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Preface

The "Projektgruppe für Psycholinguistik" set up by the Max Planck Society in 1977 should have run, in the normal course of events for Max Planck project groups, for five years. But only two years after its initiation the Society was already examining the possibility of converting it to a permanent institute. The advisory committee, which included biologists such as Detlev Ploog and Werner Reichardt (chair) as well as representatives of the social sciences such as Wolfgang Edelstein and Jürgen Habermas, unanimously recommended this step. It also recommended that the institute be sited in Nijmegen, where the project group had been located. And so it came about that in 2005 the Max-Planck-Institut für Psycholinguistik was able to celebrate the 25th anniversary of its existence.

Neither the foundation of the project group nor its transformation into an institute would have been possible without the strong support of Reimar Lüst, at that time president of the Max Planck Society. This is only one of Reimar Lüst's many merits and achievements (here in Nijmegen, of course, we believe it to be his most important one!). Some years ago, the Max Planck Society honoured its former president by founding a lecture which carries his name. When he asked us whether we would be willing to hold the lecture in 2005, we were delighted to accept. What better way to celebrate our 25th year? On November 30th, 2005, then, the Institute celebrated its anniversary, and the Reimar Lüst lecture was presented that day by Peter Hagoort, for many years researcher at the institute and now director of the F.C. Donders Centre for Cognitive Neuroimaging. His lecture posed and answered the question: "What makes humans unique?" In the course of the celebrations Reimar Lüst and Pim Levelt reminisced about the early days of the Institute, and we all were most pleased when our former president said that so far, he never regretted his decision.

Wolfgang Klein

Nijmegen, May 2006

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CHAPTER 1
PHONOLOGICAL LEARNING FOR
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Joint research with other projects:

Decoding Continuous Speech

Introduction

The Phonological Learning for Speech Perception (PLSP) project investigates how phonological structure is first learned, how it affects speech perception, and how it may be adapted once learned. The project incorporates most of the research supported by Cutler's NWO-SPINOZA project "Native and Non-native Listening", which maintains *inter alia* the two infant speech perception laboratories (for behavioral and for electrophysiological research). Research is here reported under three heads: (1) Learning a first phonology (the infant speech perception research); (2) learning a second phonology, later on (research on second-language [L2] listening); (3) using and adjusting the first phonology (research on the influence of native [L1] phonology in speech perception, and on the acquisition and re-tuning of phonological categories in adulthood). One Ph.D. thesis was successfully defended from this project in 2005 (Broersma) and two more were completed, to be defended in 2006 (Eisner, Dietrich).

1.1 Learning a first phonology

1.1.1 The beginnings of vocabulary building: word segmentation

The construction of an initial vocabulary in the second half of the first year of life is founded on the ability to segment words from continuous speech. Kooijman's Ph.D. project concerns the cortical reflections of this operation. With an ERP paradigm in which infants first hear tokens of a word (e.g., *serre*, 'conservatory'), then hear sentences of which some contain the familiarized word while the others contain a different word, a clear differential response to the familiarized words (in comparison to the unfamiliarized words) was observed in the ERPs of 10-month-old infants (Annual Report 2003). The investigation has now been extended to 7-month-old infants, using the same materials and procedure as the study with 10-month-olds. In the Familiarization phase, the 7-month-olds showed an electrophysiological response to the isolated words similar to that of the 10-month-olds: a negative, frontally distributed, repetition effect in the 200-500 ms latency range. Even though the peak latency of the 7-month-olds' response was slightly delayed compared to that of the 10-month-olds, the ERP repetition effect (difference between familiarized versus unfamiliarized words) for the isolated words was similar for both groups in both latency and distribution. Like the 10-month-olds, the 7-month-olds showed a different response to familiarized and unfamiliarized words in the Test phase. However, in this case the response differed from that of the 10-month-olds. An early repetition effect with a positive polarity and a frontal distribution appeared from 350 to 450 ms; in a slightly later time window, starting at about 475 ms,

the 7-month-olds showed a left-lateralized negative repetition effect, more similar to what was observed in the 10-month-olds. Thus even though the electrophysiological response of the 7- and 10-month-old infants to the isolated words in the Familiarization phase is highly similar, the Test phase results suggest that processing of sentences may be different in the two age groups.

Research in the behavioral infant perception laboratory has also concerned the beginnings of speech segmentation abilities. Johnson, in collaboration with Seidl (Purdue U.), measured Headturn Preferences, again in a two-stage Familiarization and Test procedure, to explore the possibility that infants segment words from the edges of utterances more readily than from the middle of utterances. Infants were familiarized to one word that always occurred at the edge of an utterance (utterance-initial position for half of the infants and utterance-final for the other half) and one word that always occurred in sentence-medial position. In the test phase the words were presented in isolation. Johnson and Seidl found that infants segmented words from the edges of utterances more readily than from the middle of an utterance. However, contrary to predictions, either edge was effective: Infants segmented words from utterance-initial and -final position equally well. There are at least two reasons why these findings are important for understanding early word segmentation. First, function words and proper nouns tend to occur along utterance edges. These words have been proposed to play a particularly important role in early language acquisition, and the present results suggest that this may be the case because their positioning makes them easier to segment than other word types. Second, infant-directed speech (IDS) consists of shorter utterances than adult-directed speech (ADS), so that words are more likely to fall at an utterance boundary in IDS than in ADS. This suggests that it should be easier to segment words from IDS than ADS.

The contribution of function words to this process was examined by Cutler, in collaboration with Shi (U. Montreal) and Werker (U. British Columbia). Using the Familiarization and Test procedure in a similar way to Johnson and Seidl, they familiarized infants with pseudo-nouns (*tink, breek*) preceded either by real functors (*the, her*) or by prosodically matched nonsense functors (*kuh, ler*) differing from the real ones only in the syllable onset. Then they tested the infants on the pseudo-nouns in isolation. A familiarity preference was thus dependent upon infants' ability to segment test items from a preceding functor: If the item heard with a real functor was preferred, it would indicate that the infants had treated the familiarization string as functor + word rather than as an undifferentiated bisyllable. Eleven-month-olds showed a clear preference for listening to pseudo-nouns which had been heard with preceding *the* over those

which had been heard with *her* or a nonsense functor. This suggests that the highly frequent functor *the* is familiar to 11-month-olds and is helpful to them in segmentation. Eight-month-olds preferred nouns which had been heard with either *the* or its analogue *kuh* over nouns which had been heard with *her* or *ler*. This suggests that these infants may also be able to use a functor representation in segmentation, but that the representation is an under-specified version of the most frequent type of English functor (an open monosyllable containing schwa?; in any case, a representation to which *her* and *ler*, with their rhotacized vowels, did not conform).

Statistical learning mechanisms also enable infants to segment words from speech. Artificial language research has addressed this issue. In typical artificial language learning experiments, infants are familiarized with a continuous stream of syllables containing no cues to word boundaries other than intersyllable transitional probabilities, and then tested on their ability to recognize words versus partial words. There are many aspects of these artificial languages that make them unlike natural languages – most obviously, the complexity and variation of natural language is lacking. To take a first step towards examining whether infants' ability to segment words from artificial languages scales up to the ability to segment words from natural languages, Tyler (U. Western Sydney) and Johnson examined Dutch-learners' ability to segment an artificial language containing four words of uniform length (CVCV) versus an artificial language containing two trisyllabic (CVCVCV) and two bisyllabic words (CVCV). Importantly, the transitional probabilities defining word boundaries were identical in the two languages, and all infants were tested on bisyllabic words. Tyler and Johnson found that infants tended to segment the language with words of uniform length more readily than they segmented the language with words of variable length. This result suggests that infants' ability to track intersyllable transitional probabilities may have been over-estimated in past studies, which would have important implications for the applicability of artificial language learning to natural language acquisition.

1.1.2 Voice discrimination as a function of language familiarity

Johnson and Nazzi (CNRS, Paris) continued to investigate infants' ability to discriminate voices in the native versus non-native language. Earlier work using the Visual Fixation Paradigm showed that Dutch-learning 7-month-olds readily detect voice changes in Dutch but failed to detect voice changes in Japanese or Italian (Annual Report 2004). Johnson, Westrek (U. Amsterdam), and Nazzi interpreted this as evidence that infants are more sensitive to voice changes in their native language than in a non-native language. An alternative explanation for these results, however, could be that the Dutch voices used in this study

were simply more distinctive than the Japanese and Italian voices. Johnson and Nazzi explored this possibility by once again using the same paradigm to test infants' ability to detect voice changes in Dutch and Japanese. But in this new experiment, the Dutch and Japanese voices were played in reverse. Reversed speech destroys most of the phonetic and prosodic information that presumably makes a language sound familiar, yet it retains many voice quality cues thought to be important for voice identification (e.g., F0, breathiness, speech rate, etc). Thus, if the Dutch voices were simply very distinctive, then infants should still be able to discriminate the voices played in reverse. In this new reversed speech experiment, infants failed to detect voice changes in either Dutch or Japanese. These results support Johnson et al.'s original interpretation of their findings, that is, infants appear to be more sensitive to voice changes in their native language than in a non-native language.

1.1.3 Acquisition of gender-marked determiners

The final-year undergraduate project of Diks (Utrecht U.), supervised by Johnson, used the Split-screen Preferential Looking Paradigm (in which participants are invited to look at one of two objects) to study 24-month-old Dutch learners' knowledge of gender agreement between determiners and nouns. In Dutch, nouns take either the definite determiner *het* or *de*. In an earlier study (Annual Report 2004), Johnson had shown that 28-month-old Dutch learners recognize *de*-words most rapidly and accurately when the words were preceded by correct determiners which were also informative in that they distinguished the target object from the alternative in the display. This was observed despite the fact that most 28-month-olds routinely fail to produce definite determiners correctly. In the current study, 24-month-olds showed no evidence of having any knowledge of gender agreement between Dutch determiners and nouns. In combination, these results suggest that Dutch learners become sensitive to the *het-de* difference, and acquire the appropriate pairing of determiner with known nouns, some time between 24 and 28 months of age.

1.2 Learning a second phonology, later on

1.2.1 Acquisition of novel phonemic contrasts

The final-year undergraduate project of Bultena (RU. Groningen), supervised by Mitterer, investigated perception of English /æ/ versus /ɛ/ by Dutch listeners. Previous investigations by Broersma and by Weber and Cutler (Annual Report 2002-2004) had indicated that this contrast – which is spanned by a single vowel in the Dutch phoneme repertoire – is very difficult for Dutch listeners; however, pairs such as *cattle* and *kettle* are not treated as complete homophones. One possible way to explain the gradedness of these results is to

assume that Dutch listeners can make the distinction for some tokens, but not for others. Such a pattern is in agreement with models in which the mental lexicon (in L1 and L2) consists of episodes of encountered words. Because previous usage is assumed to sharpen the representation of a given word by associating it with more episodes, Dutch listeners should then find it harder to distinguish minimal pairs with a low frequency of occurrence (e.g., *canyon*, *Kenyan*) than minimal pairs with a higher frequency (e.g., *gas*, *guess*). An alternative possibility is that Dutch listeners learn a word-general phonological distinction, but only incompletely, so that they have trouble distinguishing tokens in which the vowels are slightly underarticulated. To test between these two possibilities, Dutch listeners were confronted with 612 different tokens containing the vowels /æ/ and /ɛ/, arising from 51 minimal pairs (i.e., 102 words) pronounced by six different native English speakers. In an identification task, listeners were presented with one token auditorily (e.g., *kettle* pronounced by one of the six speakers) and had to decide whether the intended word was *cattle* or *kettle*. The results indicated that the size of the acoustic differences between pairs – i.e., how strongly vowel duration and vowel quality differed between the /æ/ and /ɛ/ members of a pair – and the number of syllables in a word pair – i.e., one (*bat-bet*) versus two (*cattle-kettle*) – predicted the Dutch listeners' response accuracy. Lexical frequency, however, did not. This result suggests that Dutch listeners learn a phonological contrast, albeit incompletely, and not the differences between specific whole-word forms, as assumed by episodic models.

1.2.2 Perception of reduced consonants in non-native listening

Tuinman started her Ph.D. project on the way in which late bilinguals cope with the challenges of connected casual speech in their second language. Recent studies have shed considerable light on how native listeners perceive connected casual speech, with its phonetic assimilations and consonant reduction, but little is known of how L2 learners cope with this variability. Consonant reduction (e.g., deletion of /t/ in *postbode* 'postman') can confront L2 learners with unfamiliar word forms. However, reductions that also occur in L1 may in fact prove unproblematic in L2, since listeners may be able to apply known rules to the novel input. In a two-alternative forced-choice task, Tuinman investigated both German-Dutch bilinguals' and native Dutch speakers' perception of word-final /t/ reduction, a phenomenon found in both Dutch and German. Listeners had to decide whether or not target words, embedded in a sentence frame, ended in /t/. Previous studies of /t/-reduction by Mitterer and Ernestus (Annual Report 2004) had shown that native listeners take into account preceding segmental context, phonetic detail, and lexical status of the form in the interpretation of codas that may or may not contain a reduced /t/. Tuinman

extended this list by showing that Dutch listeners also use syntactic constraints when interpreting word-final /t/ in verbs. This was possible as in Dutch the present tense third person singular inflection is /t/, while the first person inflection is null. Comparison with German listeners listening to the same Dutch materials showed that they, like the Dutch, take into account all four factors – phonetic detail, segmental context, lexical status and syntactic constraints – in inferring the presence or absence of an underlying /t/. Thus familiarity with a reduction process due to its presence in L1 may well render it less problematic than it might otherwise have been in listening to L2. German listeners, however, failed to show a completely native-like pattern, as they reported more /t/-codas than native listeners for the morphemic /t/ in verbs.

1.2.3 Competition increase in L2 listening: lexical statistics

The word recognition problems resulting from L2 listeners' phonemic confusions will depend on the number of phonemic confusions an individual listener makes, as well as on vocabulary size; exact computations are therefore impossible. Upper-bound statistics for the potential problems resulting from phonemic confusions can however be estimated from the lexicon. Using the CELEX English lexicon, Cutler calculated for one vowel and one consonant confusion the extent of pseudo-homophony, and how much spurious embedding and added ambiguity the same confusions can cause. The analyses ascertained for every word containing one confusable phoneme whether replacing it with its confusable alternative produces another real word – for example, for every word containing the vowel /æ/, whether replacing /æ/ with /ɛ/ produces a word. Thus *cattle* becomes *kettle*, which is a word, but *as* becomes *ez* which is a nonword. Even when no pseudo-homophone results (i.e., the *as* case), whether the resulting string (/ɛz/) occurs embedded in other words (e.g., /ɛz/ in *residue*, *esoteric*) provides a measure of the possibility for spurious lexical activation, for example, of *as* in *esoteric*. The added temporary ambiguity was calculated by tallying how many words begin in the same way – if the third phoneme of *stack* is heard as /ɛ/, how many words beginning /stɛ/ will be added to the pool of competitors activated as *stack* is heard? The calculations showed that the added number of pseudo-homophones for an L2 listener making each confusion was a few hundred (rather more for the consonantal confusion /r-l/ than for /æ-ɛ/); this is presumably not highly significant given the great extent of homophony in vocabularies. The added amount of spurious activation was more significant – several thousand extra competitors, such as *as* in *residue*, per million words of speech; and the added temporary ambiguity – over 100 added temporary competitors, such as *step* given the input *stack*, per word – was also substantial. It is clear from these statistics that any single phonemic confusion can bring in its wake enormous potential lexical confusion of a sort which the L1

listener is spared; there is no wonder that, as experimental evidence has attested (Annual Report 2001-2004), pseudo-homophony, spurious activation and temporary ambiguity cause real trouble for the L2 listener.

1.2.4 Competition increase in L2 listening: Experimental evidence of temporary ambiguity

Broersma further investigated the increased lexical competition for Dutch listeners compared to English listeners while listening to English speech. Previous studies had shown that nonwords differing from real words in one phoneme which did not match the Dutch phoneme inventory or phonotactic constraints (e.g., *lemp*) caused more lexical activation of real words (*lamp*), and hearing one word of a minimal pair (e.g., *cattle*) caused more activation of the other member of the pair (*kettle*) for Dutch listeners than for English listeners (Annual Report 2001, 2004). A new cross-modal priming experiment investigated Dutch and English listeners' perception of words with partially overlapping onsets. Word pairs had a similar onset, except for the vowels /æ/ and /ɛ/, e.g., *daffodil* – *deficit*. Twenty-four pairs of trisyllabic English words with stress on the first syllable were selected as visual target words. For each pair, the first parts of the two words, up to and including the vowel of the second syllable, were identical except for the /æ/ versus /ɛ/ in the first syllable; these first parts were excised to serve as auditory primes to the visual targets. Each experimental target word (e.g., *daffodil*) had an Identity prime, taken from the same word (*daffo* from *daffodil*), a Mismatch prime, from the other word of the pair (*defi* from *deficit*), and a Control prime from an unrelated word (*moni* from *monitor*). Participants heard the prime, then saw the target, and their task was to decide whether the target was an English word. Both English and Dutch listeners gave more correct responses when targets were preceded by Identity primes, compared with the Control condition. However, their results differed for the items preceded by Mismatch primes. English listeners' responses did not benefit from hearing a Mismatch prime, but Dutch listeners' responses did: for them the percentage of correct responses was higher after a Mismatch prime than after a Control prime, and even as high as after an Identity prime. Thus, for Dutch listeners, hearing the first part of *deficit* also activated the word *daffodil*, whereas no such activation was found for English listeners. These results showed again that there is increased lexical competition for non-native listeners compared to native listeners during speech perception.

1.2.5 Mapping from phonetic to lexical representations in L2

Cutler and Otake, with Weber (U. Saarbrücken), examined the mapping of phonetic information to lexical representations in L2 listening using an eye-

tracking paradigm. Japanese listeners followed instructions in English to click on pictures in a display. When instructed to click on a picture of a rocket, they experienced interference when a picture of a locker was present, that is, they tended to look at the locker instead. However, when instructed to click on the locker, they did not look at the rocket. This asymmetry is consistent with a similar asymmetry previously observed in Dutch listeners' mapping of English vowel contrasts to lexical representations (Annual Report 2002). The results suggest that pseudo-homophony, though it can apparently be displayed in tasks such as lexical decision, is actually not an accurate characterization of the phonological representations of minimal pairs such as *cattle/kettle* or *right/light* in the L2 lexicon. L2 listeners may maintain a distinction between two phonetic categories of the L2 in their lexical representations, even though their phonetic processing is incapable of reliably delivering the perceptual discrimination required for correct mapping to the lexical distinction. At the phonetic processing level, one of the L2 categories is dominant; the present results suggest that dominance is determined by acoustic-phonetic proximity to the nearest L1 category. At the lexical processing level, representations containing this dominant category are correctly contacted by the phonetic input, but representations containing the nondominant category receive significantly less input corresponding to that category.

1.3 Using and adjusting the first phonology

1.3.1 The lexical statistics underlying sensitivity to stress contrasts

Comparisons of the lexical statistics of English (44 phonemes) versus Spanish (25 phonemes) by Cutler, Norris (MRC Cognition and Brain Sciences Unit, Cambridge) and Sebastián-Gallés (U. Barcelona; Annual Report 2003) revealed significant differences in the informativeness of stress contrasts. Although Spanish had 2.2 times as many embedded words as English, taking stress into account reduced the number of embeddings twice as effectively in Spanish as in English. In lexical recognition, Spanish listeners use stress more effectively than English listeners do in distinguishing between words; the lexical statistics suggest that this is because the payoff is greater in Spanish than it is in English. New analyses by Cutler and Pasveer extended the comparisons to Dutch and German (using, as for the English analysis, the CELEX corpus). In word recognition, Dutch listeners, like Spanish listeners, use stress more effectively than English listeners do (Annual Report 1997, 1999). Thus the prediction was that the Dutch statistics should resemble the Spanish more than the English statistics (despite the fact that in every other respect – historical, structural – Dutch is far closer to English than to Spanish). Results from word recognition experiments at the MPI for Cognitive Neuroscience, while not directly com-

parable with the Dutch and Spanish studies, suggest a similar picture for German. Indeed, weighted by word frequency, Dutch carrier words contain on average 1.52 embedded other words when stress is ignored, but only 0.74 when stress is taken into account; for German, the numbers were 1.62 and .8 respectively. Thus consideration of stress in each case resulted in a reduction of just over one half in the embedding count. This fell between the Spanish reduction (two-thirds, to 0.73 when stress is considered) and the English (less than one-third, with only on average 0.94 embedded other words even when stress is ignored). The payoff in Dutch and German is sufficiently substantial that listeners are motivated to exploit stress information in word recognition.

1.3.2 Phoneme inventory effects in speech perception

Wagner's Ph.D. project investigates the effects of the size and structure of native phoneme inventories on phoneme identification in native and non-native listening. Previous experiments (Annual Report 2002) have shown language-specific differences in the speed and accuracy of the identification of vowels versus consonants. The smaller the proportion of vowels in a phoneme repertoire, the faster listeners identify them. Dutch, German, English, and Spanish were compared; Spanish listeners showed a large "vowel advantage" (faster responses to vowels than to consonants) relative to the other listener groups, when identifying /a,i,u/ versus /p,t,k,f,s/, both for a Spanish and a Dutch realization of these phonemes. However, in an experiment with both phoneme realizations presented in alternating order, Spanish listeners (resident in the Netherlands) showed this advantage only for the Spanish realizations. This prompted the hypothesis that Spanish listeners living in an environment of an L2 with more vowel categories adapt to the proportional distribution of the L2 phoneme inventory. To explore this hypothesis, further phoneme monitoring experiments were conducted with listeners in Barcelona. Spanish listeners in Spain were expected to show a vowel advantage for both native and non-native phoneme realizations; they did. In a second experiment, bilingual Catalan-Spanish listeners were tested. The vowel-consonant ratio is larger in Catalan than in Spanish. The listeners were divided in two groups depending on the first language they were exposed to early in life. The results showed a smaller vowel advantage in phoneme monitoring for Catalan-dominant bilinguals. Thus, it appears that the difficulty or ease of identifying vowels versus consonants is determined by the native, that is, first language. However, listeners exposed to an L2 with more vowel categories are aware that the L2 allows less variation within each category, and appear to become more sensitive to differences in phoneme realizations as a result. This in turn affects the extent of their "vowel advantage".

1.3.3 Acquisition of novel auditory categories

Goudbeek's Ph.D. project addresses the extent to which adult listeners can acquire new auditory categories without feedback (unsupervised learning, analogous to an infant's acquisition of phonemic categories), or whether they require feedback to succeed (supervised learning). Previous studies had shown that categories varying along a relevant and an irrelevant dimension could be learned both with and without feedback. Multidimensional categories (similar to real phonemic categories which often vary in more than one dimension), on the other hand, could only be successfully acquired with feedback (Annual Report 2003). The experiments used a learning phase and a maintenance phase. In the early experiments, the maintenance phase stimuli were sampled from an equidistantly spaced grid rather than from the distributions of the training stimuli. Maintenance of learning was not very robust. Listeners generally tended to move away from the learned behavior and started to rely more and more on duration, which was the generally favored dimension. In new studies, a maintenance phase was used that had the same stimuli as the learning phase. With feedback during training, performance in the maintenance phase improved greatly compared to the previous, equidistantly spaced, maintenance stimuli; supervised learning of category structures with one relevant dimension and one irrelevant dimension was possible, and supervised learning of multidimensional category structures was also possible, though still more difficult than learning in the one-dimensional case. These encouraging results for supervised learning prompted similar unsupervised learning experiments. In these experiments, subjects had to classify stimuli during the training phase, but were not given any feedback on their performance. The results were comparable to those of the supervised experiments, although performance overall was less good. When categories had one relevant dimension and one irrelevant one, listeners picked up on the relevant dimension. As in the supervised experiments, listeners were better at using duration as the relevant dimension than frequency in the maintenance phase. Learning to categorize according to a rule with two relevant dimensions again proved very difficult without feedback. In conclusion, unsupervised learning of auditory categories is possible, although performance is not as good as with supervised learning. This is especially true for multidimensional categories. If the learning and maintenance stimuli contain distributional information, learning is more robustly maintained.

1.3.4 Adjustment of existing phonetic categories: fricatives

In Eisner's Ph.D. project, two new studies were conducted on perceptual adjustments of phonetic categories in adults. Experiments by McQueen, Cutler, and Norris (Annual Report 2001-2004) had shown that listeners can use stored lexical representations to accommodate rapidly to unusual speech patterns of a

particular talker; the lexical knowledge constrains the interpretation of ambiguous speech sounds, and over time a perceptual bias for the affected phoneme categories develops. One of Eisner's experiments addressed whether such adjustments remain stable over time and under exposure to other talkers. A heard story induced listeners to interpret an ambiguous fricative sound as [f] or [s]. Perceptual adjustments measured 12 hours after exposure were as robust as those measured immediately after learning. Equivalent effects were found whether listeners heard speech from other talkers in the 12-hour interval, or whether they had the opportunity to consolidate learning during sleep. The second experiment, in collaboration with Van Turenout and Olders (F.C. Donders Centre for Cognitive Neuroimaging, Nijmegen), employed a similar perceptual learning paradigm together with functional magnetic resonance imaging to identify neural systems that are engaged in phonemic processing and learning. Several left-lateralized regions, in particular one lying posterior and lateral to primary auditory cortex, showed sensitivity to the [f-s] phoneme contrast. None of the regions identified in this manner exhibited evidence of lexically-driven perceptual learning, however; thus the systems underlying this type of functional plasticity may be too distributed to be detected with current imaging methods, or learning processes may engage neural systems that are remote from those recruited for phonemic processing.

