collett, Peter Marsh, & Marie O'Shaughnessy (1979). *Gestures, their origins and distribution*. London: Cape.

Musumeci, Diane M. (1989). *The ability of second language learners to assign tense at the sentence Level: A crosslinguistic study.* Unpublished PhD, University of Illinois at Urbana-Champaign.

Negueruela, Eduardo, James P. Lantolf, Susan Rehn Jordan, & Jaime Gelabert (2004). The "private function" of gesture in second language speaking activity: A study of motion verbs and gesturing in English and Spanish. *International Journal of Applied Linguistics, 14*(1), 113-147.

Nicoladis, Elena (2007). The effect of bilingualism on the use of manual gestures. *Applied Psycholinguistics, 28*(3), 441-454.

Nicoladis, Elena, Rachel I. Mayberry, & Fred Genesee. (1999). Gesture and early bilingual development. *Developmental Psychology, 35*(2), 514-526.

Nobe, Shuichi (2001). On gestures of foreign language speakers. In Christian Cavé, Isabella Guaïtella & Serge Santi (Eds.), *Oralité et Gestualité* (pp. 572-575). Paris: l'Harmattan.

O'Neill, Daniela K., Jane Topolovec, & Wilma Stern-Cavalcante (2002). Feeling sponginess: The importance of descriptive gestures in 2- and 3-year-old children's acquisition of adjectives. *Journal of Cognition and Development, 3*(3), 243-277.

Özcaliskan, Seyda & Susan Goldin-Meadow (2005). Gesture is at the cutting edge of early language development. *Cognition, 96*(3), B101-B113.

Özyürek, Asli (2002a). Do speakers design their cospeech gestures for their addressees? The effects of addressee location on representational gestures. *Journal of Memory and Language, 46*, 688-704.

Özyürek, Asli (2002b). Speech-language relationship across languages and in second language learners: Implications for spatial thinking and speaking. In Barbora Skarabela (Ed.), *BUCLD Proceedings* (Vol. 26, pp. 500-509). Somerville, MA: Cascadilla Press.

Özyürek, Asli & Spencer D. Kelly (2007). Special isssue 'Gesture, brain, and language'. *Brain and Language, 101*(3), 181-184.

Özyürek, Asli, Sotaro Kita, Shanley E. M. Allen, Reyhan Furman, & Amanda Brown (2005). How does linguistic framing of events influence co-speech gestures? Insights from crosslinguistic variations and similarities. *Gesture, 5*(1/2), 219-240.

Pika, Simone, Elena Nicoladis, & Paola Marentette (2006). A cross-cultural study on the use of gestures: Evidence for cross-linguistic transfer? *Bilingualism, 9*(3), 319-327.

Pine, Karen J., Hannah Bird, & Elizabeth Kirk (2007). The effects of prohibiting gestures on children's lexical retrieval ability. *Developmental Science, 10*(6), 747-754.

Pine, Karen J., Nicola Lufkin, & David Messer (2004). More gestures than answers: Children learning about balance. *Developmental Psychology, 40*(6), 1059-1067.

Pinker, Stephen (1989). *Learnability and cognition: The acquisition of argument structure*. Cambridge, MA: MIT Press.

Pizzuto, Elena, Micaela Capobianco, & Antonella Devescovi (2005). Gestural-vocal deixis and representational skills in early language development. *Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems, 6*(2), 223-252.

Richards, Jack C. (Ed.). (1974). *Error analysis*. London: Longman.

Riseborough, Margaret G. (1981). Physiographic gestures as decoding facilitators: Three experiments exploring a neglected facet of communication. *Journal of Nonverbal Behavior, 5*(3), 172-183.

Robinson, Peter (2003). Attention and memory during SLA. In Catherine J. Doughty & Michael H. Long (Eds.), *The handbook of second language acquisition* (pp. 631-678). Oxford: Blackwells.

Rogers, William T. (1978). The contribution of kinesic illustrators toward the comprehension of verbal behavior within utterances. *Human Communication Research, 5*(1), 54-62.

Rose, Miranda L. (2006). The utility of arm and hand gesture in the treatment of aphasia. *Advances in Speech-Language Pathology, 8*(2), 92-109.

Schegloff, Emanuel A. (1984). On some gestures' relation to talk. In J. Maxwell Atkinson & John Heritage (Eds.), *Structures of social action* (pp. 266-296). Cambridge: Cambridge University Press.

Schick, Brenda, Marc Marschark, & Patricia E. Spencer (Eds.) (2006). *Advances in the Sign Language development of deaf and hard-of-hearing children*. New York: Oxford University Press.

Schmid, Monika S., Barbara Köpke, Merel Keijzer, & Lina Weilemar (Eds.) (2004). *First language attrition: Interdisciplinary perspectives on methodological issues*. Amsterdam: Benjamins.

Selinker, Larry (1972). Interlanguage. *International Review of Applied Linguistics, 10*(3), 209-231.

Sime, Daniela (2006). What do learners make of teachers' gestures in the language classroom? *International Review of Applied Linguistics, 44*(2), 209-228.

Singer, Melissa A. & Susan Goldin-Meadow (2005). Children learn when their teacher's gestures and speech differ. *Psychological Science, 16*(2), 85-89.