1.3.5 Adjustment of existing phonetic categories: vowels

All previous studies using the lexically-guided perceptual learning paradigm have examined adjustments in consonant categories. McQueen and Mitterer investigated whether this kind of learning also occurs for vowels, and, if so, whether it generalizes to the perception of other vowels. Dutch listeners were exposed during a lexical decision task to ambiguous vowels, midway between [i] and [e], in either [i]- or [e]-biased lexical contexts. Afterwards, they categorized vowels on three different test continua: the exposure contrast ([ift]-[eft]), a near contrast ([ɪft]-[ɛft]) and a far contrast ([ɑft]-[ɔft]). In two experiments, order of presentation of the test continua was varied. Lexically-guided learning was observed. More sounds on the [ift]-[eft] continuum were identified as [i] by listeners with [i]-biased exposure than by listeners with [e]-biased exposure. This effect, however, was not replicated across all test conditions, including those in a third experiment with a pretest-exposure-posttest design that allowed for within-subject measures of perceptual learning. Generalization of learning to the other contrasts was also observed, but again these effects did not replicate. Vowel perception thus appears to be less readily adjusted by lexical knowledge than consonant perception.

CHAPTER 2

DECODING CONTINUOUS SPEECH

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Joint research with other projects:

Phonological Learning for Speech Perception
Utterance Encoding
Multimodal Interaction

Introduction

The Decoding Continuous Speech (DCS) project continues to examine the mental processes and representations which underlie listeners' decoding of spoken utterances. The project has focused in recent years on the fine-grained detail in the speech signal, and how the listener uses that detail to crack the speech code during language comprehension. This year is no exception. Research on the nature, uptake and use of segmental information (i.e., information which allows discrimination among different speech sounds) is covered in section 2.1. A parallel set of studies on suprasegmental information (i.e., that which specifies prosodic and intonational structure) is covered in section 2.2. Although these two lines of research are presented separately, a key question has concerned the relationship between these two sources of information – how are segmental and suprasegmental aspects of the speech signal integrated and used to constrain word recognition? The nature of lexical processing is also a central concern in the project. Research on the time-course of lexical decoding and on the nature and development of lexical knowledge is summarized in section 2.3.

Two Ph.D. theses were completed this year: Scharenborg (Radboud U. Nijmegen; now U. Sheffield) defended in September, and Salverda (now U. Rochester) defended in December. There were also several other personnel changes. Huettig left the Institute at the end of 2004 and started a postdoc at Ghent U. In February, Cho left to take up a position at Hanyang U., and Tagliapietra joined the project. Braun joined the project in March, and Jesse in September. Andics began his Ph.D. in November.

2.1 Decoding segmental information

A major focus of the project has been on continuous-speech processes. These speech-production processes (sandhi processes) cause words to be pronounced in ways other than their citation forms. Research concerns the recognition of noncitation forms, but also includes detailed analysis of the acoustic properties of those forms, and of when they occur. Reduction of /t/ (2.1.1), reduction in affixes (2.1.2), and voice assimilation (2.1.3) have all been studied. Another aspect of segmental decoding that has continued to be studied this year is coarticulation, specifically, fricative-vowel coarticulation in Dutch. This phenomenon has formed the basis for an investigation of the neural correlates of prelexical processing (2.1.4) and for an analysis of probabilistic biases in speech perception (2.1.5). Finally, the influence of mismatching segmental information on the time-course of lexical access has been examined using eye-tracking (2.1.6).

2.1.1 Perception of segment deletion

Mitterer and Ernestus followed up on their investigation of the perception of /t/-deletion in Dutch (Annual Report 2004:16). They had previously found that listeners are more likely to infer the presence of an underlying /t/ after [s] than after [n]. This context-sensitivity is functional for the perception of casual speech, because [t] is more likely to be deleted after [s] than after [n]. In cooperation with Yoneyama (Kokken U.), Mitterer and Ernestus showed that this context effect is at least partly based on auditory processing which is independent of language experience. Both Dutch and Japanese listeners found it more difficult to discriminate reduced [t]'s from full forms of word-final [t] after [s] than after [n]. Accordingly, it is unsurprising that Dutch listeners are led to hear a /t/, even if it is reduced in the input, more often after [s] than after [n], because the reduced [t] after [s] already *sounds* similar to a fully articulated [t].

2.1.2 Frequency and predictability effects on reduction of Dutch affixes

Pluymaekers continued his Ph.D. project on the production and perception of acoustically reduced speech. In a word-naming experiment, the durations of four Dutch derivational affixes were found to be shorter the higher the frequency of occurrence of the word they appeared in. This finding replicates results reported earlier for spontaneous speech (Annual Report 2004:22). Furthermore, two corpus surveys were conducted. In the first, the focus was on contextual predictability. For the seven most frequent words ending in the suffix *-lijk*, 40 tokens were randomly selected from a database of face-to-face conversations. Detailed acoustic analysis of these tokens showed that degree of reduction was affected by the number of times a word had previously been mentioned, its predictability given the previous word, and its predictability given the following word. Interestingly, effects of repetition were limited to suffixes, while effects of predictability given the previous word were restricted to the stems of two of the seven target words. Predictability given the following word affected the stems of all target words equally, but not all suffixes. This suggests that previous and following context play different roles during the articulatory planning process, leading to very different reduction patterns. The second corpus study addressed the role of morphological structure by investigating the circumstances in which speakers delete [h] in the Dutch suffix *-igheid*. It was shown that /h/ was more likely to be present in words in which it served as a morphological boundary marker (e.g., in *veiligheid*, 'safety', *veilig+heid*), than in words in which it occurred morpheme-internally (e.g., in *vastigheid*, 'certainty', *vast+igheid*). In addition, [h] was less likely to be realized in words with a high frequency. These findings suggest that acoustic realizations reflect

Morphological structure, as well as the probabilistic nature of the human language processing system.

2.1.3 Voice assimilation and lexical frequency

In collaboration with Lahey, Verhees, and Baayen (Radboud U. Nijmegen), Ernestus investigated the effect of a word's frequency of occurrence on sandhi processes, in particular the process of regressive voice assimilation in Dutch. According to the phonological literature, obstruent clusters ending in a voiced plosive (/b/ or /d/) tend to be pronounced as voiced in Dutch. Thus, the compound consisting of the parts *wet* 'law' and *boek* 'book' is pronounced as *wedboek*. It has been claimed that progressive voice assimilation (*wetpoek*) does not occur.

Ernestus and colleagues investigated all word-internal obstruent clusters surrounded by sonorant segments in the Library for the Blind subcorpus in the Spoken Dutch Corpus. Three transcribers classified all obstruents in 908 clusters as voiced, voiceless, or absent. Cluster-initial obstruents seemed to be less often present the more frequently the word appeared in the subcorpus. Surprisingly, 138 out of the 609 clusters on which the transcribers agreed were completely voiceless: Progressive voice assimilation is not absent, but is in fact rather frequent in Dutch. Frequency also predicted voice assimilation: Clusters were more often transcribed as completely voiced or voiceless when the frequency of the word was higher: Unassimilated clusters typically occurred in lower-frequency words. Frequency did not predict the direction of the assimilation.

In the next step, Ernestus and colleagues investigated how frequency of occurrence correlated with four important cues to perceived voicing for obstruent clusters: the duration of the preceding vowel, the duration of the period of glottal vibration in the cluster, the duration of the release noise of the cluster-final plosive, and the duration of the complete cluster. In words of higher frequencies, both the period of glottal vibration and the complete cluster tended to be shorter, while the release noise tended to be longer. These correlations suggest that clusters in words of a higher lexical frequency are produced with less articulatory effort. Shorter periods of glottal vibration and longer release noises cue less perceived voicing, whereas shorter clusters cue more voicing. Via its effect on articulatory effort, frequency thus affected the different fine-grained acoustic cues to perceived voicing in opposite directions.

These results are completely unexpected given phonological theory, in which assimilation is described in terms of a phoneme sharing its phonological features with a neighboring phoneme. These findings show, like those of Kuzla (Annual

Report 2004:19), that voice assimilation is graded, and that the different cues to voicing may be affected independently from each other. Finally, the relevance of the different cues for perceived voicing in obstruent clusters had, prior to this study, only been investigated for careful speech. The stories from the subcorpus used in the present analysis, however, had been read aloud in a lively way. The acoustic measurements, when combined with the transcriptions, showed which cues the transcribers used for the classifications of the obstruent clusters. The period of glottal vibration appeared to be the primary cue, while vowel duration was hardly relevant. The duration of the release noise affected especially the classification of the cluster-initial obstruent, while cluster duration co-determined the classification of the final plosive.

2.1.4 Distinct prelexical processing levels: functional imaging evidence

Behavioral studies of speech perception indicate a distinction between an acoustic-phonetic level and a more abstract level of prelexical processing. In his M.Sc. project, supervised by McQueen and van Turennout (F.C. Donders Centre), Andics used functional Magnetic Resonance Imaging (fMRI), in combination with an adaptation paradigm, to distinguish between the neural correlates of acoustic-phonetic and phonological processing. Perception of the fricative speech sounds [ʃ] and [s] by Dutch listeners was examined. In order to manipulate the perceived quality of the fricatives while keeping their acoustic properties constant, the sounds' vowel-context was varied: Dutch listeners are more likely to classify an ambiguous fricative from an [ʃ]–[s] continuum as [ʃ] when it is followed by [i], and as [s] when it is followed by [y] (Annual Report 1998:22, 2004:15). Syllable pairs were therefore presented consisting of an [ʃ], an [s], or an ambiguous fricative midway between these sounds, followed by an [y] or an [i]. The most ambiguous fricative was identified individually for each subject in a pretest. During the fMRI scanning session syllable pairs were presented rapidly, randomly intermixed. A sparse scanning paradigm was used, in which auditory stimuli were presented during silent gaps between image acquisitions.

Andics, McQueen and van Turennout hypothesized that syllable pairs in which the fricatives were physically identical would lead to larger adaptation in brain regions responsible for acoustic-phonetic processing than syllable pairs in which the syllables were physically different. Furthermore, they hypothesized that pairs in which the fricatives were perceived as the same (irrespective of whether they were physically identical) would lead to larger adaptation in regions responsible for phonological processing as compared to pairs in which the fricatives were perceived as different. Distinct fMRI adaptation patterns were observed corresponding to acoustic-phonetic and phonological processing

respectively, supporting the functional distinction between these processing levels. No cortical regions showed both patterns: the cortical regions underlying the acoustic-phonetic and phonological stages in prelexical processing appear to be anatomically distinct.

2.1.5 Probabilistic biases on compensation for coarticulation in fricative-vowel syllables

Mitterer also investigated compensation for coarticulation in Dutch fricative-vowel sequences (following up on previous research, Annual Report 2004:15). As just noted, Dutch listeners are more likely to perceive a fricative as [s] rather than [ʃ] in front of a rounded vowel (e.g., [y]), mirroring the fact that, in speech production, [s] is similar to [ʃ] in front of rounded vowels. Mitterer investigated to what extent the nature of coarticulation in the stimulus set influences how strongly listeners compensate for coarticulation. To this end, listeners were presented with sets of synthesized speech stimuli in which there was either natural coarticulation (more [s]-like fricatives occurring with unrounded [i]) or "negative" coarticulation (more [s]-like fricatives occurring with rounded [y]). The amount of compensation for coarticulation was not larger in the stimulus set with natural coarticulation. Instead, listeners seemed to be influenced by the statistical structure of the stimulus set, which, in the natural-coarticulation set, coupled [y]-like vowels to [ʃ]-like fricatives. Accordingly, listeners gave more [ʃy]-responses to the natural-coarticulation set than the negative-coarticulation set, even for physically identical stimuli. Note that [ʃy]-responses are "non-compensatory", because the perception of a rounded vowel [y] should lead to more [s]-responses. The statistical bias in the natural-coarticulation set thus partly counteracts the compensation effect. This shows that listeners develop a bias based on probabilistic phonotactics even within an experiment.

2.1.6 Mismatch in lexical access: tracking looks to printed words

In an undergraduate project supervised by McQueen, Viebahn (U. Münster) used eye-tracking to examine the effects of phonetically mismatching material on word recognition, and, in particular, the time-course of those effects. In a relatively new variant of the eye-tracking paradigm, the display on the computer screen consisted of printed words rather than pictures. Dutch listeners received spoken instructions to use the computer mouse to select one of the words in the display (e.g., *Klik op het woord wimpel*, 'Click on the word streamer'). The visual display, which appeared 200 ms before the acoustic onset of the target, contained the target, two phonologically and semantically unrelated distractor words, and one competitor word (e.g., *wimper*, 'eyelash'). The competitor was identical to the target except for one segment, which

differed from that in the target by one acoustic-phonetic feature. The mismatching segment was either in word-initial or word-final position, and the targets (and their competitors) were either monosyllabic or bisyllabic. In all four of these conditions, listeners looked at the competitors more than at the distractors. There were more looks to competitors with word-final mismatch (e.g., *wimper* given *wimpel*) than to those with word-initial mismatch (e.g., *kegel*, 'cone', given the target *tegel*, 'tile'). Looks to competitors were closely time-locked to information in the speech stream. There were thus more looks to the bisyllabic competitors with word-final mismatch (e.g., *wimper*) than to monosyllabic competitors with word-final mismatch (e.g., *tol*, 'toll', given the target *tor*, 'beetle'). More specifically, in both these conditions the peak of the competitor fixation function occurred during the presentation of the final segment of the target. That is, listeners began to look away from a competitor as soon as information inconsistent with that lexical hypothesis became available. Negative information in the speech signal is therefore used very rapidly to constrain lexical search.

2.2 Decoding suprasegmental information

The interest of the project in continuous-speech phenomena is also reflected in work on suprasegmental decoding, in particular in an ongoing project on voice assimilation in German (2.2.1). Previous research in the project (e.g., Annual Report 2003:19, 21) has indicated that segment duration, as a cue to prosodic structure, is used in lexical segmentation and word recognition. This year, the role of consonant duration in Italian speech comprehension has been examined (2.2.2). Previous research has further indicated that syllable duration, as another cue to prosodic structure, also influences spoken-word recognition (e.g., Annual Report 2001:13). A new study suggests that knowledge about syllable duration patterns is brought to bear when listeners recognize newly-acquired words (2.2.3). Sentence-level intonation has also been investigated, with a project asking whether the listener is sensitive to the frequency of occurrence of intonational contours (2.2.4) and another project on the influence of intonation contours on discourse processing (2.2.5).

2.2.1 Effects of prosodic structure on perceptual compensation for voice assimilation

Kuzla continued her Ph.D. research on prosodic structure in the production and perception of assimilated fricatives in German (Annual Report 2003:18, 2004:19). Lenis fricatives become devoiced across word boundaries if they follow /t/. This may cause a potential problem for word recognition if competing words exist which begin with the corresponding fortis fricative, for example,

Wälder, 'forests', versus *Felder*, 'fields'. In addition, prosodic structure constrains voice assimilation: There is more devoicing across a word boundary than across a phrase boundary (also for /v/, as more sophisticated statistical techniques revealed, contrary to what was previously reported). Prosodic structure also influences the duration of speech sounds: Word-initial fricatives are shorter in phrase-medial than in phrase-initial position. This year, the production data were reanalyzed for the combined effects of prosodically-conditioned lengthening and devoicing on the two primary cues to the fortis-lenis contrast in fricatives: glottal vibration and duration. Prosodic structure appeared to affect these cues in opposite directions: After a word boundary, a fricative is typically more devoiced than after a phrase boundary, thus becomes more fortis-like, but it is also shorter, hence more lenis-like.

The net effect of prosodically-conditioned devoicing on perception was tested in a new phoneme categorization experiment, where the durations of the test stimuli were adjusted to the prosodic domain, and only the amount of glottal vibration was varied. Listeners gave more /v/-responses after word boundaries than after phrase boundaries, but they did so both in assimilation and non-assimilation contexts. Moreover, there was a consistent bias towards /v/ (rather than /f/) judgments. These results suggest that listeners based their judgments mainly on fricative duration, paying less attention to glottal vibration. However, the findings shed light on the role of duration in the previous perception experiments (Annual Report 2004:19), where it would have counteracted the observed phoneme boundary shifts as a function of prosodic structure. That is, if the prosodic influence on fricative duration had been modelled in the stimuli in those experiments, effects of prosodic structure would probably have been even stronger.

2.2.2 Geminate and singleton duration in Italian word recognition

Tagliapietra and McQueen investigated the role of geminate and singleton duration in Italian word recognition. Across languages, consonants tend to be longer in word-initial position than in noninitial positions. Listeners of Germanic and Romance languages rely on this prosodic distinction during speech segmentation. In Italian, however, contrasts between long and short consonants also distinguish minimal pairs (e.g., *serra*, 'greenhouse', vs. *sera*, 'evening'). Accordingly, a series of cross-modal priming experiments tested whether, in Italian, consonant duration serves two functions: to locate a consonant (and hence a word boundary), and to identify a geminate or a singleton (and hence to discriminate words). Cross-spliced fragment primes (e.g., /ala/) facilitated lexical decisions to visual targets with singletons (e.g., ALANO, 'Great Dane'), regardless of whether the singletons had been realized word-initially (i.e., were

spliced, e.g., from *ladra*, 'thief') or word-medially (spliced, e.g., from *alano*), even though the initial consonants were, on average, longer than the medial consonants. Furthermore, responses to targets with singletons were not facilitated by primes with geminate consonants (spliced, e.g., from *allarme*, 'alarm'). The geminate consonants tended to be much longer than the singletons. Responses to targets with geminates (e.g., ALLARME), however, were faster after primes with geminates than after primes with singletons. These results indicate that Italian listeners do not rely on durational differences between singletons to locate word boundaries. Instead it appears that consonant duration is used primarily to identify a consonant as a geminate or a singleton.

2.2.3 Prosodic knowledge affects the recognition of newly-acquired words

As the final part of her Ph.D. research, Shatzman performed an artificial lexicon study which examined the involvement of prosodic knowledge in the recognition of newly-learned words. Previous studies by Salverda (Annual Report 2001:13) showed that the disambiguation of onset-embedded words (e.g., *ham* in *hamster*) is influenced by the duration of the ambiguous sequence (e.g., *ham*): longer sequences generated more monosyllabic-word interpretations, while shorter durations generated more polysyllabic-word interpretations. Shatzman's study examined whether listeners would display sensitivity to such prosodic information in their recognition of newly-learned words, if such prosodic information is absent in the exposure that listeners receive when they learn the words. The answer to this question is relevant to an ongoing debate regarding whether words are represented in the lexicon in a phonologically abstract form or as detailed acoustic traces of specific episodes of words.

Participants learned new spoken words (by associating them to novel shapes) along with new onset-embedded competitor words (e.g., *baptoe* and *bap*). In the learning phase, the duration of the ambiguous sequence (e.g., *bap*) was held constant. After the learning phase, the words and shapes were used in the eye-tracking paradigm. In the test phase, the duration of the ambiguous sequence was longer, shorter or equal to the learning phase duration. Listeners' fixations in the test phase indicated that syllable duration modulated the activation of new words, such that short syllables tended to be interpreted as the first syllable of a bisyllabic word, while long syllables generated more monosyllabic word interpretations. Furthermore, the real-word neighborhoods of the newly-acquired words modulated this effect. These results indicate that recognition of newly-learned words is not determined solely on the basis of episodes, suggesting in turn that the mental lexicon is not strictly episodic.

2.2.4 Infrequent intonation contours hinder word comprehension

In many languages, including Dutch and English, intonation does not distinguish between words. In collaboration with Dainora (Massachusetts Institute of Technology), Braun and Ernestus investigated how intonation affects word comprehension for such languages. Their research builds on the combined findings that intonation contours differ in their frequency of occurrence and that frequency of occurrence at the segmental level (such as phoneme frequency and bigram frequency) affects word comprehension. They hypothesized that if intonational prosody affects word comprehension, words may be processed more easily if the sentence in which those words occur has a more frequent intonation contour.

A native Dutch speaker recorded target sentences ("normal" intonation), which were then PSOLA-resynthesized with an intonation contour consisting of a single period of an inverted sine-wave ("sine" intonation). This sine intonation does not occur in Dutch, but nevertheless sounds natural. In a word monitoring experiment, participants were 70 ms slower if the utterance was presented with a sine intonation compared to normal intonation. The source of this effect was subsequently investigated using the cross-modal priming technique. Results showed that the uncommon sine intonation slowed participants more, the longer their Reaction Time (RT) to the previous filler trial had been. Thus, for example, given a previous RT of 1800 ms, the effect of intonation was 120 ms, but this was reduced to 0 ms for a previous RT of 540 ms. Subjects who were slow on the previous filler trial are likely to engage in deeper processing of the current trial than subjects who were fast on the previous trial. The effect of uncommon intonation contours therefore appears to be larger on trials which are processed more deeply. In a third experiment, the resynthesized sentences were replaced by sentences in which the sine intonation was imitated by a Dutch speaker. Once again, when the RT to the previous filler trial was long, participants were slowed by an uncommon intonation contour. The processing disadvantage for sentences with uncommon intonation patterns is thus not restricted to technically manipulated auditory material. These findings show that although segmental and suprasegmental structure are generally seen as reflecting two independent levels of linguistic description, they are not processed independently. This is even true for intonation languages, such as Dutch. The effect of intonation arises especially with deeper processing, suggesting that it results from the semantic integration of the intonation contour.

2.2.5 The intonation of "now" and the interpretation of information status

Braun and A. Chen started an investigation on how the intonation of the word "now" contributes to the resolution of scope ambiguities in British English. This

particle is often used to draw listeners' attention to something different from what has been considered so far. It has to be positioned at the beginning of a sentence. As a result of this constraint, scope ambiguities can occur (e.g., *Put the coat on the table; now put the coat on [the chair]* vs. *Put the coat on the table; now put [the comb under the chair]*; note that square brackets mark the scope of the particle "now"). Reanalysis of previous recordings has shown that the intonation of "now" depends on the intonation of the rest of the sentence. Specifically, the distributions of rising and level "now" vary according to the intonation of the referent (e.g., coat or comb).

Braun and A. Chen addressed the question of how the intonation of "now" affected the resolution of the referent. In a previous study (Annual Report 2004:148/9), eye movement data were recorded while participants followed prerecorded instructions comparable to the examples above and moved objects displayed on a computer screen. These data were recoded and analyzed in terms of the fixation proportions to the referent as a function of the intonation of "now" (which had been produced by a trained speaker as either level vs. rising), and of the information status of the referent (given vs. contrastive). The time-window of interest was from the onset of "now" to the onset of the referent. Results show that a rising "now" triggered significantly more looks to a contrastive referent than a level "now". This is explained by the difference in perceptual prominence between a level and a rising contour. The rising "now" is more prominent and triggers a stronger expectation for a contrastive referent than does a less prominent flat contour.

2.3 Lexical decoding

Work on lexical processing has examined the distinctions between different components of lexical representations, including those specifying phonological, shape, color and conceptual attributes of words. Specific projects are: an analysis of the time-course of activation of these different types of lexical representation during speech comprehension (2.3.1); a comparison of the retrieval of lexical knowledge from different sorts of stimuli (spoken words, pictures, and printed words; 2.3.2); and a study on young children's use of perceptual knowledge during word recognition (2.3.3).

2.3.1 The time-course of access to lexical information

In a series of eye-tracking experiments, McQueen and Huettig (Ghent U.) investigated the time-course of how phonological, visual-shape and semantic information accessed from spoken words is used to direct gaze towards objects in a visual display. In the first experiment, Dutch listeners heard words in neutral Dutch carrier sentences, and their eye movements to pictures on a

computer screen were monitored. Given the critical spoken word *beker*, 'beaker', for example, the display contained a phonological competitor (a beaver, *bever*), a shape competitor (a bobbin, *klos*), a semantic competitor (a fork, *vork*) and an object unrelated on all three dimensions (an umbrella, *paraplu*). Time-course differences were observed with attentional shifts to phonological competitors preceding shifts to shape and semantic competitors. In subsequent experiments the pictures were replaced with printed words (as in the study by Viebahn, see 2.1.6). Under these conditions attentional shifts were made only to the phonological competitors, both when the printed words appeared at the onset of the spoken sentence (Experiment 2) and when they appeared only 200 ms before the critical word (Experiment 3). Eye movements during language-mediated visual search depend on establishing matches between information extracted from the visual display and from the speech signal. The present results suggest that these matches are made at phonological, visual-feature and semantic levels of processing, and that attentional shifts are co-determined by the type of information in the visual display (i.e., pictures or words) and by the temporal unfolding of information in the speech signal. These results also support the hypothesis that information processing is cascaded: both in the picture-recognition system (from the visual display to visual-feature representations, followed by semantic representations and then phonological representations), and in the speech-recognition system (from the speech signal to visual-feature and semantic levels, via a phonological level of representation).

2.3.2 Semantic and phonological priming of auditory lexical decision by pictures and printed words

In a related study, Huettig and McQueen examined semantic and phonological influences of pictures and printed words on spoken-word recognition. They ran three auditory lexical-decision experiments. Auditory stimuli were preceded by picture primes (Experiments 1 and 3) or the printed names of those primes (Experiment 2). Targets were spoken Dutch words and nonwords, presented either in isolation, immediately after the primes (Experiments 1 and 2) or after a short delay, at the end of a short carrier phrase (Experiment 3). In all three experiments prime-target pairs were semantically-related words from the same category (e.g., *pijl-zwaard*, 'arrow-sword'), phonologically-related cohort competitors (e.g., *pijl-pijn*, 'arrow-pain'), or were unrelated on both dimensions. Participants were not instructed to name (or do anything else with) the primes, and strategic naming of the primes could not assist lexical decision-making (50% of all targets were nonwords and 50% of the word targets were unrelated to the primes). Semantic facilitation (faster lexical decisions on related than on

unrelated trials) was nevertheless observed in all three experiments. Phonological inhibition (slower decisions on related than on unrelated trials) was also found in all experiments. Both semantic and phonological priming effects therefore appear to be of similar magnitude for visual objects and printed words, and to be of similar size when targets immediately follow primes (as in many cross-modal priming studies) and when target presentation is delayed relative to picture onset (as in many eye-tracking studies). It appears that seeing visual objects can result in phonological inhibition even when participants are not explicitly instructed to name the objects. These results thus show that display-driven effects such as priming from visual objects must be taken into account in the design and interpretation of eye-tracking studies. Activation of lexical representations on the basis of both semantic and phonological similarity appears at least in part to be an automatic consequence of the presentation of an object in a visual display.

2.3.3 Access to color knowledge during word recognition in 3-year-olds

How do toddlers work out that bananas are called 'bananas'? Johnson and Huettig adapted the visual world paradigm to investigate how children establish the mapping between words and what they refer to. More specifically, they asked whether 36-month-olds automatically access stored perceptual knowledge, that is, stored knowledge about the typical color of a familiar object, during on-line word recognition. Toddlers' eye movements were recorded as they watched a specially designed video presented on a large-screen TV. When toddlers were presented with two familiar objects and asked to find a third familiar object that was not on the screen, they looked longer to a color-matched competitor than a distractor that did not match the typical color of the named target. For example, if they were shown a yellow cup and a blue cup and asked whether they could see the banana, they tended to fixate the yellow cup rather than the blue cup. This effect was observed despite the fact that the toddlers were given ample time to identify the objects for what they were (i.e., cups rather than bananas). These findings therefore demonstrate that color attributes are part of the content of toddlers' early lexical representations and that even young children use this knowledge during on-line word recognition to establish the mapping between words and concurrent visual objects. The present research also represents a new approach to investigate how children learn the meaning of words in infancy and early childhood.

CHAPTER 3

UTTERANCE ENCODING

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Joint research with other projects:

Decoding Continuous Speech
Multilingualism

Introduction

This is the last report of the Utterance Encoding project. The project investigated how thoughts are encoded into speech. Both single- and multiple-word utterance encoding have been central topics in the past and they were also studied in 2005. In 2005, Özdemir completed her dissertation on the relationship between speech production and speech comprehension.

3.1 Encoding single-word utterances

Over the past 15 years, a theory of the encoding of single words has been developed. This theory has been computationally implemented in the WEAVER++ model. According to the theory, words are encoded in two major steps, called lemma retrieval and word form encoding, with the encoding of word forms further divided into morphological encoding, phonological encoding (including metrical encoding), and phonetic encoding.

3.1.1 The architecture of single word encoding

Picture-word interference and other Stroop-like tasks have been important tools in studying the encoding of single words. WEAVER++ explains the interference and facilitation effects obtained with these tasks in terms of processing interactions within the language-production architecture. For example, in WEAVER++, pictures have direct access to concepts and only indirect access, via lemmas, to the forms of their names. In contrast, written words have direct access to their lemmas and word forms, and only indirect access to concepts. This architectural difference in the way pictures and words access the mental lexicon explains why distractor words interfere with picture naming, whereas distractor pictures do not influence word reading. The asymmetry in distractor effects between picture naming and word reading cannot be due to a difference in processing speed between pictures and words, because the asymmetry remains when one compensates for speed differences by manipulating the stimulus onset asynchrony (SOA) between picture and word.

WEAVER++ also provides an architectural account for asymmetries in interference effects between response modalities. For example, if the task is to indicate the direction of a left- or right-pointing arrow combined with the distractor word LEFT or RIGHT (e.g., a right-pointing arrow combined with the written word LEFT), incongruent words delay vocal responses to the arrows (say "right") compared to congruent words, but the words have almost no effect on manual left/right button-press responses to the arrows. In contrast, in responding to the word, incongruent arrows delay manual responses but they have almost no effect on vocal responses (e.g., Baldo, Shimamura, & Prinzmetal,

1998). According to WEAVER++, the asymmetry in interference effects between response modalities arises because arrows have priority access to concepts, whereas words have priority access to their sounds. Other researchers (e.g., Baldo et al., 1998) explain the asymmetries in terms of differences in processing speed. They assume, for example, that words have no effect on manual responses to arrows, because the mapping of arrows onto manual responses happens too quickly for words to have an effect. Words do affect the slower mapping of arrows onto vocal responses, explaining the asymmetry in effects between response modalities.

Roelofs examined the contribution of processing speed and architectural factors to interference effects on vocal and manual responding by manipulating the SOA between arrows and words. Participants had to name the direction of arrows while ignoring words (Experiment 1), read aloud words while ignoring arrows (Experiment 2), manually indicate the direction of arrows while ignoring words (Experiment 3), or manually respond to words while ignoring arrows (Experiment 4). Preexposed words interfered with vocally responding to arrows and preexposed arrows interfered with manually responding to words. Most importantly, preexposed words interfered with manual responses to the arrows, whereas preexposed arrows did not interfere with vocal responses to the words. These results suggest that the processing architecture rather than the processing speed is critical. The mapping of perceived words onto their sounds appears to be immune to interference from arrows, as predicted by WEAVER++. Computer simulations of the experiments using WEAVER++ showed that the model accounts for the data patterns.

3.1.2 Morpheme frequency effects in producing derivations and inflections

Bien continued her Ph.D. project on frequency effects in the production of morphologically complex words. In a monomorphemic word, the production latency of a word is smaller when the word is of high-frequency than when it is of low-frequency. In morphologically complex words, the production latency may depend on the frequency of the constituent morphemes or on the frequency of the whole word. According to the full-listing hypothesis, the forms of morphologically complex words are represented in the mental lexicon as a whole rather than in terms of the words' constituent morphemes, so only whole-word frequency should determine the production latency. In contrast, according to the decomposition hypothesis, as implemented in WEAVER++, the forms of morphologically complex words are represented in the mental lexicon in terms of the constituent morphemes, predicting frequency effects of the constituent morphemes on the production latency of the words.

In earlier studies (Annual Report 2004: 27-28), Bien, Baayen and Levelt observed frequency effects of the constituent morphemes of Dutch noun-noun compounds using factorial experimental designs. Regression analyses on all data of these experiments suggested a role for paradigmatic relations in the mental lexicon. A combination of structural measures of constituent frequencies and entropies explained significantly more variance than a strictly decompositional model. Moreover, there was a significant nonlinear effect of whole-compound frequency (Bien, Baayen, & Levelt, 2005).

Complementing the studies on compounding, Bien, Baayen and Levelt examined the effects of frequency in the two other classes of morphologically complex words: derivations and inflections. They conducted two studies, both designed for regression analyses and both using the position association learning task (Annual Report 2002:30) with learning and test phases only. For the derivations, 124 adjectives were studied, containing a verb stem plus a suffix. For the inflected words, 126 regular verbs were produced in different inflected forms. Preliminary analyses of the data suggest a replication of the structural frequency effects and a nonlinear effect of the surface frequency of the complex word.

3.1.3 Time course of metrical encoding

Schiller further investigated the time course of metrical encoding during speech production. The incremental nature of metrical stress retrieval and encoding during speech production was established in an earlier study (Schiller et al., 2006). However, the monitoring latencies from that study did not allow drawing any conclusions about the *absolute* time course of metrical encoding. Therefore, an event-related brain potentials (ERP) experiment was carried out to investigate the actual time course of lexical stress encoding in language production. Native speakers of Dutch viewed a series of pictures with bisyllabic names that were either stressed on the first or on the second syllable. The participants made go/no-go decisions about the lexical stress location of the picture names. Behavioral results replicated the pattern that was observed earlier, i.e., faster button-press latencies to initial as compared to final stress. The electrophysiological results indicated that participants could make a lexical stress decision about 70 ms earlier when picture names had initial than when they had final stress. Moreover, when word length was adjusted for, the temporal interval for lexical stress encoding specified by the current ERP results (400-500 ms window) fell into the time window identified previously for phonological encoding in language production (Indefrey & Levelt, 2004).

3.1.4 Phonological encoding and dual-task interference

What aspects of the encoding of a single word slow the performance of a concurrent, unrelated task? Using the psychological refractory period (PRP) procedure, Ferreira and Pashler (2002) obtained evidence that lemma retrieval but not phoneme selection in phonological encoding during the word planning process slows the performance of a concurrent unrelated task, whereas eye tracking evidence by Meyer, Roelofs, and Levelt (2003) suggests that phoneme selection also causes slowing. The issue was further examined by Roelofs using the PRP procedure and eye tracking. As primary task, participants named pictures in blocks of trials where they could or could not prepare in advance the initial phonemes of the picture names. As secondary task, the participants indicated manually the direction of a left- or right pointing arrow superimposed onto the pictures (Experiment 1) or presented 15 degrees away from the pictures (Experiment 2). The SOAs between picture and arrow were 0, 300, and 1000 ms.

In both experiments, facilitation of advance phoneme selection in picture naming was obtained, which was propagated into the manual response latencies at the short SOAs (0 and 300 ms) but not at the long SOA (1000 ms). Moreover, the effect of advance phoneme selection was reflected in the latencies of the gaze shifts from picture to arrow. These results suggest that phoneme selection slows the performance of a concurrent unrelated task, unlike what Ferreira and Pashler suggested.

3.2 Encoding multiple-word utterances

3.2.1 Functional decomposition of clock time naming

Sprenger, in collaboration with Van Rijn (U. Groningen), further examined the cognitive and linguistic processes that are involved in clock time naming (Annual Report 2004). Previous experiments had revealed large differences between clock time naming latencies for standard times (i.e., the five minute intervals on the clock) and nonstandard times (i.e., the minutes in-between). In addition, Sprenger and Van Rijn had replicated a distance effect that was found earlier by Meeuwissen (Annual Report 2001): The larger the distance of a target clock time to its reference point, the longer the speech onset latencies.

Sprenger and Van Rijn collected further evidence for their hypothesis that these latency differences are the result of a qualitative difference between standard times and nonstandard times. They assessed *Google*-frequencies for 960 Dutch time expressions (i.e., all minute and hour combinations, including multiple utterance formats for some parts of the clock). The results showed that standard times are much more frequent than nonstandard times (average

"Google" frequencies: 2200 vs. 260). In addition, a comparison of multiple alternative utterance formats for the time points from h:20 to h:40 showed that there are two very high frequency alternatives for both h:20 and h:40, but not for h:25 and h:35. This result supports the hypothesis that the longer speech onset latencies for the ten-minute distance compared to the five-minute distance (relative to the half hour reference point) are an effect of utterance selection competition.

In a next step, Sprenger and Van Rijn combined their data on clock time naming latencies, mental arithmetics (Annual Report 2004), and clock time frequency in a mixed effects regression model. The results showed that arithmetics and whole-form frequency, in combination with word-form frequency and distance, are important predictors for clock time naming latencies. The model fit showed that the resulting model can account for the differences in latencies between standard times and nonstandard times, as well as for the effect of distance to reference point. Based on these results, Sprenger and Van Rijn developed a dual route model of clock-time naming. According to the model, clock-time expressions can either be retrieved as fully specified chunks, or be computed on the basis of the stimulus information. Both routes involve the retrieval of a superlemma (Annual Report 1999), but they differ with respect to the extent of lemma specification (of, for example, the exact minute term).

In collaboration with Davidson (Multilingualism), Sprenger conducted an eye-tracking study on analog clock-time naming. The eyes were tracked while subjects named both standard times and nonstandard times. The gaze patterns will be analyzed with respect to utterance type and possible distance-to-reference point effects.

Time-pressure and time-correction manipulations have been employed in order to study possible speed-accuracy-fluency trade-offs. Subjects were presented with a black analog clock face on a grey background. Time pressure was induced by means of a reaction time deadline: After a fixed amount of time (e.g., 800 ms) the background color changed. Dependent on whether the subjects reacted before the deadline the display either turned green ("on time") or red ("too late"). Subjects were asked to try to meet the deadline as often as possible. In the time-correction condition, subjects had to change either the minute term or the hour term of the utterance in order to produce the "corrected" clock time. Fluency and accuracy are expected to decrease as subjects try to meet the requirements of the speech task under increasing time pressure. In addition, an interaction of these effects with correction type is predicted, showing the incremental nature of utterance formulation. First

analyses of the speech-onset latencies and accuracy rates confirmed these predictions.

3.2.2 Grammatical feature selection

Schiller, together with Costa (U. Barcelona), continued his research on the selection of grammatical features in language production (Schiller & Caramazza, 2003). Recently, it has been claimed that the retrieval of free-standing and bound morphemes in the course of language production is governed by similar processing mechanisms (Schriefers, Jescheniak, & Hantsch, 2005). However, Schiller and Caramazza (2003) were the first to argue that the processes for the selection of free-standing and bound morphemes are different, the first being subject to competition, and the second not. According to Schriefers et al. (2005), however, whenever the gender-marked element corresponds to a closed-class word and is located in initial position of the utterance, a gender congruency effect should be present, regardless of whether the gender-marking morpheme is bound or free-standing. If Schriefers et al. (2005) are correct and gender-marked closed-class words always lead to a gender congruency effect, then one should observe the effect for utterances in which the determiner form is gender-marked by means of a bound morpheme. In contrast, if gender congruency effects are restricted only to those utterance formats in which the noun's gender surfaces as a free-standing morpheme (irrespective of its grammatical category), as argued by Schiller and Caramazza (2003), then gender congruency effects should be absent for utterances in which the determiner form is gender-marked by means of a bound-morpheme. To scrutinize this issue, Schiller and Costa ran two picture-word interference experiments.

In the first experiment they tested whether or not a gender congruency effect was present in German when the noun's gender surfaces as a bound morpheme attached to a closed-class word (i.e., *ein*_{mas/neu} 'a[n]' vs. *eine*_{fem} 'a[n]') in the initial position of utterances. *Ein*_{mas,neu} and *eine*_{fem} are indefinite determiners in German, but they behave like adjectives in the sense that their inflectional paradigm is the same as for adjectives, with the -e suffix for the feminine form. Participants named objects of masculine or feminine grammatical gender using indefinite determiner NPs (e.g., *ein*_{mas} *Tisch*_{mas} 'a table' or *eine*_{fem} *Tür*_{fem} 'a door'). while a gender-congruent or a gender-incongruent distractor word was visually presented. In the second experiment, a different group of participants did exactly the same using definite determiner NPs (e.g., *der*_{mas} *Tisch*_{mas} 'the table' or *die*_{fem} *Tür*_{fem} 'the door').

Gender-congruent and gender-incongruent distractors affected the production of utterances containing gender-marked bound morphemes to the same extent in

the first experiment, whereas gender-marked free-standing determiners led to a gender-congruency effect in the second experiment. These results show that the gender-congruency effect does not depend on the specific grammatical class of the gender-marked element. What seems to be critical is whether the noun's gender surfaces as a free-standing or bound morpheme. When the noun's gender surfaces as a free-standing morpheme that corresponds to a closed-class word, gender congruency effects are observed; however, when it surfaces as a bound morpheme attached to a closed-class word, gender congruency effects are absent. It appears that the retrieval of free-standing gender-marked morphemes is subject to competitive processes, as the retrieval of any other free-standing lexical item, while the retrieval of bound morphemes is not, supporting the claims by Schiller and Caramazza (2003).

3.2.3 Explaining the distant relationship between rated grammaticality of word-order variants and corpus-based production frequency

In German, the order of argument NPs – Subject (S), Indirect Object (I), and Direct Object (O) – is relatively flexible. This does not imply, however, that all possible orders are judged as equally grammatical or acceptable. Keller (2000) observed a great deal of variation in the rated grammaticality of different argument orders in subordinate clauses of German that express the same meaning. For example, native speakers of German assign higher acceptability scores to (1) than to (2). The difference even increases when a personal pronoun plays the role of Subject, as in (3).

- (1) SIO: ...dass der Produzent dem Regisseur den Schauspieler vorschlägt
'... that the producer proposes the actor to the director'
- (2) ISO: ...dass dem Regisseur der Produzent den Schauspieler vorschlägt
- (3) ISpO: ...dass dem Regisseur er den Schauspieler vorschlägt
'... that he proposes the actor to the director'

Keller's results inspired Kempen to investigate whether grammaticality scores of argument NP orders correlate with production preferences in native speakers. More precisely, do speakers/writers use argument orders with higher grammaticality ratings more frequently than orderings that score lower in the grammaticality range? In collaboration with Harbusch (U. Koblenz-Landau), he determined the frequencies of argument orders in the same type of clauses that Keller used. As text sources served the TIGER and NEGRA-II treebanks, both containing written materials (Annual Report 2003) and the VERBMOBIL corpus for spoken language.

The frequency patterns emerging from these different sources turned out to be rather similar. Nevertheless, the grammaticality-frequency relationship was not very close. In fact, Kempen and Harbusch (2005) found a "grammaticality-frequency gap" in the midrange of the grammaticality spectrum. Each of the corpora only contained argument NP orderings in the high-grammaticality range; orders of intermediate grammaticality were scarce and did not outnumber low-grammaticality orders.

One possible explanation for the grammaticality-frequency gap was proposed by Featherston (2005), who had found similar discrepancies in other constructions of German. His proposal is based on the assumption of an explicit winner-take-all strategy during grammatical encoding. The encoder first generates multiple paraphrases (e.g., word order variants) for the meaning it aims to express, then assigns grammaticality ratings to each paraphrase, and finally selects the highest scoring one for overt expression. For instance, in order to select reliably the winning constituent order in a finite ditransitive clause, it needs to encode all six permutations of Subject, Direct Object, and Indirect Object (disregarding the verb placement options). However, this theory conflicts with the fact that speakers usually zoom in rapidly on a single way of saying what is on their mind and do not systematically encode multiple paraphrases.

Clues for a more plausible explanation of the grammaticality-frequency gap are provided by the fine-structure of Keller's (2000) grammaticality ratings. In his Optimality-theoretic model, a high proportion of the variance of the rating scores is attributed to two ordering constraints: "pronominal before full NPs", and "Subject before (in)direct objects." That is, the average grammaticality ratings depended on the left-to-right position of pronominal constituent(s) (i.e., constituents in the form of personal pronouns) and of the Subject NP. Orderings where these constituents occupied leftward positions tended to be judged as more highly grammatical than orderings with such constituents in rightward positions (Kempen & Harbusch, 2005). Sentence (3) is worse than (2) because it violates both constraints, whereas (2) violates only one of them; and in (1), no constraint is violated at all.

The phenomenon that Subject NPs and pronominal constituents tend more strongly to occupy leftward positions than other types of constituents, can be accounted for in terms of incremental sentence production: The conceptual, lexical and/or syntactic information underlying pronominal constituents and Subject NPs tends to become available earlier. This predicts, for example, that sentences (2) and (3) are unlikely outcomes of an incremental sentence generation process. Stated differently, the incremental nature of the

grammatical encoding process predisposes speakers to produce utterances that (near-) optimally realize the two ordering constraints. Crucially, this suffices to explain the absence from the corpora of argument orders in the midrange of the grammaticality spectrum, such as (2) and (3) (and *a fortiori* of low-grammaticality versions). No additional assumptions, e.g., an explicit winner-take-all strategy or parallel computation of multiple paraphrases, are needed.

Which criterion did Keller's informants use as basis for their ratings? One possibility is that they judged the similarity between the to-be-rated constituent order and the – presumably self-generated – variant(s) that would be optimal from the point of view of incremental generation. Orders of midrange grammaticality meet this criterion more closely than orders in the low range although, as explained above, they are not more frequent. Hence, the grammaticality-frequency gap.

CHAPTER 4

MULTIMODAL INTERACTION

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Joint research with other projects:

Space

Introduction

Research within the Multimodal Interaction project focuses on language in its natural home, conversational interaction. This brings new perspectives to key psycholinguistic questions, in language production and comprehension as well as the process of first language acquisition. Two key issues in the production and interpretation of an utterance are its *formulation* (i.e., which words, constructions, or other kinds of signals are selected to convey the intended communicative meaning) and its *placement* (i.e., at what precise point in time it occurs, and in what order relative to what else is going on in the interaction). These two problems are central to the questions posed in this project. Another important distinction is between interactants' attention to problems of informational alignment, on the one hand (i.e., to converge on common referential understanding at any given point in a discourse), and to problems of social affiliation, on the other (i.e., to express an appropriate type and degree of agreement or social bondedness). Methodologically, most of the work involves the collection and analysis of video recordings of spontaneous interaction, both in natural settings (as gathered in ethnographic field work) and experimental settings.

4.1 Person reference

When referring to persons, speakers can choose from a range of possible formulations – *John, your husband, that guy over there, his majesty*, etc. Despite volumes of philosophical, linguistic, and psychological research on problems of linguistic reference, little work has been done on the formulation of references to persons in actual interaction. In connection with a workshop on this topic (see Chapter 13.2), project members conducted language-specific and crosslinguistic investigations of how speakers refer to other people in casual conversation across 5 languages: Tzeltal (P. Brown), Lao (Enfield), Yélf Dnye (Levinson), Kilivila (Senft), and English (Stivers). Using video recorded corpora of spontaneous conversation, project members identified instances of person reference and analyzed their formal and functional properties. The most general question addressed was whether there are principles of language usage (or social interaction more generally) that transcend culture-specific uses of language. Person reference is a good test domain, since it occurs in all cultures, yet there is evidence of substantial variation. The studies done in this project collectively suggest a balance between universal interaction principles and culture-specific or locally organized interaction principles.

A first finding of comparative work in support of universal interaction principles is the discovery that patterns found in earlier work on English appear to have

broader crosslinguistic applicability. These are preferences for 1) achieving recognition through the use of person-referring expressions and 2) using only one referring expression if possible (minimization). Additionally, the studies identified a third principle, of person-affiliation, by which speakers attempt to connect referents as closely as possible to the interaction in progress, often explicitly linking the referent to either the speaker or hearer (e.g., *my sister*, *your grandmother*) or to someone else known (e.g., *Katy's sister*).

A second type of universal principle supported by this comparative work is a distinction between pragmatically marked vs. pragmatically unmarked types of person reference formulation, with consequences for pragmatic interpretation. In each of the languages examined, certain types of formulation are standard for particular contexts, and are thus used to achieve reference in the simplest way. Departures from these standard manners of formulation generally enable speakers to perform other tasks in social communication besides simply making reference. For example, Stivers discovered patterns in English conversation whereby speakers can convey that they are complaining even before a complaint is otherwise articulated (e.g., *that next door neighbor we got there* at the beginning of a complaint about neighborhood noise), or can mobilize assistance in a request for help (e.g., *the birthday boy* in a request that someone go and pick him up).

The comparative studies also revealed cultural differences. While the strategy of using marked formulations of person reference to signal special social action was a strategy observed in all language settings, the specific social actions performed by these marked cases differed, reflecting cultural differences. In contrast to the English examples just described, Levinson observed the exploitation of departures from the unmarked forms of person reference on Rossel Island to deal with motivations of circumspection (for political or other reasons) and name avoidance (for reasons of taboo).

A second site of cultural difference in person reference concerns the use of names. Several of our studies agreed with earlier work on English, where bare personal names are the preferred form of person reference. However, data from Tzeltal and Lao show that this is not universal. Default referring expressions in informal village talk in these languages incorporate a kinship term (as in Tzeltal where this accounted for 70% of referring expressions), or a title plus name (as in Lao, where title marks social hierarchical relations, including classificatory kinship). In the Lao case, the standard use of explicit marking of hierarchical social relations (whereby a child whose name is *Seng* will be standardly referred to as "the-non-respected-Seng") implies that despite being pragmatically

marked, some types of person reference formulation may nevertheless have socially consequential meanings, semantically expressing culture-specific values of social organization.

A third observed type of variation concerns the way in which the preferences of person reference formulation are ranked relative to each other. A previous study of English showed that interactants typically privilege achieving recognition over using a single form (recognition over minimization; *Laura, the club president* versus *Laura*). This was generally supported crosslinguistically by our studies. However with the addition of a third principle, person-affiliation (i.e., affiliate the referent to a conversational interactant if possible: *Your daughter* versus *Sally*), the question of relative ranking needs to be reconsidered. In English, the preference for person-affiliation is virtually invisible in recognitional reference (though preliminary work suggests it is visible in nonrecognitional reference), and thus the order of preference appears to be such that recognition trumps both other preferences, and the preference for minimization is further prioritized over the preference for person-affiliation. By contrast, in Tzeltal, P. Brown shows that the preference for person-affiliation is prioritized over the preference for minimization. Thus, in Tzeltal, if recognition can be achieved with a single referring expression, and the expression is an affiliating form, then the preference for minimization is also observed (the preferences have not come into conflict). But if recognition cannot be achieved with a single referring expression that links the referent in some way, then the data suggest that interactants will add a name or some other referring expression (e.g., "your sister Xun") but will not simply use "Xun" even if that would enable immediate recognition. The preference for person-affiliation is stronger in Tzeltal than the preference for minimization though in all cases the preference for recognition receives the highest priority.

Finally, it was observed that across multiple languages people often made use of gesture in person-referring expressions. For instance, in Yéíí Dnye, Tzeltal, Kilivila and Lao, people were observed to make use of points to an individual's home base when referring to the individual verbally.

4.2 Feedback

Subproject work on feedback in interaction continued (see Annual Report 2004). While the speaker is naturally a key focus of research in language production, the activities of listeners are an important part of the speech production process. When a speaker is producing an extended turn at talk (e.g., giving a narrative), listeners produce audible and visible signals of reciprocity, making significant contributions to the collaborative construction of interactional sequences.

4.2.1 Response tokens in Dutch

Using the large multimodal route negotiation corpus collected in the SLOT laboratory (Annual Report 2002), de Ruiter did a study on the use of the Dutch response tokens "ja" and "hm-hm". In conversation, these two tokens can have two different functions. One is *confirmation*:

A: Gaan we hier linksaf? [Eng: are we going left here?]