Slama-Cazacu, Tatiana (1976). Nonverbal components in message sequence: "Mixed syntax". In W. C. McCormack & S. A. Wurm (Eds.), *Language and man: Anthropological issues* (pp. 217-227). The Hague: Mouton.

Slobin, Dan I. (1996). From "thought and language" to "thinking for speaking". In John J. Gumperz & Stephen C. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70-96). Cambridge: Cambridge University Press.

Stam, Gale (2006). Thinking for Speaking about motion: L1 and L2 speech and gesture. *International Review of Applied Linguistics, 44*(2), 143-169.

Stefanini, Silvia, Maria Cristina Caselli, & Virginia Volterra (2007). Spoken and gestural production in a naming task by young children with Down syndrome. *Brain and Language, 101*(3), 208-221.

Sueyoshi, Azano & Debra M. Hardison (2005). The role of gestures and facial cues in second language listening comprehension. *Language Learning, 55*(4), 661-699.

Swain, Merrill (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In James P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 97-114). Oxford: Oxford University Press.

Taranger, Marie-Claude & Christine Coupier (1984). *Recherche sur l'acquisition des langues secondes. Approche du gestuel.* In Alain Giacomi & Daniel Véronique (Eds.), *Acquisition d'une langue étrangère. Perspectives et recherches* (pp. 169-183). Aix-en-Provence: Université de Provence.

Tellier, Marion (2006). *L'impact du geste pédagogique sur l'enseignement/apprentissage des langues étrangères: Etude sur des enfants de 5 ans.* Unpublished PhD, Université Paris VII - Denis Diderot, Paris.

Tellier, Marion (to appear). The development of gesture. In Kees de Bot, Sinfree Makoni & Robert Schrauf (Eds.), *Language development across the life-span*. Hove: Psychology Press.

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

Valenzeno, Laura, Martha W. Alibali, & Roberta Klatzky (2002). Teachers' gestures facilitate students' learning: A lesson in symmetry. *Contemporary Educational Psychology, 28*, 187-204.

van Dijk, Marijn & Paul van Geert (2005). Disentangling behavior in early child development: Interpretability of early child language and the problem of filler syllables and growing utterance length. *Infant Behavior and Development, 28*, 99-117.

van Els, Theo, Guus Extra, Charles van Os, & Annemieke Janssen van Dieten (1984). *Applied Linguistics and the learning and teaching of foreign languages*. London: Edward Arnold.

van Hell, Janet G. & Ton Dijkstra (2002). Foreign language knowledge can influence native language performance in exclusively native contexts. *Psychonomic Bulletin & Review, 9*(4), 780-789.

Verspoor, Marjolijn, Wander Lowie, & Marijn van Dijk (2008). Variability in L2 development from a dynamic systems perspective. *Modern Language Journal, 93*.

Viberg, Åke & Kenneth Hyltenstam (Eds.). (1993). *Progression and regression in language*. Cambridge: Cambridge University Press.

Volterra, Virginia, Maria Cristina Caselli, Olga Capirci, & Elena Pizzuto (2005). Gesture and the emergence and development of language. In Michael Tomasello & Dan I. Slobin (Eds.), *Beyond nature-nurture: Essays in honor of Elizabeth Bates* (pp. 3-40). Mahwah, NJ: Erlbaum.

Volterra, Virginia, Jana M. Iverson, & Marianna Castrataro (2006). The development of gesture in hearing and deaf children. In Brenda Schick, Marc Marschark & Patricia E.

Spencer (Eds.), *Advances in the Sign Language development of deaf children* (pp. 46-70). New York: Oxford University Press.

Wagner, Susan M., Howard Nusbaum, & Susan Goldin-Meadow (2004). Probing the mental representation of gesture: Is handwaving spatial? *Journal of Memory and Language, 50*(4), 395-407.

Wallbott, Harald G. (1995). Congruence, contagion, and motor mimicry: Mutualities in nonverbal exchange. In Ivana Marková, Carl Graumann, & Klaus Foppa (Eds.), *Mutualities in dialogue* (pp. 82-98). Cambridge: Cambridge University Press.

Wexler, Kenneth & Peter Culicover (1980). *Formal principles of language acquisition*. Cambridge, MA: MIT Press.

White, Lydia (2003). On the nature of interlanguage representation: Universal grammar in the second language. In Catherine J. Doughty & Michael H. Long (Eds.), *The handbook of second language acquisition*. Oxford.

Wolfgang, Aaron & Zella Wolofsky (1991). The ability of new Canadians to decode gestures generated by Canadians of Anglo-Celtic backgrounds. *International Journal of Intercultural Relations, 15*(1), 47-64.

Wu, Ying Choon & Seana Coulson (2005). Meaningful gestures: Electrophysiological indices of iconic gesture comprehension. *Psychophysiology, 42*(6), 654-667.

Yoshioka, Keiko & Eric Kellerman (2006). Gestural introduction of Ground reference in L2 narrative discourse. *International Review of Applied Linguistics, 44*(2), 171-193.

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Notes

[1] For an overview of critiques of this hypothesis, see Ellis, 1994: 273-280.