B: Hm-hm

The other use of these tokens is as a *continuer* (Schegloff, 1982)

A: En dan gaan we hierheen [Eng: and then we go this way]

B: Ja

A: en dan naar links [Eng: and then left]

B: Hm-hm

A: en dan weer naar links [Eng: and then left again]

De Ruiter found that the two uses of these tokens can often be distinguished by their intonation. A low-high pitch contour indicates use as a continuer, whereas a flat pitch contour is correlated with the use as confirmation.

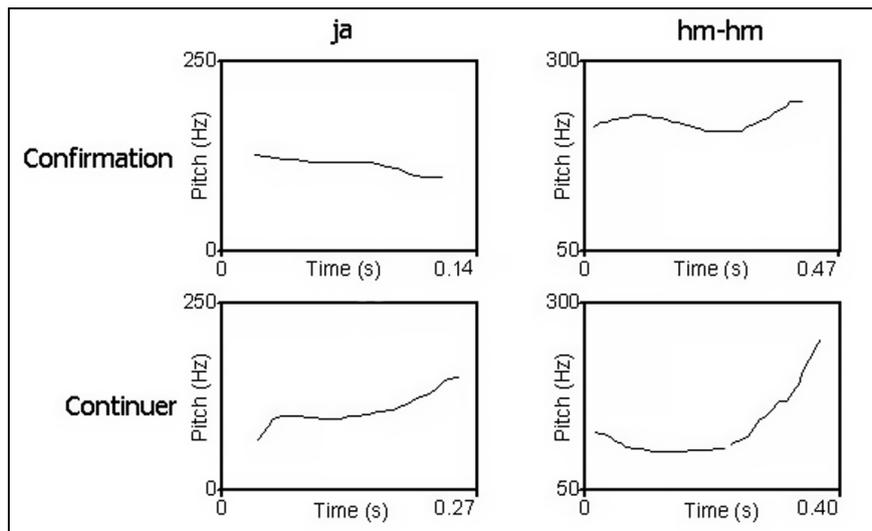


Figure 4.1. Pitch contour of response tokens in different contexts.

Furthermore, a comparison between the continuer uses of "ja" and "hm-hm" revealed that if route description was made more difficult, by preventing the subjects from using a shared whiteboard to draw routes on a common map, the frequency of the continuer "ja" became much higher than that of the continuer "hm-hm", suggesting that "ja" commits the utterer to a stronger shared understanding than "hm-hm".

4.2.2 Nodding

Nodding is often regarded as a visible version of vocal continuers such as "Uh huh" and "Mm hm." Stivers examined nodding during story telling in spontaneous American English conversations. She found that whereas vocal continuers convey alignment (convergence in referential/structural understanding of the discourse or activity structure) with the story telling activity, nods convey preliminary affiliation (interpersonal agreement or common identification in stance) with the teller and his/her stance towards what he/she is telling about.

Nods were most common at points in story tellings when the teller had offered some insight into their own stance towards the telling (as, for example, funny or ridiculous or frustrating). This insight was at times provided through explicit statements of stance such as "It was so frustrating" but was also commonly provided through more subtle word choice, laughter, facial expression, etc. In these environments, if a recipient offered only "mm hm" or "uh huh", story tellers treated them as *not* affiliating with them and might pursue their affiliation. In contrast, in these environments if a recipient nodded, speakers treated them as having satisfactorily affiliated and would move on to the next element in their story.

Further, the study found that nods are *preliminary* affiliation tokens and do not convey affiliation in all positions. Supporting evidence for this is that they generally occur in the middle of tellings, and when nods are offered at possible story completions, story recipients treat nods as inadequately affiliative, even to the point of being disaffiliative.

4.3 Turn/sequence organization

A key problem for people to solve in conversation and similar types of interaction is that of jointly building an effectively linear discourse structure. Problems of turn-taking and sequence organization in conversation have long been central to the analysis of conversational interaction. This project is contributing with new methodologies and special attention to the multimodal nature of talk in interaction.

4.3.1 Projection of turn completion points in Dutch conversation

De Ruiter, Mitterer and Enfield analyzed more than 1500 turn transitions from recorded Dutch conversations. In Figure 4.2, the distribution of the temporal offset of speaker transitions is shown.

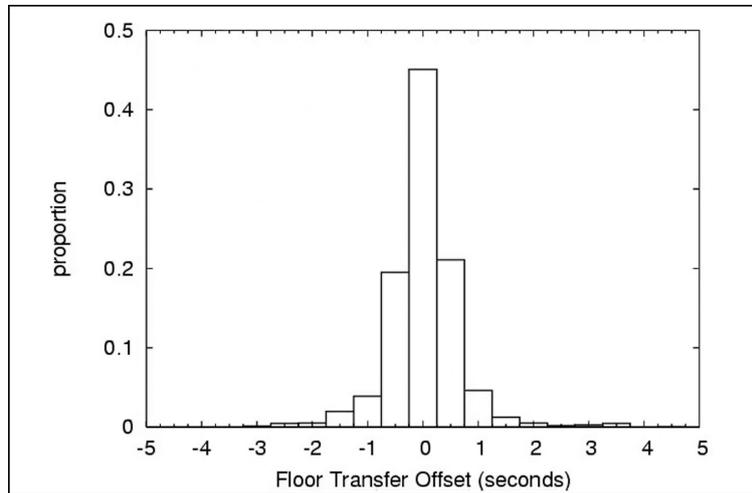


Figure 4.2. Floor Transfer Offset distribution of 1521 speaker transitions in Dutch conversation.

Negative values of Floor Transfer Offset indicate the amount of overlap between two successive turns, and positive values a gap (silence) between the turns. The generally precise timing of listeners' transitions to being speakers is evidence that they can predict the end of the current speaker's turn with great accuracy. This high accuracy in natural projection has been noted elsewhere, some authors suggesting that it is achieved via lexico-syntactic cues, others arguing that it is based on intonational contours. De Ruiter, Mitterer and Enfield tested these hypotheses in an on-line experiment, manipulating the presence of symbolic (lexico-syntactic) content, and intonational contour of utterances recorded in natural conversations. The subjects were asked to press a button at the moment they anticipated that the recorded speaker's turn at speaking would end. It was found that when hearing the original recordings, subjects could anticipate turn endings with the same degree of accuracy attested in real conversation. With intonational contour entirely removed (leaving intact words and syntax, with a completely flat pitch), there is no change in subjects' accuracy of end-of-turn projection. But in the opposite case (with original intonational contour intact, but with no recognizable words), subjects' performance deteriorates significantly. These results establish that the symbolic (i.e., lexico-syntactic) content of an utterance is necessary (and possibly sufficient) for projecting the moment of its completion, and thus for regulating conversational turn-taking. By contrast, and perhaps surprisingly, intonational contour is neither necessary nor sufficient for end-of-turn projection.

4.3.2 Eye gaze behavior in Italian conversation

Rossano continued his research on the organization of gaze behavior in conversation.



Figure 4.3. Two views of the same conversation, filmed with two cameras to capture gaze behavior of both speakers.

Previous research (Kendon 1967, Goodwin 1980) has claimed that gaze is organized at the level of the conversational "turn". Relying mainly on dyadic ordinary Italian conversations, Rossano found that gaze withdrawal after sustained mutual gaze is organized at the sequential level and not at the turn level. Investigation of the moment when people withdraw from mutual gaze, i.e., when people look down after they have been looking at each other's eyes, reveals that the appropriate unit is the "sequence of actions" (e.g., a request followed by a granting of the request, a farewell followed by another farewell). If there is sustained mutual gaze during a question-answer sequence and both participants look away from each other before entering the silence that follows the answer, then the sequence is treated as complete, and what follows is a new sequence of actions. If, instead, both or at least one of them keeps looking during the silence that follows the answer, then the one who maintains the gaze is treating the sequence as incomplete and if the other perceives this, what usually follows is an expansion of the sequence (e.g., okay, sure, that's wonderful, are you sure?, etc). Participants will then coordinate a disengagement from mutual gaze around the next sequential boundary (e.g., the end of the first expansion of the sequence). Gaze behavior at sequential boundaries thus reveals a systematic and visible way of making a bid for sequential closure (similar to Schegloff and Sacks' 1973 findings regarding phone calls).

4.4 Questions and responses

Questions and their responses constitute a classic type of "adjacency pair", a collaboratively produced communicative structure in which a first action makes relevant a quite specific kind of next action by another interactant. Ongoing research on this topic within the project is intensifying, with new comparative research towards a workshop to be staged in 2006.

4.4.1 Doctors' questions addressed to children in pediatric encounters

It is generally agreed that children learn substantially about language use and social roles through interaction. Stivers and Majid examined pediatrician-parent-child interactions in Los Angeles, USA, to see when doctors directly engaged children (vs. parents) in question-answer sequences. Approximately 6500 questions that doctors asked were coded along nine dimensions including who they were directed to and what they were about.

The questions commonly posed by doctors to children fall within particular topics: why the child is visiting the doctor, social questions (e.g., how old they were or what they got for their birthday), whether they were ready to be examined, and about what hurt, etc. Using a mixed effects regression model, Stivers and Majid found that direct selection by doctors of children to answer questions was more likely as the children grew older, if the topic was one that doctors viewed as a "child topic", if the parents had more education, and if the father was present.

Doctors were less likely to select a child to answer a question if the family was African-American. There was no association between the child being selected and doctor-parent racial congruence, parent age, or other parent races. Thus, children of socio-economically disadvantaged families by race or education; mostly Latino and Black children) will be less likely to receive the beneficial interaction with physicians that could help them acquire competence in the patient social role.

4.4.2 Hai||om questions

Hoymann continued her Ph.D. research on the endangered language Hai||om, a Khoisan language spoken in Namibia. This research is conducted within the ≠Akhoe Hai||om project of the DoBeS program, funded by the Volkswagen Foundation, documenting the language and cultural practices of a small community in northern Namibia. Hoymann's main focus is on the interrogative system of Hai||om. During a four month fieldwork trip she conducted several tasks with the aim of eliciting questions in conversation. Most of these tasks were adaptations of several existing field protocols, including the MPI Staged

Events stimuli, the Mouse films and the Frog Story. Informants were asked to watch the video clips or look at the book in pairs, and talk about them, without the researcher being present. The informants were also paired up and given Lego blocks and building plans to complete. There were numerous question-answer sequences in the recorded conversations. Many of these experiments were transcribed and translated and are now being analyzed. To complement the experimental data, additional natural conversational data was collected, transcribed and translated.

4.5 JAST (Joint Action Science and Technology)

The Multimodal Interaction project is a partner in the European Union Integrated Project JAST (Joint Action Science and Technology). The project runs from 2005 through 2008. The goal is to build autonomous robots that are able to collaborate with one another and with humans. Partners in the project are NICI (Radboud U. Nijmegen), F.C. Donders Center for Cognitive Neuroimaging (Radboud U. Nijmegen), Technical U. Munich, U. Edinburgh, U. de Minho (Portugal), MPI for Biological Cybernetics Tübingen, and the Technical U. Athens. De Rooter leads the work package on "Dialogue in Joint Action", a collaborative project with U. Edinburgh. In collaboration with NICI, de Rooter and Weijers collected naturalistic data in which participants constructed toys together (see Figure 4.4), to study actions that require mutual collaboration such as giving, receiving, showing, pointing and placement.

In addition, a computerized experimental platform has been developed in which two participants have to construct two-dimensional objects together in a shared virtual workspace. The computerized environment substantially reduces the need for human coders, as most of the constructive actions can be coded automatically by the experimental software.

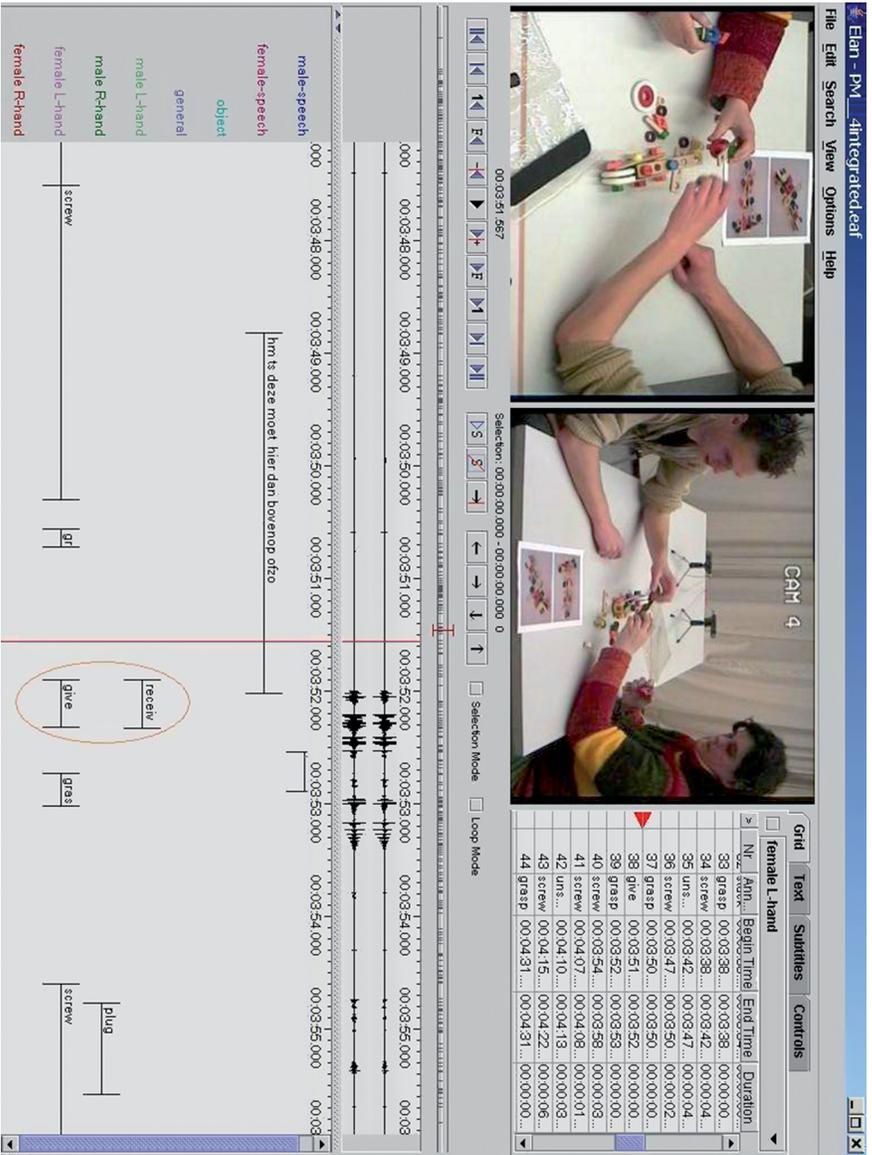


Figure 4.4. Example of a joint action from a toy construction session, annotated using ELAN: The woman is giving an object, the man is receiving the object.

4.6 Infant interaction

P. Brown continued a comparison of infant-caregiver interaction based on ethnographic video-recordings in two field sites: Tenejapa, Mexico (Tzeltal Mayan) and Rossel Island, Papua New Guinea (Yélf Dnye); see Figure 4.5. The focus is on infants of 9-12 months, a period during which claimed universals in the development of joint attention (in particular, index-finger pointing) reliably appear in western infants. The two nonwestern societies of this study are both small-scale traditional societies, with people living in extended households, children having multiple caregivers (and frequently, child caregivers), and where multiparty interactions are the norm. Yet there are strong differences in interaction style with 9-12-month-old infants. In Tzeltal, infants of this age are physically restrained (e.g., carried on a caretaker's back in a shawl, or held on a caretaker's lap), have a quite restricted interactional space and few interlocutors, there is generally nonresponsiveness to infants' preverbal "utterances", little scaffolding (i.e., explicit support whereby children can extend current abilities), and low interaction density. In Rossel, the contrast could hardly be greater: there is much greater physical freedom for infants, a large interactional space, many interlocutors, great responsiveness to infant "utterances", ample scaffolding, and high interaction density. Quantitative measures reflect these differences. Rossel infants initiate interaction only slightly more than Tzeltal infants, but Rossel caregivers initiate interaction with infants more than 3 times more often on average than Tzeltal caregivers. However, looking at particular kinds of child-initiated actions (showing, reaching, pointing to objects), it was found that in both cultures, children at the expected age (9-12 months) can be seen to do these actions, suggesting that the Rossel hyperactivity of interaction with infants does not result in earlier attunedness to joint attention (the "referential triangle") than in Tzeltal.



Figure 4.5 Twelve-month-old children initiating joint attention by index-finger pointing (left, Rossel Island, Papua New Guinea; right, Tenejapa, Mexico).

4.7 Multimodality – Arandic sand drawing

Green visited the MPI Nijmegen for three months from November 2005, in the initial stages of her Ph.D. candidature with U. Melbourne. While at the MPI she developed technical and conceptual aspects of her research proposal in collaboration with members of both the Multimodal Interaction group and the Sign Language Typology group. The performance of the Arandic story-telling genre known as *tyepety* is multimodal to its core – a traditional form in which co-speech graphics form an essential part of a composite utterance. The word *tyepety* has a range of meanings including 1. women's painting, body paint or ceremonial designs and 2. a story that is told by drawing designs on the ground. To paint someone up, or paint or draw a ceremonial design is *tyepety-wem* (*wem* 'throw'), and to tell a story by drawing on the ground is *tyepety-ilem* (*ilem* 'tell'). A narrator of *tyepety* uses a range of verbal and visual elements including speech, sign, gesture and graphic representation in sequence and in unison, yet little is known of how this complexity is woven into an integrated whole. The primary aim of the project is to video-record performances of *tyepety* narrative in Arandic languages, with a view to analyzing the interplay of the various semiotic systems and the different combinations of modalities that are possible within these systems. Particular attention is being paid to the ethnographic context of such performances, including aspects of these stories which express Arandic kin relations.

CHAPTER 5

SPACE

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Joint research with other projects:

Event Representation
Sign Language Typology

Introduction

The Space project is concerned with how spatial distinctions are represented in cognition, how they are encoded in language, and the relation between these. The first section reports on progress in the neurocognition side of the project. The next section reports further neurocognitive research on the temporal integration of spatial semantic information from speech and gesture. The third section reports on the use of sign space in Kata Kolok, an indigenous sign language used in northern Bali. The last section reports results of research on landscape terms and place terms in eleven languages and cultures.

5.1 Space in Neurocognition (SpiN)

The SpiN research group (Janzen, Haun, with Levinson, Levelt, Van Turenout, and Hagoort) examined the neural basis of spatial memory and spatial language.

Janzen and Van Turenout continued their work on human object location memory. Two previous functional Magnetic Resonance Imaging (fMRI) studies (using the facilities of the F.C. Donders Centre for Cognitive Neuroimaging) (Janzen & Van Turenout 2004, Janzen, Wagensveld, & Van Turenout submitted) showed that the human brain automatically distinguishes between landmarks placed at navigationally relevant (decision points) and irrelevant locations (nondecision points). This selective neural representation of navigationally relevant objects in bilateral parahippocampal gyrus is already stable after only one exposure to a maze and is long-lasting. It has also been shown that the medial temporal lobe including the hippocampus and the parahippocampal gyrus is crucially involved in the process of memory consolidation (Alvarez & Squire 1994, Walker 2005). In the present event-related fMRI experiment, Janzen and Van Turenout investigated memory consolidation of navigationally relevant landmarks in the medial temporal lobe after route learning.

Sixteen right-handed paid volunteers (8 male, 8 female) participated in the experiment. Participants viewed two film sequences through a virtual museum with objects placed at locations that were relevant (decision points) or irrelevant (nondecision points) for navigation. To investigate consolidation effects, one film sequence was seen the evening before scanning, the other one was seen the following morning, directly before scanning. Event-related functional magnetic resonance data of the whole brain were acquired on a 3 Tesla MRI system (Siemens) during recognition of the objects in isolation. All objects were shown from a canonical perspective on a white background. After scanning,

participants answered standardized questions about their navigational skills (the Santa Barbara Sense of Direction (SBSOD) scale). Based on their scores, participants were divided into two equal groups of good and bad navigators.

Consistent with previous results, neural activity in the parahippocampal gyrus reflected the navigational relevance of an object's location. Parahippocampal responses were selectively increased for objects that occurred at decision points. In addition, a general effect of consolidation was obtained in the left hippocampus: objects from the maze that were seen in the evening before scanning elicited more activity than objects seen directly before scanning. This effect interacted with navigational ability. Increased activity in bilateral hippocampus for objects seen in the evening was observed in good navigators only. Bad navigators showed decreased activity in this region (see Figure 5.1).

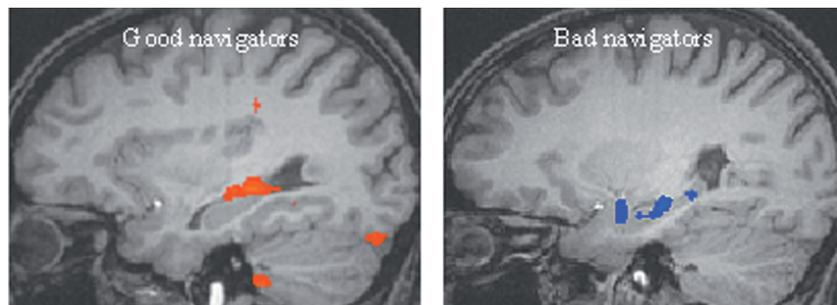


Figure 5.1: Increased activity (red) and decreased activity (blue) in the right hippocampus of good and bad navigators for objects seen in the evening as compared to objects seen in the morning.

Besides this general effect of memory consolidation, a specific effect of consolidation of navigationally relevant objects was observed in the parahippocampal gyrus. Decision point objects seen the evening before scanning induced increased activity in bilateral parahippocampal gyrus, as compared to decision point objects seen directly before scanning. Again, this effect was observed in good navigators only. The results provide evidence for a contribution of memory consolidation to successful navigation. This efficient connection between general memory and navigational abilities is supported by findings that show better representation of places and views in good navigators (Epstein, Higgins, & Thompson-Schill 2005).

In a second behavioral experiment, Janzen and Van Turenout investigated the changes in the representation if the same object appears more than once in locations with different and identical navigational relevance. The same objects

appeared at a decision point and afterwards at a nondecision point (dp_ndp) or vice versa (ndp_dp). The same object could also appear twice at two different nondecision points (ndp_ndp) or at two different decision points (dp_dp). Twenty-six participants (13 male, 13 female) walked themselves through a complex virtual maze by pressing a key. Afterwards, they performed a simple object recognition task and decided whether they had seen the objects in the maze (see Figure 5.2).

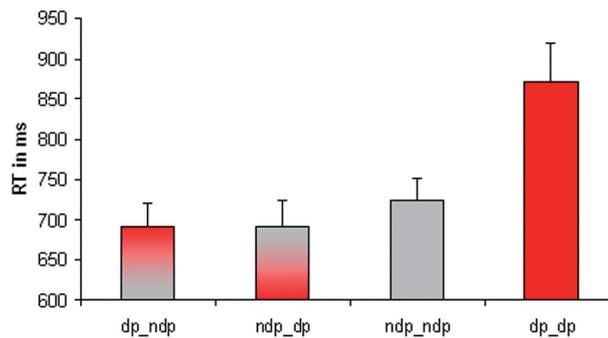


Figure 5.2: Mean response times (RT) and standard errors for the four conditions.

The response times show that the recognition advantage remains if the same object is placed at a decision and a nondecision point. In contrast, an object loses the ability to facilitate recognition if it is placed at two different decision points. The results provide evidence for a special dedicated mechanism underlying successful navigation.

The SpiN project also has a sustained interest in the role of language and culture in spatial cognition. In 2004, Haun established a research collaboration with the Wolfgang Koehler Primate Research Center in Leipzig, Germany. By comparing great apes to infants and adults of different cultures, the SpiN project hopes to shed new light on basic conceptual categories of human cognition and their adaptation through language and culture.

Haun in collaboration with Call (MPI for Evolutionary Anthropology, Leipzig) compared prelinguistic human infants (12-13 months) and children who produce language (36 months), with great apes, who are equal to humans in their spatial abilities, yet lack language. The general spatial cognitive abilities of apes are closer to those of children who produce language. So, if apes and prelinguistic infants solve a particular spatial task in the same way, but differently from older children, the performance of the older children can be

attributed to the effects of language (and related human enculturation) rather than general cognitive development. Subjects were tested for preferences between two central strategies to remember object–location: using features of the container in which they were placed ("object feature strategy") vs. using the location of the container ("place strategy") (see Figure 5.3). The results show that all great ape species primarily use place, as do prelinguistic human infants, thereby identifying a shared cognitive preference throughout the phylogenetic family. After learning language, children switch to an object feature strategy. This is consistent with the claim that language and culture can change the mode of operation in spatial cognition.



Figure 5.3: Orangutan and human infant in the place vs. feature task.

The impact of language and culture on inherited cognitive predispositions was tested in a second set of experiments by Haun in collaboration with Rapold (MPI Nijmegen and Leiden U.) and Call (MPI for Evolutionary Anthropology, Leipzig). A spatial relational learning paradigm was devised in which participants from two different cultures had to learn contingencies between a spatial array on one table and the same array on a second table rotated at an angle of 180 degrees (for example, a target hidden under a cup on table 1 would also be under a cup at a similar location on table 2). Speakers could identify the location of the hidden target on table 2 using either a body-centered (Relative) or an environmental (Absolute) Frame of Reference ("FoR", see Annual Report 2004). For example, if the target was identified by the speaker as being under the right-hand cup on table 1, he might look for a target under the right-hand cup on table 2 (Relative strategy). Alternatively, if the target was identified by the speaker as being under the "western" cup, he would look for the target under

the "western" cup on table 2 (Absolute strategy). The two cultures were Dutch, a typical western-European, post-industrial culture, and ≠Akhoe Hai||om, a Khoisan hunter-gatherer community in Namibia. Dutch speakers predominantly use Relative spatial relational descriptions. Cardinal directions are sometimes used for large-scale spatial reference ("Amsterdam is north of The Hague") but never for tabletop space. In ≠Akhoe Hai||om speakers we find the opposite pattern. They mainly employ an Absolute spatial reference system and rarely use a Relative system with left-right-front-behind terms.

Findings from a nonlinguistic spatial memory task reveal that cognitive preference varies between these two populations consistent with the parallel variation in spatial relational language. Data from all great ape species tested with the same paradigm reveal a common preference for non-Relative over Relative strategies across all great ape species. Our results suggest that humans inherit a phylogenetic bias for non-Relative spatial thinking, which language and culture can either reinforce or override.

5.2 Temporal integration of spatial semantic information

Özyürek, together with Hagoort and Willems from the F.C. Donders Centre started an NWO funded project that investigates how the interpretation of language (specifically, semantic information about space) is influenced by information from gestures (which represent certain aspects of spatial relations) in a series of ERP and fMRI studies. Last year, the fMRI results were reported (see Annual Report 2004). This year, ERP data were gathered using the same experimental design as in the fMRI experiment. The question was whether information from gesture is integrated into the context provided by the prior sentence during comprehension in the same way that words are, as measured by the timing and the amplitude of the ERP signal.

Subjects (n=16) viewed iconic gestures that depicted motion events accompanying sentences. Each sentence contained a *critical verb* that either matched previous sentence context or did not match it. Gestures were time locked to the critical verb and they also either did or did not match the previous sentence context. This resulted in 4 experimental conditions (exemplified in Figure 5.4). In one condition (Control), both critical verb and gesture matched the previous context (Double Match condition). Three conditions were contrasted to the Control condition: a) Language Mismatch condition: gestural information matched the previous context of the utterance but the critical verb did not, b) Gesture Mismatch condition: the critical verb matched the previous context of the utterance but the gesture did not, c) Double Mismatch condition: neither the critical verb nor the gesture matched previous sentence context.

<p><i>Control condition</i></p> <p>He slides on the roof and [rolls down] (Gesture: ROLL DOWN)</p> <p><i>Language Mismatch to previous context:</i></p> <p>He slides on the roof and [knocks] at the door (Gesture: ROLL DOWN)</p> <p><i>Gesture Mismatch to previous context:</i></p> <p>He slides on the roof and [rolls down] (Gesture: KNOCK)</p> <p><i>Double Mismatch to previous context:</i></p> <p>He slides on the roof and [knocks] at the door (Gesture: KNOCK)</p>

Figure 5.4: Examples showing speech-gesture pairs used in 4 conditions.

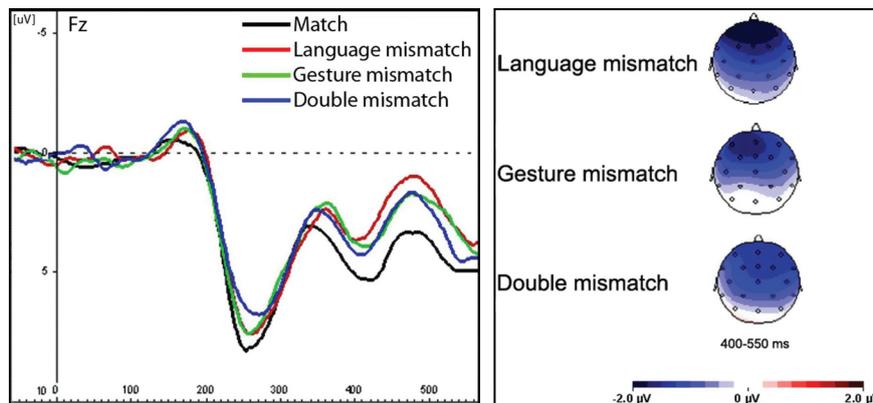


Figure 5.5: ERP waveforms (a) and scalp distributions (b) for all the conditions.

The results (see Figure 5.5a) show that an N400 effect was observed for all mismatch conditions. The onset latencies and amplitudes of these effects did not differ significantly from each other. Furthermore all the effects have anterior scalp distributions (see Figure 5.5b) which are highly similar among the mismatch conditions, suggesting a common neural source.

These findings reveal that the brain integrates semantic information from speech and gesture with the context provided by the previous sentence at the same time and in a similar manner in spite of differences in the modality. These results are in line with previous results reported using fMRI which show that the same brain area, that is Broca's area (BA45), is activated when either speech or gesture information does not match the previous context.

5.3 The use of sign space in Kata Kolok

Kata Kolok (lit. "deaf language") is the indigenous sign language used in a village in northern Bali where there has been a high incidence of hereditary deafness over the past several hundred years. Both deaf and hearing people alike communicate in the sign language which shows a number of typologically exceptional structural features, in particular with respect to the use of the sign space. Two prominent features that Zeshan and Marsaja investigated in 2005 are the relative absence of metaphorical uses of the sign space, and the use of an absolute spatial reference system.

5.3.1 Topographical and metaphorical uses of the sign space

Sign languages in urban communities around the world use the sign space (that is, the space around the torso that is conventionally used for signing) in two principal ways: for talking about space, and for expressing nonspatial concepts. Using sign space to talk about spatial relationships is, as far as we know, universal in sign languages and is referred to as the "topographical" use of space. This involves, for instance, placing the hands in sign space to indicate the location of a referent, or moving the hands to indicate that a referent moved from A to B.

The second use of the sign space is metaphorical in that space is used to talk about nonspatial concepts. For instance, space is used to talk about time by establishing a metaphorical "time line" that typically indicates the past behind the body and the future in front of the body. The sign space is also used to indicate the subject and object of a transitive verb through the movement direction of the sign. Thus if the signer is helping someone else, the hand moves away from the signer, but if it is someone else who is helping the signer, the hand moves toward the signer. The sign space can also be used for expressing logical relationships between referents, for example indicating a logical contrast by setting up the two contrasting referents on opposite sides of the sign space.

Kata Kolok is exceptional and differs from all documented urban sign languages in that metaphorical uses of the sign space are lacking. Kata Kolok signers do not use a time line, do not have transitive verbs with directional movements, and do not use the sign space to express logical contrasts.

5.3.2 Absolute spatial reference system

Kata Kolok signers make use of absolute directions in their signing in a number of ways. Interestingly, this feature is shared with the spoken Balinese culture in that spoken Balinese also uses terms of absolute spatial direction in language and gesture. Uses of absolute spatial reference in Kata Kolok occur at the level of individual signs, for time reference, with index pointing, and more generally in the spatial set-up of discourses.

At the level of individual signs, some signs obligatorily require reference to an absolute cardinal direction. For example, the sign for MORNING must be signed with the hand positioned in an easterly direction. No matter which way the signer is facing, the movement of the sign MORNING always has to come from the east. Similarly, Kata Kolok signers indicate the time of day by pointing to the sky and following the course of the sun. Pointing diagonally upwards in an eastern direction indicates 10 a.m., slightly towards the west but more steeply upwards indicates 3 p.m., and so forth.

Users of all sign languages set up discourse referents (places, persons, etc.) in sign space. However, for urban signers the locations of these referents are largely arbitrary, whereas Kata Kolok signers almost always set up discourse referents in correspondence with absolute real-world locations. A common way of indicating the position of a discourse referent in sign space is by index finger pointing, which can also be used to refer back to the referent later on, similar to the use of pronouns in spoken languages. When Kata Kolok signers talk about persons, they usually point to the real-world location of the person's home, and this can happen with reference to animals, too. Places are referred to by pointing to the absolute direction where the place is located; thus, Kata Kolok has very few signs for place names, since places are uniquely identified by pointing to the direction of their real-world locations.

5.4 Landscape terms and place names

Research continued in the Landscape subproject, which deals with the linguistic and conceptual categorization of the geophysical environment, as reflected in landscape terms and place names. Several project members collected field data from a range of diverse languages around the world (see Table 5.1). A central issue under investigation is which factors drive the formation of categories, e.g., natural salience and ecology, human use and activity, or cultural models and beliefs. Our work shows that the balance of these factors can differ greatly within and across languages.

RESEARCHER	LANGUAGE
Penelope Brown	Tzeltal
Niclas Burenhult	Jahai
Gaby Cablitz	Marquesan
Michael Dunn	Touo
Nick Enfield	Lao
Alice Gaby	Kuuk Thaayorre
Loretta O'Connor	Lowland Chontal
Stephen Levinson	Yéli Dnye
Carolyn O'Meara	Seri
Gunter Senft	Kilivila
Thomas Widlok	≠ Akhoe Hai om

Table 5.1: Researchers and languages in the *Landscape subproject*.

Our previous research has shown that languages differ as to how presumed basic and salient landscape concepts are "carved out" and segmented, like "river" and "mountain" (see Annual Report 2002). New work shows that not even languages spoken in the same ecology categorize their environment in the same way. For example, Yéli Dnye (work by Levinson) and Kilivila (work by Senft), two languages spoken in Island Melanesia, categorize parts of the sea in very different ways. Kilivila has a distinct label referring to the area of sea between the beach and the inner reef (the lagoon). Yéli Dnye does not have a corresponding term, but divides the same area into finer categories encoding features like depth, puntability and muddiness. Also, Kilivila has a specific term for the area of sea between the inner and outer reef, which does not have a corresponding term in Yéli Dnye (see Figure 5.6).

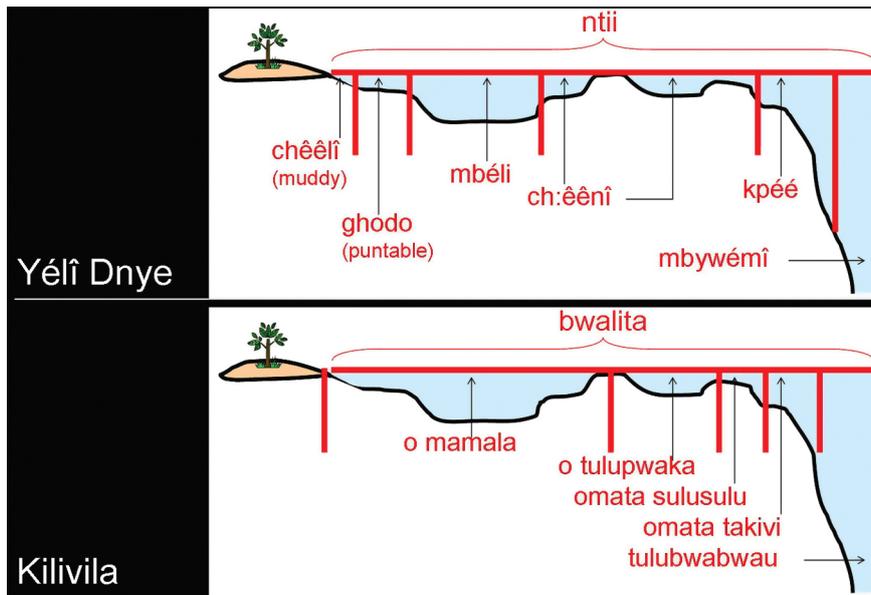


Figure 5.6: A comparison of categorizations of the sea in relation to the contour of the ocean floor in Yéli Dnye and Kilivila, two languages spoken in similar ecologies in Melanesia.

Our research has also shown that some languages categorize and map landscape by means of predefined models or templates. In Jahai (work by Burenhult) and Tzeltal (work by P. Brown), for example, the human body serves as a productive and systematic source of metaphor for mapping landscape features. Such culturally defined templates may ignore features which are naturally salient (see Annual Report 2004). They also do not necessarily handle features in terms of their significance to human use and activity. For example, Jahai metaphorical templates are flexible as to scale, and the same template may be applied to features with vastly different utilitarian properties. This is unlike landscape terms in Lao (work by Enfield), which have close associations with human affordances (see Annual Report 2004). Levinson, working on Rossel Island, Papua New Guinea, also found such a conceptual template that explains a great number of facts, from place names to verbs of motion, under a single implicit model of an inclined ridge as shown in Figure 5.7, Panel A.

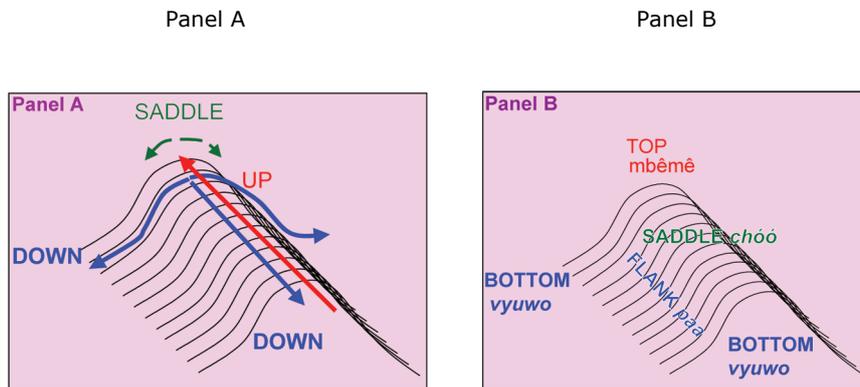


Figure 5.7: Conceptual template of an inclined ridge underlying many Rossel Island landscape terms and motion verbs: Panel A shows the dynamic version underlying motion verbs, Panel B the static version underlying nominals and toponyms.

The underlying idea is that there is only one UP direction, all others being effectively Down. In addition, there are clear notions of a TOP and multiple BOTTOMS, FLANKS and SADDLES to the inclined ridge as shown in Panel B. These topographic notions translate directly into place names, as shown diagrammatically in Figure 5.8.

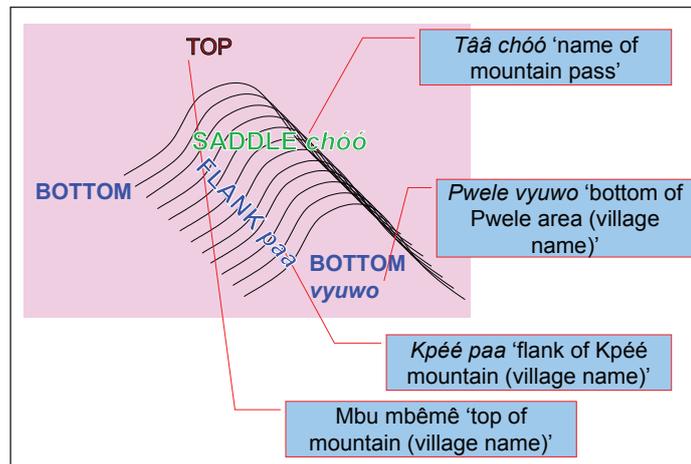
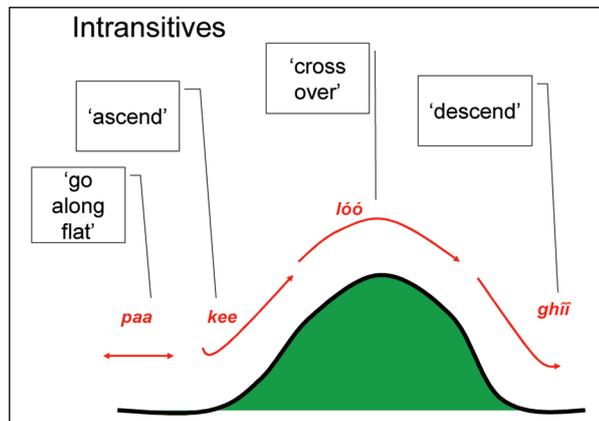


Figure 5.8: Place names based on the parts of the conceptual template.

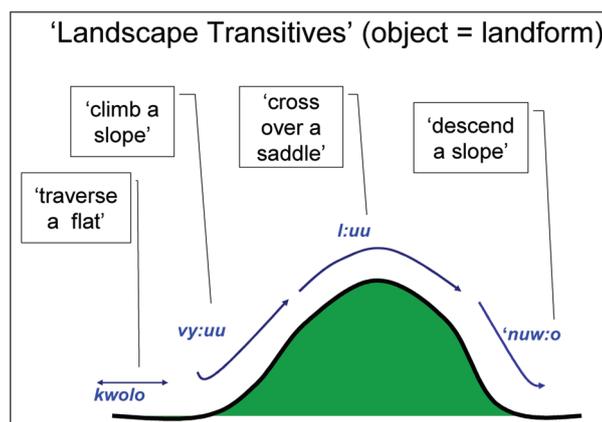
However, the underlying model is further generalized to watercourses (rivers) and to the ocean, and it plays not only a role in providing the ontology for place names, but also for organizing verbs of motion. Consider for instance that there are three distinct sets of verbs of motion – intransitive verbs of motion, transitive verbs of motion that collocate with a landscape term in the object position (cf. "climb a mountain", "cross over a (mountain) pass"), and transitive verbs of carrying ("carry X over a pass", etc.). These three sets are isomorphic over the four distinct kinds of landscape motion (level, up, over, down) they presuppose, as shown in Figure 5.9.

Figure 5.9: Three distinct sets of verbs of motion conforming to the conceptual template

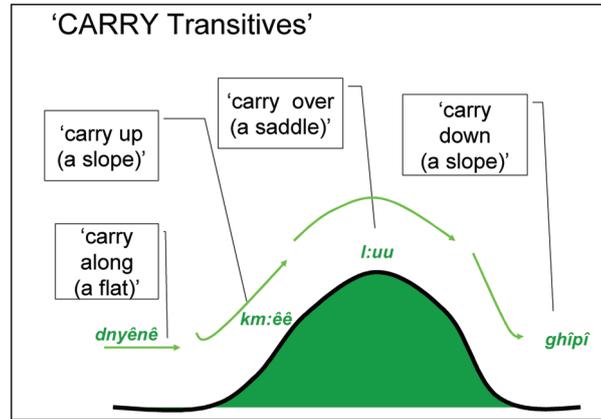
(a) Intransitive verbs of motion



(b) Transitive verbs taking landscape terms as objects



(c) Transitive verbs of carrying



Now these verbs (or special alternates for them) also apply to watercourses and ocean travel. Figure 5.10 shows the application of the 'landscape transitives' to a water course. Notice the new verb *ngmêê* specialized to crossing over watercourses, but following the same template.

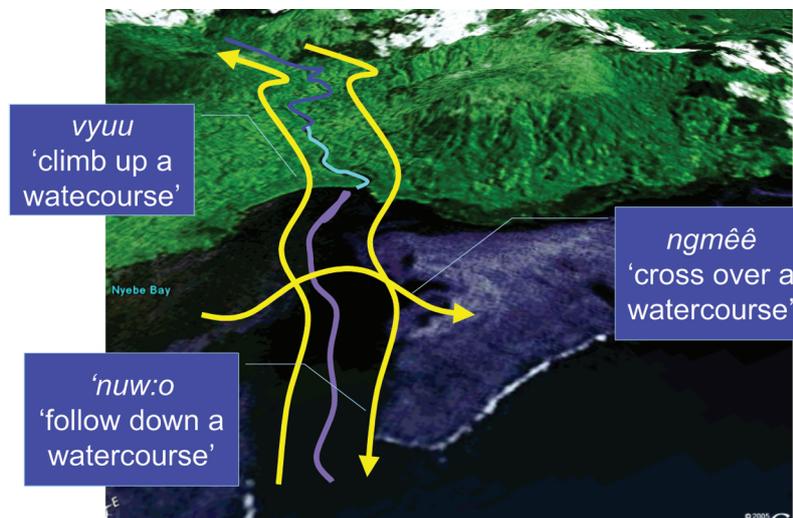


Figure 5.10: Application of landscape transitive verbs to a water course.

The same verbs also apply, at least in part, to ocean travel by boat, as illustrated in Figure 5.11.

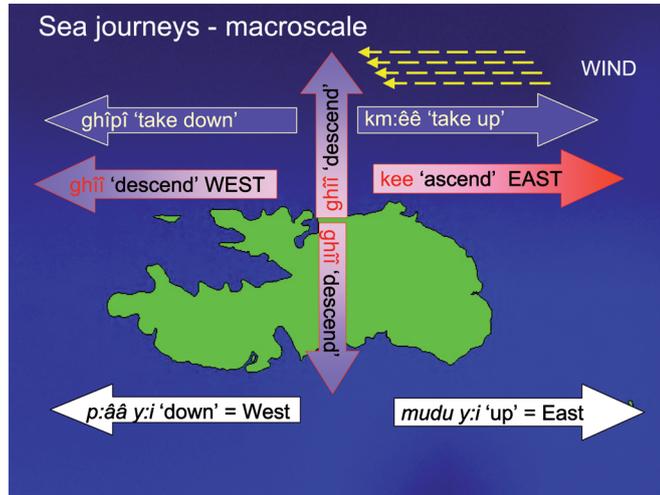


Figure 5.11: Application of 'carry' verbs and intransitive motion verbs to seascape.

The reason for the application of the same asymmetries here is that the *inclined ridge* model is applied to sea travel on a 'force dynamics' analogy: to go upwind is parallel to going up a ridge, in that it is against the prevailing force (wind: gravity), and just as one can 'go down' from a ridge in any direction but upwards, so one can 'descend' in any direction except upwind. (The prevailing tradewinds are reliably from the east, and travel is by sailing in all directions except upwind, in which case it is by paddling or poling).

This implicit conceptual model, then, explains a great deal of the landscape terminology, the formation of place names, the cross-domain application of motion verbs, and much else besides. It is a key underlying concept that unlocks a wealth of lexical semantic detail. As mentioned above, similar kinds of conceptual models have been found in other languages and cultures, and the basic principle may be widespread. Interestingly, there is no established terminology in linguistic semantics for this kind of underlying schema which structures lexical fields across a number of domains.

Kilivila landscape terms (work by Senft) consist of simple and complex forms. Usually they are (common) nouns – this holds for the terms for currents, reefs, corals, coastlines, and for different types of soils and gardens; however, we also find prepositional phrases, locatives for referring to sea areas, and directionals

for referring to coastlines. All these landscape terms constitute sets of lexical alternates which cover specific subdomains (reef, river, sea, etc.). However, with just a handful of exceptions, they do not enter into lexical relations with terms outside their domain; i.e., they are neither targets nor sources for metaphor.

With the exception of one noun phrase (for referring to a reef channel) and one sentence (for referring to a reef formation), all the place names (see Annual Report 2004 Table 5.2) have the form of simple (though not necessarily monomorphemic) nouns; however, their meaning can be quite complex. They refer to events, landmarks, states, places, things, villages, songs, people, activities, anecdotes, food, animals, plants, and stones. Most place names are far from being semantically transparent; they are highly culture specific and their origin is quite surprising and puzzling at times. Like landscape terms the place names also systematically cover specific landscape subdomains (i.e., water wells, reef channels, islands, island points, and villages).

Place names never include landscape terms; however, they may refer to the same locations. With the exception of terms for corals and reefs, Kilivila has a generic term for "sea" and proper names for sea areas, a generic term for "current" and proper names for currents, a generic term for "fresh water well" and proper names for fresh water wells, a generic term for "reef channel" and proper names for the channels, a generic term for "point" and proper names for the points, and a generic term for "garden" and proper names for gardenlands. Like place names in other languages the Kilivila place names denote cultural knowledge about the environment and point out significant characteristics of the place. However, they do much more, like, for example, telling tales.

The Kilivila place names cause many problems for scholars who seek universals in place-name systems (see Annual Report 2004). However, the data suggest the general speculation that landscape terms are indicative of the geographical domains that are conceptually important for the speakers who coined them – thus, just a brief look at the Kilivila lexicon reveals that "sea" and "soil for gardens" play an important role in the life of the Trobriand Islanders who are not only skilled seafarers and excellent navigators but also first and foremost gardeners. And place names, once understood, reveal much with respect to the culture, the characteristics and the culture-specific humor of the speakers who created them.

CHAPTER 6

PIONEERS OF ISLAND MELANESIA

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Introduction

The Pioneers of Island Melanesia project is an international, interdisciplinary project within the ESF EUROCORES scheme "Origin of Man, Language, and Languages". The project began in mid 2002, and ended in June 2005. This report covers the activities of the linguistic group, funded for the first half of 2005 by the NWO (Netherlands Organization for Scientific Research) with additional support from MPI, and based at MPI.

6.1 Language genealogy in deep time and typological stability

Island Melanesia was colonized as early as 35,000 years ago. It contains languages derived from the relatively recent arrival of the Austronesians up to 3500 years ago, as well as sparse remnants of the languages ("Papuan" languages) of more ancient populations. The great time depth of human occupation and the heterogeneity of the Papuan languages has rendered the past history of these languages intractable to traditional methods of historical linguistics, and despite claims in the literature (Wurm 1975, Greenberg 1971), it has not been established whether these Papuan languages form a phylogenetically valid grouping. This is not surprising given the likely time-depth involved in the dispersal of the relevant populations, far beyond that reconstructed even for well-attested, large families. Cognate lexical density is extremely low for the Papuan languages of Island Melanesia; for instance only 3 out of 180 words compared among Solomon Islands Papuan languages were identified as mutually similar but not derived from Austronesian languages.

The Papuan languages of Island Melanesia nevertheless do show recurrent typological similarities, which have served to keep the hypothesis of the genetic unity of these languages alive. Dunn, Reesink, Terrill and Levinson (along with Foley, LCHES, Cambridge U.) developed a computational cladistic analysis of typological features in an attempt to provide a rigorous test of this hypothesis. Over the term of the project, a large database of typological features was developed, containing data from both Papuan and Austronesian languages of Island Melanesia. Linguistic structural features are syntactic regularities specific to any language; they include distributional patterns in the ordering of sentence elements, as well as abstract features of systems of linguistic classification such as grammatical gender or tense. They may be considered equivalent to taxon-specific organizational systems in biology, and lend themselves to being analyzed with the computational tools developed in bioinformatics. These underlying features of a language may remain stable despite linguistic change at the lexical level.

Initially, cladistic methods were applied to the Austronesian languages in the database, which demonstrated that the typological features as coded in the database did in fact carry a phylogenetic signal. The tree generated by the cladistic method was congruent in most respects to the tree generated by the comparative method using lexicon – despite totally independent sources of data. The same cladistic methodology was then applied to the Papuan languages. In contrast to the Austronesian test, there are no generally accepted independent linguistic criteria for assessing the Papuan trees, but the results are strikingly consistent in their geographical patterning, strongly suggesting that this was not a chance result, but rather reflected underlying historical relationships (for methods and results, see Dunn et al. 2005).

This analysis produced results that are consistent with the hypothesis that grammatical structures can retain a phylogenetic signal across highly diverse languages with little lexical similarity, suggestive of a considerable time depth since their last common ancestor. If this conclusion is correct, then the current temporal ceiling on the reconstruction of language history may be increased. In general, applying biological cladistic methods to grammatical structure holds the promise for a more central role for linguistic data, in conjunction with genetics and archaeology, in the reconstruction of the events involved in the early peopling of the world.

The database developed in this project is notable for its size and completeness, giving numerous other possibilities for exploitation. In particular, experiments have been carried out testing hypotheses from the literature about the grammatical stability of particular typological phenomena, as well as investigations of the phylogenetic signal strength of other partitions of the data. It has proved possible to reconstruct known phylogenetic trees from much smaller sets of features than the 125 features used so far.

6.2 Ancient language contact

The cladistic analysis discussed above showed structured relationships between the Papuan languages of Island Melanesia. These relationships must be motivated by historical factors; however, the cladistic method forces a tree structure on data, and is insensitive to factors of lateral transfer. In the comparative method, lateral transfer – in the guise of 'lexical borrowing' – is excluded; in the cladistic method, the researcher cannot identify individual data-points as the result of vertical (inheritance) or lateral transfer (borrowing). The parsimony method used builds in the assumption of evolutionary change, i.e., an inheritance-only model. Other computational methods address situations where these assumptions are violated. The NeighborNet method draws a network representing relationships in two orthogonal dimensions (Huson & Bryant 2006).

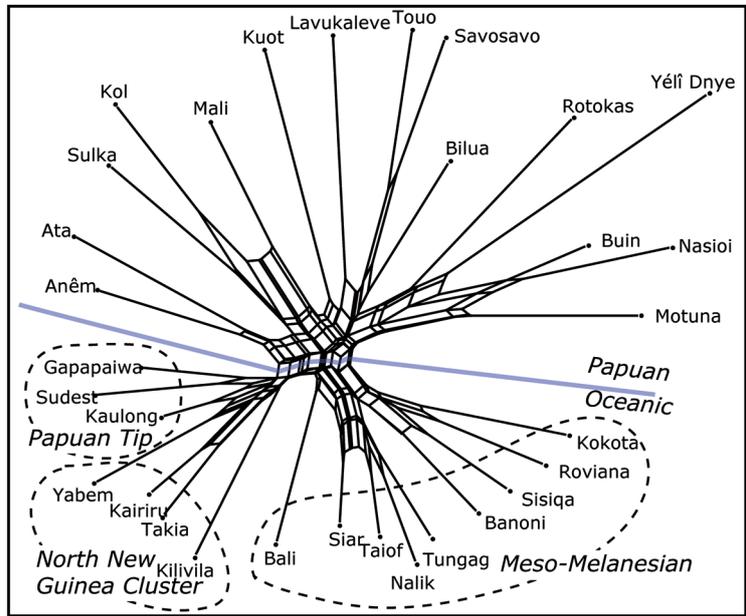


Figure 6.1: NeighborNet network showing genealogical and contact relationships between Austronesian and Papuan languages of Island Melanesia.

Figure 6.1 describes the relationships between all the languages of the sample used in the two cladistic analyses, both Papuan and Austronesian. The relationships within the Austronesian languages reflect the structure of the cladistic and comparative method trees, relationships known to be genealogical. However we know a priori that their relationships with Papuan languages must come from contact (i.e., since the comparative method cannot establish any relationship between them). It can be seen from the network that certain of the Papuan languages have closer similarities to Austronesian languages than others. This raises the hypothesis that the structured similarities between Papuan languages identified by cladistic methods stem from similarities in the patterns of Austronesian-Papuan contact in different areas of Island Melanesia. Figure 6.2 shows the results of one investigation into such patterns of contact.

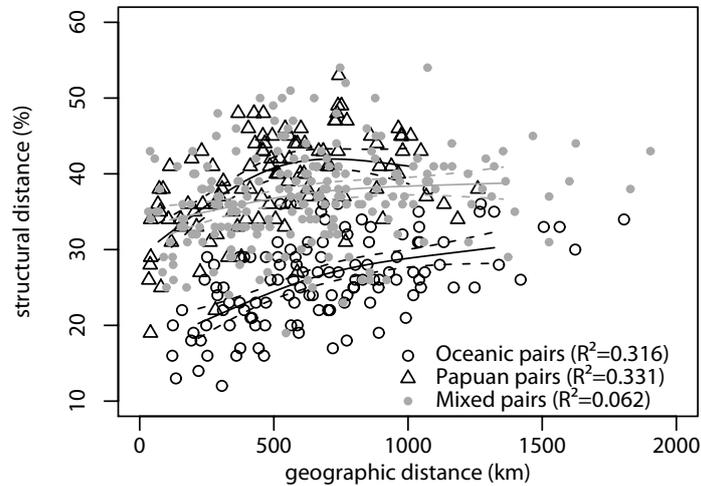


Figure 6.2: Pairwise structural and geographic distances between languages of Island Melanesia

An approximate measure of linguistic distance was calculated for all pairs of languages in the database, using the percentage mismatch between the feature values in the project typological database. These linguistic distances were plotted against geographic distance (measured in kilometres), and correlations were calculated. Papuan-Papuan and Austronesian-Austronesian pairs showed definite patterns of increasing typological distance with geographic distance. Austronesian-Papuan pairs showed a very weak correlation, supporting the hypothesis that the Papuan languages are related by more than just recent patterns of contact.

6.3 Linguistic description

Linguistic description has been an important aspect of the *Pioneers of Island Melanesia*. In the final year of the project, Levinson continued his long-standing work on the Yélf Dnye language of Rossell Island, at the south-eastern tip of the Louisiade Archipelago of Papua New Guinea. The two Ph.D. students associated with the *Pioneers of Island Melanesia*, Wegener and Robinson, are approaching the end of their projects, and carried out the final field expeditions for their dissertation research during 2005.

6.3.1 Savosavo

Wegener continued her Ph.D. project on the syntax of Savosavo, one of the Papuan languages of the Solomon Islands. One of the areas investigated in detail was the structure of relative clauses.

Relative clauses in Savosavo are clauses with a verbal predicate. The constituent order is the same as in verbal main clauses. They are externally headed by the nominal they modify, and precede this nominal as well as other modifiers in the noun phrase. All positions can be relativized. This is independent of the function the NP containing the relative clause fulfills in the matrix clause. When the subject or object of the relative clause is relativized, the respective position is left empty. For any other constituent, some coreferential material must remain within the relative clause, either a personal pronoun or agreement morphology (on postpositions). Relativization is a kind of nominalization; when the subject is not relativized it is transformed into a possessor.

Two morphemes can be used to form relative clauses: the suffix *-tu* and the attributive marker *sua*. The former is formally identical to the present progressive suffix, but synchronically it does not have any temporal or aspectual meaning. The latter is used to derive nominal modifiers from verbs, postpositional phrases etc.

Semantically, relative clauses with *-tu* give information that should facilitate the identification of the referent. This information must be known by the addressee. The NP containing the relative clause is obligatorily definite. In contrast, relative clauses with *sua* primarily provide additional information about the referent which the addressee may or may not know. The NP is usually indefinite.

Relative clause with *-tu*:

- (1) [aghe k-ate-tu] lo pa nyari sisi
 POSS.1DUEx 3SGFO-hold-REL DETSGM one small piglet
 'that one small piglet we caught'

Relative clause with *sua*:

- (2) [aghe k-ate soma] pa nyari sisi
 POSS.1DUEx 3SGFO-hold ATTS GF one small piglet
 'one small piglet we caught'

6.3.2 Rotokas

During his last fieldwork trip to Bougainville, Robinson investigated the phoneme inventory of the Aita dialect of Rotokas. According to previous accounts (Firchow & Firchow 1969), the size of the Aita phoneme inventory is the same as that of Central Rotokas and differs only in replacing the voiced stops with nasals. However, more careful investigation by Robinson revealed that the Aita dialect has, in fact, both voiced and nasal stops.

A comparison of cognate items in the two dialects reveals that the nasal stops of Aita Rotokas systematically correspond to voiced stops in Central Rotokas, regardless of their position within the word. This is illustrated in Table 6.1.

	Correspondence	Aita	Central	
Word-initial	m~b	misi	bisii	'you (PL)'
	n~d	nimuko	dibuko	'mosquito'
	ŋ~g	ŋau obi	gau obi	'tear drop'
Word-internal	m~b	emaoto	ebaoto	'tree'
	n~d	konato	koodato	'possum'
	ŋ~g	meŋoa	begoa	'jungle'

Table 6.1: Nasals in Aita Rotokas correspond to voiced consonants in Central Rotokas.

However, voiced stops in Central Rotokas do not always correspond to nasal stops in Aita Rotokas, as illustrated by the cognate forms in Table 6.2, which are identical in form in the two dialects.

	Correspondence	Aita/Central	
Word-initial	b~b	bokia	'day'
	d~d	daoa	'branch'
	g~g	gibu	'beard'
Word-internal	b~b	abukato	'old man'
	d~d	oidata	'man'
	g~g	sigoa	'knife'

Table 6.2: Cognates identical in form in Aita and Central Rotokas.

Its inventory consists then of 14 segmental phonemes: five vowels and nine consonants. The correspondences between Central and Aita Rotokas suggest that the former is innovative with respect to its consonant inventory and the latter conservative, and that the small inventory of Central Rotokas arose by collapsing the distinction between voiced and nasal stops.

CHAPTER 7

EVENT REPRESENTATION

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Joint research with other projects:

Dynamics of Multilingual Processing
Space
Sign Language Typology

Introduction

The Event Representation project explores universal and language-particular patterns in how speakers of different languages characteristically encode events, and in how children acquire these patterns. Project members investigate how speakers segment their experiences into simple or complex event units, how they classify these units into event types according to the semantic categories of their language, how they assign participant roles to events, and how they mark these roles and map them to syntactic clause structure. The work of the Project is carried out with a variety of techniques, including basic linguistic analysis and description, analyses of spontaneous speech from children, experiments with adults and children, and – the hallmark technique of the group – the use of specially designed videoclip stimulus sets to elicit descriptions of the same events across a wide range of field languages and from speakers of different ages.

In 2005 two major subprojects focused on the encoding of motion events. One is the "Put and Take" project, which was introduced in 2004 to investigate the crosslinguistic categorization of placement events in adult and child language. The second is an in-depth comparison of the resources available for expressing spontaneous motion events in two typologically different languages, Polish and French. Work also continued on Reciprocals, a large-scale study aimed at formulating a typology of syntactic constructions for encoding reciprocity. Several projects continued ongoing work on language acquisition: a study of the acquisition of participant marking in a linguistically complex multilingual Australian community; a crosslinguistic comparison of the acquisition of verbal morphology in five Mayan languages; and a study of the acquisition of complex predicates in Mandarin. Finally, a new Ph.D. project was initiated to document and describe Semai, a Mon-Khmer Aslian language of Malaysia. This project broadens the scope of the Event Representation Project by focusing on Semai's elaborate system of "expressives", forms that convey speakers' immediate perceptual experiences of events.

7.1 Motion events

7.1.1 Placement events

Work continued on the "Put and Take" project, coordinated by Bowerman, Gullberg, Kopecka, Majid, and Narasimhan and carried out in collaboration with the Dynamics of Multilingual Processing and Space projects. This is a large-scale crosslinguistic comparison of the encoding of placement events (putting things in places and removing them from places). Using a standardized set of videoclips of a variety of placement events, project members and colleagues

elsewhere have collected event descriptions from speakers of 21 genetically, typologically, and areally diverse languages (see Annual Report 2004). Multivariate statistical analyses are currently in progress to explore broad patterns in the semantic categorization of placement events across the entire data set (see Annual Report 2004 for analogous work on the "Cut and Break" project). Some findings revealed by preliminary descriptive analyses of selected languages are the following.

Four unrelated languages in the sample – Tamil, Mandarin, English, and Jahai – provide a relatively general verb that speakers use for a wide range of goal-oriented placement events ("put" verbs, e.g., English *put*). These verbs are similar in some ways but different in others. All the verbs are applied to a core set of placement events such as putting an apple in a bowl and a box on a shelf, and their use is not sensitive to whether the placement is done by hand or with e.g. a pair of tongs or the mouth. The verbs are also similar in that they are rarely or never used for placements with an "uncontrolled landing", such as dropping a book or dumping blocks on the floor. But only in English is the "put" verb used routinely to describe events of putting on clothing; English speakers are also far more liberal than speakers of Tamil, Mandarin, and Jahai in applying their "put" verb to placements involving an (attached) body part, e.g., putting one's head into a bucket or one's hand into a hole.

Speakers of another subset of languages (Dutch, Swedish) rarely use a general placement verb, routinely selecting instead among a small set of caused-posture verbs on the basis of distinctions in the shape and orientation of the object placed. Although Dutch and Swedish share the posture-verb strategy, they differ in which posture categories they recognize, with Swedish making a three-way distinction (*lägga* 'lay', *sätta* 'set', *ställa* 'stand') and Dutch offering only two verbs for the same range of events (*leggen* 'lay', *zetten* 'set/stand'). To encode the placement of an object into a container, speakers often abandon the posture-verb system in favor of a verb that lexicalizes path "into" (D. *stoppen*, Sw. *stoppa*: 'put.in'). The posture verbs carve out partially overlapping extensions within the languages, e.g., putting a box on a shelf was described in Dutch as both 'lay' and 'set/stand', and in Swedish as 'lay', 'set', and 'stand'. There is also some competition between the posture verbs and the path verb in these languages; e.g., putting a pen into a hole in a tree trunk was described as both 'lay' and 'put.in'. These overlaps occur in contexts where a placement event can plausibly be conceptualized in multiple ways.

Running parallel to the large "Put and Take" project, which focuses on adult speakers, a smaller-scope study by Narasimhan and Gullberg compares the use of general "put" verbs and caused-posture expressions in child and adult

speakers of Dutch and Tamil. Speakers were asked to describe videoclips of events in which inanimate and (toy) animate objects were placed in various "postures" (e.g., standing up, lying down). Dutch-speaking adults almost never used a general "put" verb (*plaatsen* 'put'; only 2% of responses), heavily preferring the caused-posture verbs (*zetten* 'set/stand', *leggen* 'lay'; 98%). In contrast, Tamil-speaking adults split their responses between a general verb and caused-posture expressions (*veyyii* 'put': 51% vs. *nikka veyyii* 'make stand' and *paDka veyyii* 'make lie': 41%).

We might expect caused-posture verbs to be learned earlier and more accurately by children acquiring Dutch than Tamil, since the distinction between 'standing' and 'laying' is near-obligatory in the speech of Dutch adults, while it is only optional in the speech of Tamil adults (since the general 'put' verb is often used instead). Surprisingly, it is the other way around. Tamil children (age 4-6 years) label events of horizontal versus vertical placement appropriately with the two caused-posture predicates as well as the general "put" verb. In contrast, Dutch children of similar age make systematic errors, often overextending *leggen* 'lay' to vertical placement events such as standing up a small picture frame, and limiting *zetten* 'set/stand' to a subset of the events for which adults use it. (Errors between *leggen* and *zetten* are not bidirectional: *zetten* is rarely overextended to events of horizontal placement).

These results suggest that factors other than the frequency and consistency with which adults label events also play a critical role in children's semantic development. The near-obligatory distinction between *zetten* 'set/stand' and *leggen* 'lay' in Dutch may be difficult for children because it is not based entirely on the perceptually straightforward criterion of whether the placed object extends saliently in the vertical vs. horizontal direction. For example, when a plate is placed on a table it extends horizontally, not vertically, but one describes this event with *zetten* 'set/stand' because the plate "stands" on a functional base. When a ball is placed on a table it extends equally in all directions, so verticality/horizontality cannot determine the choice between *leggen* and *zetten*. But the ball does not rest on a functional base, so the right choice is *leggen*. Compared to Dutch, Tamil caused-posture expressions label relatively clear cases of vertical versus horizontal placement; less clear cases like putting an apple on a table are typically described with the general "put" verb. Learners of Dutch, like learners of Tamil, can distinguish events of true vertical versus horizontal placement (e.g., younger Dutch learners often use the intransitive verb *staan* 'stand' to label the end state of a vertically-placed object). But the Dutch caused-posture verbs present additional semantic subtleties that take Dutch children many years to resolve.

7.1.2 Typology of motion event expressions

In a new subproject, Kopecka compared the linguistic representation of motion events in French and Polish, exploring inter- and intra-linguistic typological variation. She showed that Polish is a very systematic Satellite-framed language (Talmy 1991), expressing Path of motion in a prefix and Manner of motion in the main verb (e.g., *w-biec* 'in-run', *wy-biec* 'out-run'). By contrast, French has a greater diversity of patterns. French often follows the Verb-framed pattern, expressing Path in the main verb and Manner in a gerund (*entrer en courant* 'enter running', *sortir en courant* 'exit running'). But, as a study by Kopecka and Stéphanie Pourcel (U. Sussex) shows, French can also reverse the expression of the two elements, encoding Manner in the main verb and Path in a gerund (*courir en descendant* 'run descending', *courir en montant* 'run ascending'). French also has a Satellite-framed pattern comparable to that of Polish, where Path is expressed in a prefix and Manner in the main verb (*ac-courir* 'toward-run', *par-courir* 'over-run'), as well as a hybrid pattern in which Path is conflated with Manner in a synchronically monomorphemic main verb (*dégringoler* 'tumble down', *dévaler* 'hurtle down'). This variation within French is the result of a typological change that has taken place: the Satellite-framed pattern is a remnant of the former system of French, whereas the hybrid and Verb-framed patterns have arisen from a lexical fusion of verb prefixes with some motion verbs, many of which were lexically independent in Old French. Hence, whereas in Polish the Satellite-framed pattern is very productive, in French this pattern is no longer available for new verb formation.

These typological characteristics have an impact on the degree of explicitness of spatial information. In Polish, thanks to the systematic combination of the same manner-of-motion verb with different prefixes, both Manner and Path are always expressed overtly in the main clause, as illustrated in (1) and (2):

(1) *Pszczoły wy-leciały z ula*
bees.NOM out-fly.PST of hive.GEN
'The bees flew out of the hive.'

(2) *Pszczoły w-leciały do ula*
bees.NOM in-fly.PST to hive.GEN
'The bees flew into the hive.'

French, in contrast, can be more or less explicit in the representation of Manner or Path, depending on the construction types available to describe a given event. For example, for "bees flying out of a hive", the Satellite-framed pattern is available, just as in Polish, so both Manner and Path can readily be mentioned; cf. (3), which shows the verb *voler* 'to fly' combined with the prefix

en- 'away'. By contrast, for "bees flying into a hive" no Satellite-framed pattern is available and the Verb-framed pattern is the normal choice, as shown in (4). Manner could be overtly expressed in a periphrastic clause, but this would be superfluous because Manner is readily inferred: flying is the habitual way bees move.

(3) *Les abeilles se sont en-volées de la ruche*
 the bees REFL PST away-fly.PTCP from the hive
 'The bees flew away/out of the hive.'

(4) *Les abeilles sont entrées dans la ruche [en volant]*
 the bees PST enter.PTCP in the hive [flying]
 'The bees entered the hive.'

Path, like Manner, can also be expressed with various degrees of explicitness in French. In Polish, the same prefix can be systematically combined with different verbs, allowing for a consistently overt expression of Path, as illustrated in (5) and (6):

(5) *Woda wy-płynęła z wiadra*
 water.NOM out-flow.PST of bucket.GEN
 'The water flowed out of the bucket.'

(6) *Rybak wy-padł z łódki*
 fisherman.NOM out-fall.PST of boat.GEN
 'The fisherman fell out of the boat.'

In French, the explicitness of Path depends again on the pattern available to express a given event. In the Verb-framed pattern, Path is always expressed overtly in the main verb. But in the Satellite-framed pattern the degree of explicitness of Path information depends on possible combinations between prefixes and verbs, which means that Path might be overt, as in (7), where the boundary-crossing Path is expressed in the prefix *é-* 'out', or covert, as in (8), where the same information is not expressed explicitly at all, but is left to inference:

(7) *L'eau s'est é-coulée du seau*
 the water REFL PST out-flow.PTCP from.the bucket
 'The water flowed out of the bucket.'

(8) *Le pêcheur est tombé du bateau*
 the fisherman PST fall.PTCP from.the boat
 'The fisherman fell from the boat.'

The two languages differ therefore not only in the types of patterns available for encoding motion events, but also in the degree of explicitness of spatial

information. Kopecka's ongoing research will investigate in a more systematic way the *semantic granularity* of both Path and Manner of motion in the descriptions of motion events.

7.2 Reciprocals

Further work continued on the crosslinguistic survey of reciprocal constructions, coordinated by Gaby, Levinson, and Majid in collaboration with N. Evans (U. Melbourne). A core reciprocal event involves two participants performing the same action on each other at the same time (e.g., hugging each other) This project aims to provide a typology of syntactic constructions for encoding reciprocity, and to investigate how such constructions are extended to events that vary in number of participants, temporal organization, event type, and the "saturation" of relationships across the participant set (how many participants acted or were acted on) (see Annual Reports 2003 and 2004). As a first step towards a typology, the project continued with its basic descriptive work of determining what construction types for expressing reciprocals are available within each language, and identifying their range of application.

Most languages recognize core reciprocal events as a special type of situation to be encoded in a dedicated construction. But Senft's research shows that Kilivila, an Austronesian language spoken in the Trobriand Islands, has neither reflexives proper nor reciprocal forms. In order to talk about reciprocal events, Kilivila speakers use emphatic pronouns or periphrastic descriptions. The absence of both reflexives and reciprocals challenges generative theories of anaphors.

Rapold finds that in Khoekhoe, a Central Khoisan language spoken in Namibia, South Africa, and Botswana, reciprocity is indicated with three different strategies: (1) zero marking, (2) inflectional marking with a verbal suffix, and (3) syntactic marking with a binominal phrase. Zero marking is used only with a very restricted set of verbs that denote what is sometimes called an inherently reciprocal state of affairs. In the verb-marking strategy a reciprocal pronoun is suffixed to a transitive verb. This strategy, which is by far the most frequent, can replace the zero marking strategy in all cases found (Rapold 2005). The binominal strategy, not found in all varieties of Khoekhoe, makes use of a phrase glossable as "this one that one", whose syntactic status poses interesting problems for Khoekhoe syntax.

The reciprocal pronoun suffix in the Khoekhoe verb-marking strategy is also found on some postpositions and nouns, e.g., towards-EACH.OTHER, neighbor-EACH.OTHER 'each other's neighbors'. Most of the relevant postpositions can be traced back to verbs. The semantics of this form revolves around a "reciprocal"

core meaning; the suffix does not encode reflexivity, comitativity, or "adjudativity", to name just a few categories that often cluster with reciprocity crosslinguistically. Any string of "identical" actions carried out symmetrically by two or more participants (i.e., with at least one of the actors also serving as undergoer) may be coded by this strategy. The time interval between actions seems to be irrelevant. Normally the reciprocal suffix cannot be used to encode asymmetrical actions in which the actor is not also an undergoer (e.g., A hit B), but there are some exceptions: for example, the suffix can be used when two (or more) asymmetrical actions are carried out pair-wise among multiple participants (e.g. A hits B, C hits D, and E hits F), and it can also be used for asymmetrical actions encoded by certain verbs – e.g., it is acceptable with the verb glossed as 'to speak/talk to someone (tr.)' in the context where only one person is speaking to the other.

Burenhult reports yet another strategy for encoding reciprocity, in this case in Jahai (Mon-Khmer, Malay Peninsula). Reciprocity does not have an obligatory overt marker in Jahai; instead there is the option of using three different types of construction. The most common construction involves distributive forms of verbs, which usually occur in descriptions of scenes in which more than one individual performs the action designated by the verb (whether simultaneous or sequential, and whether symmetrical or asymmetrical). A less common construction involves so-called "reciprocal" verb forms; this seems to be predominantly restricted to scenes involving symmetry, duality, and sequentiality ("tennis-type" situations). The third construction operates independently of the others and combines optionally and freely with both derived and underived verbs. It involves an adjunct consisting of a relational noun meaning "same" in combined with a body part noun like "chest", "hand", or "eye", signaling bodily symmetry and creating meanings like "chest-to-chest", "hand-to-hand", and "eye-to-eye".

The language sample of the Reciprocals project is typologically broad, including a sign language as well as spoken languages. Zeshan and Panda show that Indo-Pakistani Sign Language (IPSL) uses two constructions for the explicit expression of reciprocity, a verbal derivation and an auxiliary construction. In several other constructions reciprocity is implied, but not overtly expressed. The verbal derivation always involves a spatially inflected verb that expresses the relationship between subject and object through the movement of the hand in space: the movement starts at the subject location and ends at the object location. In the reciprocal form of the verb, the second hand moves simultaneously in the opposite direction, mirroring the sign made on the first hand; that is, one hand moves from A to B while the other hand moves from B to A.

Not all verbs in IPSL can take this spatial reciprocal inflection, but other predicates can receive reciprocal marking through the addition of a reciprocal auxiliary form. The auxiliary is based on index finger-pointing and is semantically relatively empty, conveying only the meaning of "from A to B and from B to A". This auxiliary usually appears directly after the predicate, as in LOVE AUX: recip 'They love each other'. There are three distinct forms of the auxiliary, all two-handed but with different movement patterns: a) single movement, b) repeated movement with the hands moving in parallel, c) repeated movement with the hands crossing each other.

Some of the various reciprocal constructions in IPSL are related to each other or to other constructions through grammaticalization and lexicalization processes. For example, the reciprocal auxiliary is derived from the basic auxiliary, which is in turn based on pronominals. IPSL also has a large number of inherently reciprocal lexical predicates which clearly originate from a reciprocal verb derivation, but have undergone formal and semantic changes in the process of lexicalization.

Unlike the reciprocals of many spoken languages, reciprocals in IPSL cannot be used to express spatial relationships such as objects being "next to/on top of each other", or movements of animate referents such as "moving behind/following each other". For such meanings a different type of construction, a so-called "classifier construction", is used to map the spatial relationship onto the signing space .

7.3 Participant marking and verb morphology

Two studies examined children's acquisition of patterns of participant marking and verbal morphology across languages that share nominal or verbal participant-marking morphology, but differ in details of how these forms are used.

O'Shannessy continued her Ph.D. project documenting the emergence and acquisition by children of a new language in a multilingual community (Lajamanu) in northern Australia. This language, Light Warlpiri, has arisen from contact between Warlpiri (a Pama-Nyungan language), Kriol (an English-based creole), and varieties of English. It is a Mixed Language, meaning that neither of its source languages can be considered to be the sole parent language. Most verbs and the verbal morphology are from Aboriginal English or Kriol, and most nouns and the nominal morphology are from Warlpiri. The language input to children is complex. Adults older than about thirty speak Warlpiri and code-switch into Aboriginal English or Kriol. Younger adults, the parents of the current cohort of children, speak Light Warlpiri and code-switch into Warlpiri and into

Aboriginal English or Kriol. Warlpiri and Light Warlpiri, the two main input languages to children, both indicate transitive subjects with ergative marking (and they share one allomorph of the marker), but Warlpiri includes the marker much more consistently than Light Warlpiri. Children learn both languages from birth, but they target Light Warlpiri as the language of their everyday interactions, and they speak it almost exclusively until four to six years of age.

Determining when children differentiate between two input languages in their production has been a major goal in studies of bilingual acquisition. But this issue has not been investigated in a multilingual setting as complex as that studied by O'Shannessy, where the input languages share much lexicon and grammar and there is considerable language mixing. To investigate language differentiation in this context, O'Shannessy elicited narrative production data in both languages from adults and children aged 6-9 years, using stimulus picture books designed to promote more overt transitive subjects than are usually found in spontaneous speech. The youngest group of children, age 6-7, who are just starting to speak Warlpiri, already show an adult-like differentiation between the two languages in the distribution of ergative case-markers. So even in this complex input situation children pick up early on subtle differences between languages.

Working together with Mayanist colleagues, P. Brown has continued her comparative research on the acquisition of participant marking and other verbal morphology in five Mayan languages – Tzeltal (Brown), Tzotzil (de León, C.I.E.S.A.S., Mexico City), Yukatek (Pfeiler, Autonomous U., Yucatan), K'iche' (Pye, U. Kansas), and Q'anjob'al (Mateo, U. Kansas) (see Annual Report 2002). Verb morphology in these languages is broadly similar, e.g., verb roots are inflected for aspect, mood, and "status" (primarily transitivity and mood), and transitive verbs carry separate cross-referencing inflections for the two core arguments. But the ordering and organization of elements within the verb complex differ, e.g., forms that are prefixes in one language turn up as suffixes in another. These differences clearly have an impact on patterns of first language acquisition, with children (age 2-3½ years) homing in on different subsets of the total inventory of elements in their early verb forms.

To determine what is responsible for these differences, project members have analyzed features of verbs in caregiver speech across the languages, and correlated these features with their counterparts in children's early verb forms. An important challenge was to develop appropriate techniques for comparing sentences across the languages. The following features were examined: (1) whether the verb root appears at the right or left edge of (a) the word or (b) the sentence; and whether the input contains a large proportion of (2)

imperatives, (3) underived verbs, and (4) CVC roots. A comparison of frequency rank orders for each feature in child and adult speech reveals a strong pattern of correlation that suggests that the acquisition process is sensitive to the structure of the right edge, but not to the left edge, of Mayan verbs.

7.4 Complex predicates

J. Chen continued her dissertation research on the acquisition of verb compounding by children learning Mandarin. In earlier work, she examined various aspects of children's production and comprehension of verb compounds (Annual Reports 2003, 2004). In 2005 she extended her investigation to learners' knowledge of the argument structure of resultative verb compounds (RVCs) in a transitive syntactic frame [NP₁ RVC NP₂]. For example, how does a child determine, given a sentence like *mei4mei ku1-pao3 le ge1ge* 'sister cry-run brother', who cries (sister or brother), who runs, and who is causally responsible for what? According to Chen's analyses, the argument assignment patterns of RVCs vary according to both the transitivity and semantics of the component verbs. The child's task is twofold: (1) to learn the meaning and argument structure of the component verbs of an RVC, and (2) to learn how to interpret the argument structure when the two verbs are joined into a single compound, for example, e.g., when the component verbs both have a subject and an object, which arguments will be the subject and object of the RVC as a whole?

To test learners' knowledge, Chen conducted a judgment task in which children (mean ages 3;6, 4;7, 6;0) and a group of adults watched short videoclips and decided whether a puppet's description of the scene was correct or silly. Five different patterns of argument structure assignment were tested. From an early age, children preferred the argument-structure interpretation for a particular clip that adults also preferred or insisted on, but overall they accepted more interpretations per clip than adults did, and they narrowed in only gradually on uniquely correct interpretations. This pattern of development is compatible with a constructional view of language acquisition that stresses the formulation and gradual refinement of argument structure schemas over time.

7.5 Expressives

Tufvesson began her doctoral research, which aims to document and describe Semai, a Mon-Khmer Aslian language spoken by approximately 20,000 people in the states of Perak and Pahang on Peninsular Malaysia (see also Chapter 11.1: Tufvesson's work). Previous work on Semai has been sporadic, with a handful of word lists from the early 20th century and limited but more analytic publications on Semai phonology and morphology from the 1970s onwards.

These later works show that Semai, like other Aslian languages, has a rich phoneme system and a productive morphology with intricate affixal processes worth further investigation. Like many other Mon-Khmer languages, Semai exhibits a distinct syntactic and lexical word class known as expressives (see Diffloth 1972, 1976), and this is Tufvesson's primary focus. Expressives convey speakers' sensory or perceptual experiences. They are governed by first-person experience of a situation and are characterized by very detailed semantics and sound symbolic features. Expressives have rarely been examined in cross-linguistic perspective. The Semai repertoire of these forms is large and elaborate, and Tufvesson plans to explore the interplay between language, cognition, and perception by investigating the nature of their phonosemantic and morphosemantic iconicity.

CHAPTER 8
THE COMPARATIVE STUDY
OF L2 ACQUISITION

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Introduction

This project differs from other Institute projects in that only a small fraction of the actual work is done at the Institute itself. Its role is rather to co-ordinate the joint research of a group of European research institutions.

The project is concerned with the study of untutored second language acquisition from a comparative perspective that focuses on the following factors:

- 1) previous knowledge (L1 vs. L2 acquisition)
- 2) age (younger vs. older L2 learners)
- 3) language type (crosslinguistic comparisons)

Researchers in the project follow an approach in which the process of second language acquisition is not characterized in terms of errors and deviations, but in terms of the two-fold systematicity which it exhibits: the inherent systematicity of a learner variety at a given time, and the way in which such a learner variety evolves into another one. New types of naturalistic and experimental data are constantly added to a combined L2 corpus (including the ESF data base).

The impact that the above-mentioned factors have on language acquisition is investigated in the project's five thematic initiatives. These deal with the following topics:

THEME	RESPONSIBLE COORDINATOR
acquisition of aspect & temporal structure	Monique Lambert (U. Paris VIII)
acquisition of finiteness	Christine Dimroth (MPI, Nijmegen)
lexical development	Giuliano Bernini (U. Bergamo)
acquisition of scope particles	Sandra Benazzo (U. Lille 3)
development of the topic component	Marina Chini (U. Pavia)

This year's annual report focuses on the work of the Finiteness Group (section 8.1) and the Scope Group (section 8.2), where mainly previous knowledge and language type have been investigated. Some recent results on the impact of age on second language acquisition will also be presented (section 8.3).

The work of Jolink, Kirsch, Verhagen, Schimke, Klein, and Dimroth has been carried out at the Institute. Benazzo, Jordens, and Pagonis are external collaborators of the project. Birdsong has been a guest of the Acquisition Group in 2005 (see Chapter 11.2).

8.1 Finiteness

The group focuses on the structure and the functioning of finiteness, a verbal category which has recently received considerable attention in language acquisition. Traditionally, finiteness is primarily seen as a morphological phenomenon: verb forms that are inflected for tense, mood, person, number and maybe other categories are considered to be finite, all others are considered as nonfinite. This is problematic, because the distinction between finite and nonfinite forms is also made when there is hardly any morphological distinction on the verb (as, for instance, in English). In addition, there are a number of syntactical, semantical and pragmatical phenomena which are clearly associated with finiteness. These include, for example, basic word order rules, the licensing of grammatical subjects and of expletive elements, constraints on gapping and other forms of ellipsis, nonspecific readings of indefinite noun phrases in nonfinite constructions, and the temporal interpretation of verbal elements. It appears, therefore, that finiteness is not a mere fact of verb morphology but a grammatical category in its own right, which plays a core role in the organization of utterances. Research from the Finiteness Group presented in the following subsection addresses some of its many facets. The focus is on previous knowledge and language type as comparative dimensions.

8.1.1 The acquisition of inversion in L1 and L2 Dutch

Jordens investigated the acquisition of inversion as a formal means to express topicalization in Dutch. Dutch is a so-called verb second language, i.e., the finite verb typically occurs in second position with one constituent in initial position (normally the subject). However, if it is an object or an adverb, the subject occurs after the finite verb as, for example, in *Gisteren las Karel een boek* 'Yesterday read Charles a book', *Dit boek las Karel gisteren* 'This book read Charles yesterday'. This is what is called *inversion*.

For L2 learners of Dutch, inversion is difficult to acquire. Instead of (1a), L2 learners often (incorrectly) use two constituents before the finite verb (*heb*) as in *(1b).

- (1a) die politie *heeft* hem gezien (that police has him seen)
*(1b) dan ik *heb* ongeluk gemaakt (then I have accident made)

Thus, adult learners of Dutch produce utterances in which the initial position is occupied by the subject or by both an adverb and the subject.

Errors as in *(1b) do not occur in children learning L1 Dutch. However, initially Dutch children have no inversion either. As shown in (2) utterances may occur with either the subject (2a) or the object (2b) in initial position. However,

utterances with an object in initial position as in (2b) are nontargetlike. The subject (*ik*) is simply absent.

- (2a) *poes il mij vinger happe* (kitty want my finger bite)
*(2b) *die magwel teke* (that-one may-indeed draw)

Spontaneous L1 and L2 acquisition of Dutch is a two-stage process. Initially, the learner system is determined by the use of elements that are purely lexical. Only in the course of development is the form of the system determined by so-called functional elements. Development from a lexical system to a functional system is a major process in the acquisition of Dutch.

The auxiliary *heb/heeft* 'have/has' is among the first words with no lexical function. Its acquisition causes the change from a lexical system to a functional system. Evidence from both child and adult learners shows that the use of the auxiliary *heb/heeft* triggers the acquisition of inversion. Examples are given in (3).

(3) The auxiliary *heb/heeft* and the acquisition of inversion

Child L1 Dutch

- no inversion: *Mijnne heefe nome?* (M has-it taken?)
inversion: *die hem ik van J kege* (that have I from J got)

Adult L2 Dutch

- no inversion: *ik heb daar geslapen buiten* (I have there slept outside)
inversion: *dat heb ik nooit gezegd* (that have I never said)

The examples in (3) show that inversion of a pronominal subject with the AUX *heb/heeft* provides a means to convey a particular communicative function. It explicitly indicates that the element in initial position is what the utterance is about, i.e., it establishes an element as the topic. Thus, in spontaneous production, inversion with AUX is a structural means to specify the initial position as a topic position. Hence, it functions as a topicalization device (4).

(4) Topicalization device

AUX + subj.pron.
heeft-ie/heb-ik (has-he/have-I)

The acquisition of *heb/heeft* as an AUX establishes a functional category. As such, it serves to express the illocutive meaning of the utterance (assertion). It leads to a reanalysis of lexical illocutive markers such as *nee*, *kanwel* and *magniet* as modal auxiliary verbs. Like the auxiliary verbs *heb/heeft*, they also function to express illocutive meaning.

Summarizing, both in children and in adults, inversion in Dutch is learned as an artifact of the acquisition of topicalization. First as *heb/heeft* + subject pronoun and then, after reanalysis of lexical illocutive markers such as *nee, kanwel, magniet* etc., also as modal auxiliary verbs + subject pronoun. This explains why nonmodal and modal auxiliary verbs, subject pronouns and inversion are learned simultaneously. It also explains why this process takes place in a similar way in both children and adults.

8.1.2 The acquisition of finiteness in normally developing Dutch children and children with Specific Language Impairment

Jolink collected a corpus of longitudinal speech data from 4 normally developing (ND) children and 2 children with Specific Language Impairment (SLI). The data were analyzed for the way in which subjects mark the semantic 'link' between the topic and predicate of utterances over the course of the acquisition process.

The findings from this corpus study confirm the patterns that Jordens (2002) and Dimroth et al. (2003) found in the diary data of 2 Dutch siblings: children start out by using lexical means to link topic and predicate and only later acquire the grammatical means to do so. The lexical linking devices that children use during earlier stages of the acquisition process are additive particles and fixed forms of modals, lexical verbs and the copula:

TOPIC	LINK	PREDICATE	
Alisha	ook	lope	(Alisha also walk)
daar	is	auto's in	(over there is cars in)
auto's	mag	hier rijden	(cars may (singular) here drive)
hand	maak	hij	(hand make (stem) he)

At this stage, verbal elements look like finite constructions but are in fact still used as unanalyzed lexical elements. It is only during the next stage that children start to use aspectual auxiliaries: linking devices that are purely grammatical. From this point on, the other verbs are increasingly used as grammatical elements with target-like morphological markings.

The SLI children acquire finiteness two years later than the normally developing children do, but the patterns in their development are the same: they also acquire lexical links before grammatical ones. Interestingly, this implies that these children, although they come from a group of learners who are known to have severe and long lasting difficulties with the morphosyntactic expression of finiteness, eventually do reach the grammatical linking stage.

8.1.3 The acquisition of finiteness in the acquisition of Russian as a first language

Kirsch continued her research on the acquisition of finiteness in Russian as a first language, focusing on the role of lexically empty and full verbs. Previous research (Dimroth & Jordens 2001) found that the auxiliary system of the Germanic languages offers learners the possibility to separate the finiteness component from the lexical component of a verb. Russian has rich verb morphology, but no prominent auxiliary system. Children are therefore forced to use other strategies to acquire the complex concept of finiteness.

Investigating a longitudinal corpus of two Russian children, Kirsch observed the following order of acquisition of synthetic verb forms. Forms with little morphological marking of finiteness (imperative, infinitive, past perfective) are attested first. In a next step, forms of the present imperfective are used in contrast to the past perfective. This strong correlation between tense and aspect is also found in the input. Ultimately, the present perfective and the (analytical) future imperfective are acquired.

In contrast to the Germanic languages, analytical constructions are acquired only after the first synthetic verb forms appear. The acquisition path is then however similar to that found in Dutch children (Jordens 2002).

First, the children use so-called Optional Infinitives in modal contexts. Then lexical elements, e.g. modal adverbs or high frequency synthetic verb forms are used to specify how the description of a situation relates to the topic. At this stage, children's use of two apparently finite linking elements (1) or of idiosyncratic linking elements (2) is common.

- | | | | |
|-----|---------------------|----------------|-------------|
| (1) | nuzhno | pospat' | xochu. |
| | Must (MODADV) | sleep.PERF.INF | want.1PS.SG |
| | 'I want to sleep' | | |
| (2) | delaet | pisat' | koshka. |
| | Make.IMPERF.3PS.SG | pee.IMPERF.INF | cat |
| | 'The cat is peeing' | | |

These constructions disappear when auxiliaries and modal verbs are used more frequently. In a last step, subject pronouns are used regularly in topic position, marking the grammaticalization of the analytical constructions.

8.1.4 The acquisition of auxiliaries in L2 Dutch

Verhagen continued her research on the role of the nonmodal auxiliary *hebben* 'have' in Dutch as a second language. The acquisition of *hebben* or *haben* in

Germanic languages has been claimed to enable L2 learners to acquire postverbal negation (Becker 2004, Parodi 2000) and inversion (Jordens 2005).

To find out whether the acquisition of *hebben* indeed entails structural reorganization of the learner system, two experiments were conducted. The first experiment aimed at testing the possible relation between *hebben* and postverbal negation and the second experiment was designed to investigate the relation between *hebben* and inversion. Moreover, an important goal of both experiments was to assess learners' active and 'passive' knowledge of the structures at issue. The tasks therefore ranged from free and controlled production tasks (film retelling, picture description and sentence imitation) to an implicit, reaction-timed judgment task (sentence matching). Subjects were beginning learners of Dutch with Moroccan or Turkish as their native language.

For negation, the production data confirmed the earlier finding that the production of *hebben* is related to the production of postverbal negation. Learners who did not produce *hebben* used preverbal negation with lexical verbs, while learners who produced *hebben* used postverbal negation with these verbs. The data from the sentence imitation and sentence matching tasks showed, however, that this dichotomy became less clear-cut when data reflecting passive knowledge were taken into account. It was found that learners who did not yet produce the auxiliary *hebben* were sensitive to postverbal negation in sentences with *hebben*. Thus, learners who neither produced *hebben* nor postverbal negation appeared to have knowledge of the position of the negator in sentences with an auxiliary when they had to imitate or judge sentences, instead of producing the sentences themselves.

Preliminary results from the inversion experiment show that all learners who produced inversion also used the auxiliary *hebben*. Ongoing research is aimed at investigating the issue of whether learners may have passive knowledge of inversion that is not reflected in production.

8.1.5 The role of semantic finiteness in the acquisition of L2 German and French

It has been shown that untutored adult learners of Germanic languages start with pragmatic and lexical means to mark semantic finiteness (the making of an assertion) before making the transition to morphosyntactic marking: the use of finite verb forms in finite positions. Schimke's work investigates if the transition in the production of (in)finite verb forms in L2 learners of French and German is also reflected in their interpretation of these forms in the input. As a first step, two pilot tasks were designed and tested with native speakers of German and French.

In a picture selection task, participants listened to finite or infinite utterances, e.g., *Peter spült das Geschirr* ('Peter washes the dishes') vs. *Peter das Geschirr spülen* ('Peter wash the dishes'). Participants were asked to match the utterance to the appropriate picture. One picture depicted the action described in the utterance as being in progress, while a second picture only depicted the possibility that the action would occur. A pilot study showed that native speakers of German and French select the picture where the described action is in progress more often when the utterance is finite, even if intonation is kept constant.

In a second task, participants were presented with sentences containing stressed versus unstressed finite verb forms. When a finite verb form is stressed, the assertion is one of the meaning elements that is highlighted (*verum focus*). Participants were asked to indicate how well a given utterance fitted a context in which the assertion made in the test sentence is questioned. Results from a pilot study showed that, as expected, native speakers of German and French judge utterances with stress on the finite verb to be the most appropriate answers to such questions.

These tests will be run with learners of French and German, and the results will be compared to their performance in elicited production and grammaticality judgment tasks.

8.1.6 Is finiteness universal?

If the transition to finite utterance structure is a major step in first as well as in second language acquisition, one wonders how the notion of "finiteness" is rooted in human language itself. Clearly, its morphological marking on the verb is not found in all languages; but as is argued in this project, this particular form of marking must not be confused with the very notion of finiteness itself, which shapes the syntax, semantics, and information structure of utterances in many ways (see Annual Report 2001). In this sense, finiteness could still be a major structuring principle even in languages such as Chinese, which are often considered to be "nonfinite" – in contrast, for example, to very early learner varieties which exhibit neither the morphological marking nor other major traces of this organizing principle. Should we therefore exclude these manifestations of the human language faculty from the class of human languages?

Klein addressed this question from the broader context of how we should conceive of the species-specific innate ability to construct and to learn linguistic systems. In the tradition of generative grammar, it is assumed that the human language faculty essentially consists of a set of universal principles ("Universal Grammar"), which define the initial state of language acquisition and which

unfold under the influence of the environment into specific systems, such as Mohawk, Latin, or Chinese. Under this view, (a) there is a strong structural similarity between Universal Grammar and specific linguistic systems, and (b) the principles which constitute Universal Grammar must indeed be found in all human languages. Both assumptions are problematic.

First, what we are born with is the capacity to construct linguistic systems ("construction capacity"), the capacity to copy the specific features of particular human languages from the input ("copying capacity"), and the capacity to use these systems for communicative and perhaps other purposes in a given context ("communication capacity"). In language acquisition, first or second, all of these "subcapacities" interact. There is no reason to assume that the human language faculty itself bears any structural resemblance to what these subfaculties produce: the properties of the bread are not the properties of the baker.

Second, and not accidentally, any attempt to define a set of universal principles found in all known languages seems to end with a few very general properties: roughly, human languages are systems of expressions which combine sound (or some other physical carrier) with meaning, and there are elementary expressions ("lexicon") and rules which allow one to construct more complex expressions from simpler ones ("morphosyntax"). There is hardly any undisputed candidate of a structural principle beyond these trivia. Sometimes, recursivity is mentioned in this regard. But it is not clear at all whether recursivity is indeed constitutive of human languages (would we say a language exactly like English but without recursive devices is no human language?). In other words, there is no nontrivial innate Universal Grammar, whose structural constraints are instantiated in all languages. There is the practically unlimited capacity to associate sounds with meanings, and there is the practically unlimited capacity to construct more complex expressions from simpler ones, and while these are used for communicative purposes, other structuring devices may but need not evolve.

The finite utterance organization is such a device that is particularly well-tuned to the information flow of communication; structural scope or subordination are others. In this sense, these devices are "universal", not because they are found in all languages but because they typically evolve in the construction of linguistic systems. The evolution of these devices may take many generations, and they may take different forms; but once available in a language, learners can more or less easily copy them, since they are within the range of what is possible for our innate language faculties.

8.2 Scope

Researchers in the scope group investigate how finiteness interacts with the negation *not* and other "assertion-related" particles such as *too*, *again*, *still*, and *already*, and how this interaction affects the acquisition of these kinds of scope-bearing elements. Results indicate that the stepwise grammaticalization of developing learner varieties determines the way in which the "assertion-related" particles are integrated in learner utterances. The studies reported here focus on the impact of the comparative dimension "language type".

8.2.1 Negation

Dimroth analyzed the results of several longitudinal studies dealing with adult learners' untutored acquisition of negation in English, French, and German as second languages (Giuliano & Véronique 2005, Silberstein 2000, Becker 2005, Dietrich & Grommes 1998, Dimroth submitted) and argued that their findings can best be explained by relating them to the acquisition of finiteness. In these languages, the negator appears in a position following the morphologically finite verb. In addition to tense, finiteness marks the fact that predicative information is asserted in relation to a topic (Klein 1995). In the target languages under discussion this also holds for negative utterances. As shown in example (1), learners often start out with the assumption that the relation between predicate and topic has to be specified by either finiteness (assertion) or negation.

- (1) gefänge IS gut, zu hause NICH essen
prison is good, at home not eat
'Being in prison has advantages if one doesn't have anything to eat at home'

Whereas semantic finiteness (assertion) can be expressed by the mere juxtaposition of topic and predicate from early on, consecutive learner varieties differ with respect to the way in which finiteness is marked with morphological and syntactic means. Learners have been shown to proceed from an early variety, where utterances mainly consist of nominal elements, to a second one characterized by the use of nonfinite verbs (Basic Variety) before they reach a variety in which finite verbs prevail (Klein & Perdue 1997). According to the most characteristic utterance type, these stages have been labeled NUO (Nominal Utterance Organization), VUO (Verbal Utterance Organization), and FVO (Finite Utterance Organization).

At the NUO stage, assertion in the sense of linking a (mostly nominal) predicate to a topic can be expressed, but there is no formal marking of finiteness. The placement of the negator is therefore independent of finiteness – it mostly precedes the NP in its scope (in case the of contrastive topics it can also follow it). When learners reach the VUO stage, the predicative part of their utterances

mostly contains a morphologically nonfinite lexical verb. Despite a few occurrences of the copula or presentational constructions, finiteness is not yet systematically marked by syntactic or morphological means. Negation in VUO precedes the lexical verb but follows the copula as shown in (2) and (3) for German.

(2) Polizei NICH GUCK-MAL
 police not look
 'The policeman didn't look.'

(3) in Deutschland IS NICHT palm
 in Germany is not palm tree
 'There are no palm trees in Germany.'

Learners entering the FUO stage first develop a system in which auxiliary verbs (nonthematic verbs) can be seen as formal instantiations of finiteness. In the absence of lexical content they spell out assertion and tense. The negator follows the auxiliary verbs as in (4), but still precedes lexical verbs.

(4) ich HABE NICH gemacht
 I have not done

This developmental step has quite some advantages for the learner. The former utterance structure remains intact and the scope of negation is still marked in a very transparent way (adjacent to the right of the auxiliary). These principles have to be given up when learners no longer restrict the expression of finiteness to nonlexical morphemes, but acquire morphological finiteness marking of lexical verbs. Only then is the negator put in a target-like position to the right of finite lexical verbs as in (5).

(5) ich SAGE NICHT deine name
 I say not your name
 'I don't tell your name.'

Postverbal negation is thus first acquired with the copula (at VUO), then with auxiliary verbs and finally with lexical verbs (at FUO). It can be concluded from this development that verbs have to be finite in order to be used with postverbal negation. Learners must have understood that finiteness marks tense and assertion, that the expression of these notions is kept to the left of negation and that they can fuse with the lexical content of a verb. The relation between finiteness and negation is easier to discover with nonthematic verbs since they function as lexically empty carriers of semantic finiteness. These verb types therefore play a leading role in the acquisition of finiteness and postverbal negation.

8.2.2 From lexical to grammatical expression of temporal relations: Contrasting French and Dutch L2

Benazzo investigated the transition from lexical to grammatical means for the expression of temporal relations. The comparison of recent studies based on longitudinal ESF data of French and Dutch L2 (Benazzo 2003 and Starren 2001) highlights the crucial role of the acquisition of both auxiliaries and specialized particles as an intermediate step towards the development of finite verbs expressing tense and aspect.

In early L2 varieties (Basic Variety), temporal relations are expressed by lexical means, i.e., mainly adverbials and the *Aktionsart* of the verb. In the transition towards finite utterance organization, learners of Dutch L2 have been shown to develop idiosyncratic structures with two free morphemes as distinct markers for tense and aspect (Starren 2001). As can be seen by contrasting the following examples, the morpheme in the first position encodes the tense relation "present" vs. "past", while the morpheme in the second position signals aspect: *heeft* 'has' for perfect and *is* 'is' for imperfectivity.

- (1) dan IS hij HEEFT werk aanvragen
 then is he has work ask
 'then he has asked for work.'
- (2) die WAS bij Charlie IS gestaan
 'that (=girl) was with Charlie is stood
 'the girl was standing near Charlie.'

Such constructions allow the learner to split up tense and aspect instead of expressing them in a combined way as in the target language (TL) finite verb forms.

The production of Spanish learners of French L2 does not provide evidence for the presence of double protoauxiliaries, but the emergence of finite verbs coincides with the productive use of *déjà* 'already' (Benazzo 2003). This adverb is initially in complementary distribution with finite verbs. Its function is rather ambiguous between marker of (past) tense and of (completed) aspect, as it invariably shows up in contexts that are compatible with both readings (example 3).

- (3) je [arrive] à la maison à 8h y la fête DEJA [fini]
 I arrive home at 8 o'clock and the party already finish

Considering the aspectual reading (marking the post-state of a situation), the use of *déjà* at this stage is comparable to the use of morphological means found in other target languages: in Dutch and German, for example, past participles

are attested before the emergence of the auxiliary. The preference for *déjà* in French L2 is probably related to the problem of discriminating between the learners' base forms and past participles, which, contrary to Dutch and German L2, very often have the same phonological form: [arive] and [sorti] are learners' typical base forms and they sound like TL past participles.

The later combination of *déjà* with finite verbs (examples 4-5) shows that learners have overcome its stereotyped association with past situations and resolve its ambiguous status in favor of an aspectual marker:

(4) (ma fille) elle va DEJA à l' école
(my daughter) goes already to school

(5) DEJA Carlos il [ete] en la maison...
already Carlos was at home...

At this stage, the learners' verbal system includes an opposition between simple forms equivalent to the present and structures containing auxiliaries, while the *imparfait* is restricted to *être* 'to be' and *avoir* 'to have'. There is thus no aspectual distinction for the past. In (4-5), the finite verb seems to encode the 'tense' value, while *déjà* marks an aspectual relation indicating that the situation is over or has started before the time interval expressed by the verb.

These constructions can be put on a par with the analytic ones found by Starren (2001) in Dutch L2: in both cases tense and aspect are expressed by separate means. As both free morphemes as well as specialized particles + lexical verbs (Vlex) appear before synthetic verb forms, their acquisition seems to represent an intermediate step towards the acquisition of finite verb forms. Learners tend to split up temporal and aspectual components, expressing them in an analytic way before packaging both values and the lexical content of the verb in one form.

8.3 Age

Besides a comparison of first and second language acquisition and cross-linguistic comparisons, the project also investigates the impact of the learner's age at first contact with a second language.

In his Ph.D. project, Pagonis studied age-related differences in the untutored acquisition of German L2 in two Russian sisters aged 8 and 14 at acquisition onset (see Annual Report 2004). He observed that the younger learner gets significantly closer to the target variety than her older sister.

Explanations attributing age-related differences in L2 acquisition to a loss in neural plasticity in language-relevant brain areas (critical period hypothesis)

have been questioned by end-state studies proving that late learners can attain native-like proficiency (e.g., Birdsong 1992, Bongaerts 1997, Moyer 1999).

In his corpus study, Pagonis examined the plausibility of an alternative explanation for these age-related differences, claiming that young beginners attain native-likeness as a means of social identification whereas late learners predominantly aim at mere referential communication in the second language and therefore cease to adapt to its communicatively less relevant aspects.

Pagonis found the following differences in the development of morphology, syntax, pragmatics and the lexicon. In contrast to her younger sister, the late learner:

- fails to systematically apply inversion despite early and correct usage in some contexts;
- acquires a significantly smaller set of modal particles even though the lexicon of both learners is almost equally comprehensive;
- overgeneralizes one suffix in 90% of all cases for attributive adjectives without an attempt to use other target-like forms (correctly or incorrectly) in spite of their massively frequent occurrence in the input;
- makes frequent use of nominal inflectional morphology where it has a function (e.g., genitive singular *-s* of the declension of strong nouns) but consistently ignores forms with less functional value (e.g., *-en* of the weak noun declension);
- acquires the regular system of person-number agreement and tense marking in verbs but fails to do so where the target language shows formal irregularities.

The lack of attention to communicatively less relevant features in an otherwise highly functional variety in the older learner does not appear to stem from a neurobiological difference in her acquisition capacity relative to that of her younger sister. Rather, it points to a socio-psychologically driven lack of motivation to totally assimilate to the surrounding speech community.

CHAPTER 9
THE DYNAMICS OF MULTILINGUAL
PROCESSING

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Introduction

The Multilingualism project, headed by Gullberg and Indefrey and sponsored by a grant from the Netherlands Organization for Scientific Research (NWO), is devoted to the study of the processing of second and third languages (L2+) during first contact, during acquisition, and in the (stabilized) end state of high proficiency or functional bilingualism. These aspects of L2+ processing are explored using different methods, including reaction time and eye-tracking experiments, gesture analysis, and neuroimaging techniques (fMRI, ERP). The project is in part situated at the F.C. Donders Centre for Cognitive Neuroimaging.

9.1 The effects of exposure to an unknown L2+

Dimroth, Gullberg, Roberts, and Indefrey continued to examine the earliest perception and processing of input in an unknown L2. Native Dutch listeners were exposed to seven minutes of controlled but naturalistic input in the form of a weather report in Mandarin Chinese, a typologically unrelated L2 that was unknown to the participants. The weather report included a set of nominal, verbal, and functional target words that were either frequent (8 occurrences) or infrequent (2 occurrences). Half of the target words were also highlighted with gestures forming a deictic link to the referential content, i.e., the icons on the weather charts. Figure 9.1 illustrates the stimulus material.

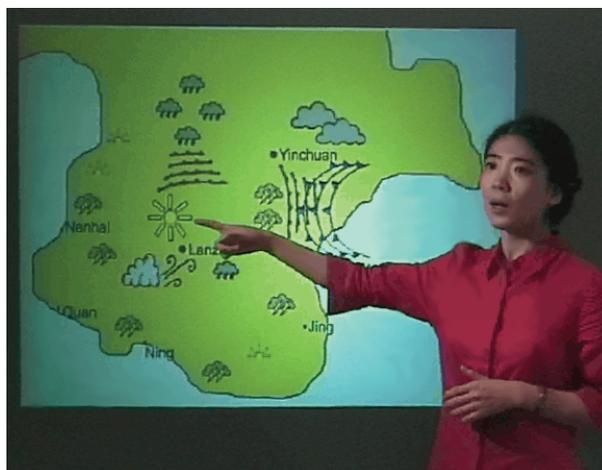


Figure 9.1: Example stimulus from First Exposure study

We first examined whether learners can extract segmental, word-related information from complex, continuous speech input after minimal exposure.

Learners watched the weather report without any particular instructions and then performed a word recognition task, in which they were asked to indicate whether a word had occurred in the weather report or not. The results indicate that adults recognize word forms after only 7 minutes if the forms have been frequent and gesturally highlighted in the input. Mono-syllabic words were only recognized if frequent and gesturally highlighted, whereas bi-syllabic words were recognized even if infrequent and not accompanied by gesture.

Second, we investigated the conditions under which adults can link meaning to the sound strings they recognize, i.e., extract lexical-semantic information. Again, learners watched the weather report without any particular instructions and then performed an auditory picture-word-matching task. After 7 minutes of exposure adults were unable to link meaning to sound strings and performed at chance. However, after double exposure to the weather report (i.e., 14 minutes), adults reliably assigned meaning to bi-syllabic nouns that had been frequent and gesturally highlighted in the input. Therefore, though sufficient for recognition, 8 encounters with a gesturally highlighted noun in an unknown language were insufficient for meaning assignment. However, it only required 16 encounters with gesturally highlighted nouns for adults to be able to reliably link meaning to sound strings.

The findings from these experiments suggest not only that lexical learning presupposes some segmental knowledge, but also that the number of exposures adults need to go from segmental to lexical learning is very small. The difference between 8 and 16 encounters with a gesturally highlighted word equals the difference between only recognizing it and knowing what it means. Moreover, the experiments show the importance of syllable structure for the segmental task, and also indicate that cues like gestures and item frequency work in tandem at first exposure. Overall, the results suggest that the adult learning mechanism is a great deal more powerful than normally assumed, and that adult learners have considerable capacities for extracting segmental and lexical information from complex, continuous speech input.

9.2 The dynamics of the transition towards automatic processing of L2+

9.2.1 Neural correlates of L2+ syntactic processing

Indefrey, Davidson, Hellwig, and Gullberg continued their research on functional reorganization at the neural level in the course of L2 acquisition. In a longitudinal fMRI study using a scene description paradigm (Annual Report 2004:124-125), Mandarin native speakers learning Dutch participated in further measurements at nine and fifteen months post learning onset. The results

confirmed the earlier finding of native-like hemodynamic response differences between sentences compared to word lists in Broca's area and a posterior temporal region that had been first observed after six months. Apart from strengthening the reliability of the earlier finding, the results suggest that the underlying functional reorganization is stable.

Indefrey, Davidson, Hellwig, and Oliver completed the data acquisition of a new longitudinal experiment investigating the acquisition of Dutch syntax in twelve German native speakers who followed an intensive course of Dutch for four to six weeks. At three time points during and after the course, the participants underwent a test battery including a language questionnaire, a nonverbal intelligence test, two standard Dutch proficiency tests, a grammaticality judgment task, a word-monitoring-in-noise experiment, an fMRI experiment, and an MEG experiment. So far only the behavioral data have been analyzed, showing a rapid increase in general Dutch proficiency, which was expected given the typological proximity of the two languages. The word monitoring experiment, comparing normal spoken sentences (NP), syntactic prose stimuli (SP), and random prose (RP) stimuli showed faster reaction times to stimuli containing syntactic structure (NP and SP as compared to RP) already at the first measurement point (week 1 or 2 of learning Dutch). In contrast to Dutch controls, there was no additional semantic facilitation (NP versus SP) at the first measurement point. From the second time point (week 3 or 4) onwards, however, the German learners also showed a semantic facilitation. Surprisingly, German learners of Dutch showed no stronger adverse effect of noise on performance than Dutch native controls. The grammaticality judgment data suggest an effect of a crucial experimental manipulation also used in the fMRI and MEG experiments. In contrast to their overall syntactic similarity, German and Dutch differ with respect to the word order in sentence final verb clusters. We created Dutch sentences following either Dutch or German word order. The German learners of Dutch initially judged sentences with German word order (thus violating Dutch syntax) as better, showed mixed results after 3 or 4 weeks of learning, and had acquired this aspect of Dutch syntax at the final time point (2 months after the course). fMRI and MEG data are currently being analyzed.

9.2.2 Real-time processing of L2+ morphosyntactic features

Schneider continued her Ph.D. research on the transfer of L1 syntactic mechanisms to the processing of L2 in intermediate learners. She completed the data acquisition of an fMRI experiment on the processing of Dutch sentences with SOV, SVO, and VSO word orders by Turkish learners of Dutch and by native Dutch controls.

Indefrey conducted a meta-analysis of the findings of 30 hemodynamic experiments comparing within-subject L1 and L2 language processing in a range of tasks. The results suggest that, compared to L1 processing, reliably stronger activation during L2 processing is found within some, but not all regions that are also typically activated in native language processing. The relative influence of L2 onset, proficiency and exposure on stronger L2 activation differs between tasks. While for word-level production the current evidence is compatible with a role for all three factors, this is different for word-level semantic processing in comprehension, where L2 onset and exposure do not seem to play a major role. L2 onset is the most important factor for activation differences related to syntactic processing in sentence comprehension. However, even in late L2 learners stronger L2 syntactic processing activations only become visible when subjects are required to make explicit metalinguistic judgments.

9.3 The interaction of L1 and L2+ processes in the proficient speaker

9.3.1 Interactions in multilingual syntactic processing

This line of study continues to investigate possible L1-L2 interactions in bilinguals at the syntactic level. In an earlier study (Annual Report 2004: 126-127), Roberts, Gullberg and Indefrey collected eye-movement data, comprehension questionnaire data, and acceptability judgments to examine Turkish-Dutch bilinguals' subject pronoun resolution processing in comparison to a group of native Dutch speakers. In Dutch, overt subject pronouns are obligatory, whereas in Turkish they are optional, their use being governed by pragmatic factors. In Turkish, overt subject pronouns in complex sentences can only have a disjoint interpretation. This is illustrated in [1] below, where the singular subject pronoun 'o' can only co-refer with the nonlocal referent [Hans]. In contrast, in the comparable Dutch construction [2] the subject pronoun 'hij' can co-refer with the local antecedent [Peter].

- (1) Peter ve Hans ofiste oturuyorlar. Peter çalışırken, o sandviç yiyor.
'Peter and Hans are in the office. While Peter is working, he [Hans] is eating a sandwich.'
- (2) Peter en Hans zitten in het kantoor. Terwijl Peter aan het werk is, eet hij een boterham.
'Peter and Hans are in the office. While Peter is working, he [Peter] is eating a sandwich.'

- (3) De werknemers zitten in het kantoor. Terwijl Peter aan het werk is, eet hij een boterham.
'The employees are in the office. While Peter is working, he [Peter] is eating a sandwich.'
- (4) De werknemers zitten in het kantoor. Terwijl Peter aan het werk is, eten zij een boterham.
'The employees are in the office. While Peter is working, they [The employees] were eating a sandwich.'

The specific question addressed was whether the bilinguals would resolve subject pronouns in Dutch like native Dutch speakers, or whether such L2 processing is influenced by their L1. The latter would predict a preference for a disjoint interpretation for the pronoun in constructions such as (2): Turkish subjects would assume that the pronoun 'he' refers to Hans, not to Peter. The results found an effect of language dominance in the bilingual group, such that those who were less proficient in Dutch differed in their on-line eye-movement patterns. Unlike the Dutch and the Dutch dominant bilinguals, these Turkish L2 learners' fixation times were shorter for conditions where only one possible referent for the pronoun was grammatically available, whether this led to a local (3) or a disjoint interpretation (4). In contrast, when either a local or a disjoint reading for the pronoun was available (2), processing difficulty reflected in longer fixation times was observed. This indicated that these L2 learners' earliest pronoun resolution processing may be under the influence of their L1, but that this L1 influence may come into play only in constructions where the L2 grammar allows for such L1-L2 competition. In order to investigate this further, a group of German L2 learners of Dutch matched for proficiency with the Turkish L2 group were tested with the same experimental tasks. German and Dutch subject pronouns are similar in their distributional properties and thus the German L2 learners were expected to perform like the Dutch native speakers. Off-line, the German L2 learners' interpretations for the pronoun in constructions like (2) above matched those of the Dutch control group, with local resolution overwhelmingly preferred, in contrast to the Turkish learners, who showed optional interpretation for the pronoun in the off-line task. However, this L1 influence was not in evidence in the fixation data. On-line, the German and the Turkish learners patterned together, both with higher fixation times for (2) suggesting processing difficulty in this condition. Taken together with the earlier results, these findings suggest that compared to native speakers, subject pronoun resolution is more difficult for less proficient L2 learners when the pronoun is ambiguous, irrespective of either the properties of their L1 or their final interpretation for the pronoun.

A second line of study on syntactic processing measures ERP and oscillatory responses to grammatical and semantic violations in proficient Dutch speakers of English. Previous electrophysiological work on semantic processing in bilinguals has shown that second language event-related potential (ERP) responses to semantic violations, such as the N400 effect, have a similar topography as in a first language, but are sometimes delayed. To further quantify the differences between first and second language electrophysiological responses to semantic violations and to examine the relationship between the N400 effect and violation-related changes in spectral power observed in an earlier experiment (Annual Report 2004: 128), Davidson compared Dutch (L1) and English (L2) responses using the contrast between semantic violation and control sentence completions (examples shown in 1 and 2; critical word in italics).

- | | | |
|-----|---|-------------------|
| (1) | Het meisje spreekt drie <i>bomen</i> . | Dutch Violation |
| | De wind speelt met de <i>bomen</i> . | Dutch Control |
| (2) | The little girl speaks three <i>trees</i> . | English Violation |
| | The wind rustles through the <i>trees</i> . | English Control |

As in previous ERP research, we observed an N400 effect (violation-control) in both L1 and L2. An analysis of the joint time-frequency responses to the same violations revealed an increase in theta band (3-5 Hz) power for the L1 semantic violations, but no corresponding increase in power in the L2 response. This result is evidence that the N400 and the theta band power increase are not intrinsically linked, and that time-frequency decomposition may reveal certain differences in the electrophysiological response between first and second languages that are not reflected in the N400 response.

9.3.2 Interactions in multilingual lexical access

Menenti and Indefrey tested assumptions of the Revised Hierarchical Model (RHM, Kroll and Stewart, 1994) in a new between-language phonological priming paradigm. The RHM assumes that words in a bilingual's languages have separate word form representations but shared conceptual representations. Two routes lead from an L2 word form to its conceptual representation: a word association route, where concepts are accessed through the corresponding L1 word form, and a concept mediation route with direct access from L2 to concepts. The model assumes a developmental pattern, with concept mediation increasing as proficiency increases. Proficient German-Dutch bilinguals were presented with L2 noncognate word pairs in which the L1 translation of the first word rhymed with the second word (e.g., GRAP [joke] – Witz [joke] – FIETS [bike]). If the first word in a pair (GRAP) activated its L1 equivalent (Witz), then

a phonological priming effect on the second word (FIETS) was expected. Priming was observed in lexical decision but not in semantic decision (living/nonliving) on L2 words. In a control group of Dutch native speakers, no priming effect was found. These findings suggest that, in contrast to the prediction by the RHM, proficient bilinguals still make use of their L1 word form lexicon to process L2 in lexical decision.

To investigate the neural correlates of L1 word form activation in an L2 task, an fMRI experiment was conducted. Proficient German-Dutch bilinguals performed voice decisions, lexical decisions, or semantic decisions in their L1 and L2. The right middle temporal gyrus was the only area responding more strongly to L1 than to L2. Based on the results of the behavioral experiment suggesting that between-language word association takes place in lexical but not semantic decision, an interaction between task and language was expected in an area that processes L1 word forms. Such an interaction was again found in the right posterior middle temporal gyrus. Activation of this area may therefore reflect activation of L1 word forms during L2 lexical decision.

9.3.3 Interactions in multilingual processing at the conceptual/semantic interface

A. Brown continued her dissertation research investigating bi-directional relationships between Japanese (L1) and English (L2) in the domain of event construal in motion events. The analyses focused on Manner and Path expressions and co-speech gestures. Elicited narrative production data were collected from monolingual Japanese speakers, monolingual English speakers, and high-intermediate Japanese speakers of English resident in Japan or the USA. Six motion event descriptions in the L1 have been analyzed to date.

In speech expressing Manner and Path, both groups of monolinguals lexicalized Path in ways predicted by typology (Talmy, 1991): in verbs in Japanese and in adpositional phrases in English. (1) and (2) below show examples in monolingual Japanese and monolingual English each with one Path expression (in italics) per verb clause.

(1) Neko-ga amadoi-no naka-wo *tsutat*-te
Cat-NOM gutter-GEN inside-ACC go.along-CON
'The cat goes along the inside of a gutter'

(2) Sylvester crawls *up* the drainpipe

Furthermore, there were no differences between monolingual groups in the number of Path expressions per verbal clause. In contrast, speakers of Japanese with knowledge of English lexicalized Path in their L1 in a combination of verbs and adpositional phrases and packaged significantly more Path expressions into

each verbal clause than both monolingual groups. (3) below shows an example of a verb clause with three Path expressions: one verb and two postpositions.

- (3) Chijyou *kara* tokoro *made* nobotte *it-te*
Ground from place to climb go-CON
'(He) went climbing up from the ground to the place'

Differences were also found in gestures depicting Manner and Path, specifically in perspective taken: character versus observer. Japanese monolinguals used significantly more character-perspective gestures (sagittal and bi-manual, employing an enactment hand-shape) than English monolinguals who preferred observer-perspective (lateral and single-handed, employing no enactment hand-shape). In contrast to the monolinguals, Japanese speakers with knowledge of English patterned significantly differently, showing equal tendencies to adopt either perspective.

Similarities in the above speech and gesture patterns between learners resident in Japan and the USA suggest that intra-language variation from monolingual Japanese patterns does not result from cultural exposure, but arises from linguistic convergence between the L1 and L2. Therefore, in addition to well-known effects of L1 on L2, a bi-directional relationship is likely, whereby L1 usage patterns may be affected by the presence of an L2 system, even at intermediate levels of L2 proficiency.

Another line of research investigated the time course of the availability of a conceptual representation in object recognition. When speakers produce multiple-word descriptions of visual scenes, object recognition and conceptual preparation of the message to be produced are interleaved with utterance formulation. Davidson, in collaboration with Korvorst (Aachen University), conducted an electrophysiological study of object recognition to understand when speakers have extracted the conceptual information that would form the basis for a multiple-word utterance. Subjects saw a series of randomized analog, digital, or verbal time displays and judged whether the successive times were identical or not. A negative amplitude response to mismatching compared to matching times was observed approximately 350-400 ms after time display onset, with no difference between times that mismatched only on the hour, only on the minute, or both. The results suggest that viewers extract the hour and the minute conceptual information in parallel. The results complement studies of clock time production using eye-movement techniques (see Utterance Encoding section) by providing an estimate of when conceptual information from clock displays is available. The results will also serve as a basis for further studies of bilingual phrase production.

9.3.4 Complex interactions in multilingual processing: Code-switching

Gullberg, Indefrey, and Muysken (Radboud U. Nijmegen) continued to examine code-switching, i.e., the switching from one language to another mid-utterance. Code-switching (CS) offers a particular perspective on parallel processing of two languages as it indicates that two co-existing language systems are being processed simultaneously. Using bilingual and code-switching experimenters, we have collected data from the same 21 Papiamentu-Dutch bilinguals on several tasks progressing from interactive to individual settings, and from more naturalistic to experimental tasks (Annual Report 2004: 129). Baseline CS data consist of natural four-party conversations, and data from a dyadic director-matcher task intended to elicit complex noun phrases with adjectival modifiers. Both data sets have been fully transcribed and tagged for language and grammatical category and constitute the first adult Dutch-Papiamentu corpora available. The corpora are multi-modal – sound is already fully linked, and the linking of video data is in progress (cf. Figure 9.2). The corpora contain a rich inventory of natural inter- and intra-sentential switches, as well as switches between and within constituents. Dutch baseline data come from the same director-matcher task as above performed in Dutch only, and scores from a standardized Dutch proficiency test (Nt2 Staatsexamen). The baseline data sets are used to validate the experimental data, as well as to help determine language issues.



Figure 9.2: Example from Papiamentu-Dutch four-party conversation corpus.

We have previously reported on the results from the first experimental task, a picture naming task intended to examine what factors influence language choice when switches occur between major constituents (Annual Report 2004: 130). Our current work focuses on postulated constraints on switches occurring within constituents. One such constraint concerns the effect of conflict sites where the grammars of the two languages are in opposition. Noun (N) adjective (A) order constitutes a conflict domain in the current language pair since the word orders

differ in Dutch (AN) and Papiamentu (NA). It has been suggested in the literature that switches leading to such conflicts in surface grammar should not occur. Yet the baseline data contain examples like (1) and (2):

- (1) un refresco groen
det(P) drink(P) green(D)
- (2) un groen refresco
det(P) green(D) drink(P)
'a green drink'

Example (1) has Papiamentu word order, NA, and example (2), has Dutch word order, AN. We are currently examining what factors may determine the possible word orders in and the processability of such mixed noun phrases (NPs). The effect of the language of the functional morpheme, the determiner, and the language of the preceding finite verb (either Dutch or Papiamentu) is considered. We use a shadowing task and an acceptability judgment task in order to compare potential differences within subjects in the on-line processing of these mixed sentences and off-line meta-linguistic assessments of their naturalness and conformity to code-switched grammar.

Dikker, under the supervision of Indefrey, investigated the comprehension of code-switched sentences with different VP internal word orders in bilingual English/Dutch subjects. Using the sentence matching paradigm, she found that reaction times to sentences in which VP word order followed the language of the auxiliary (Jan heeft [has] A NEW BOOK BOUGHT) were shorter than to sentences in which VP word order followed the language of V (Jan heeft [has] BOUGHT A NEW BOOK). The data suggest that code-switched sentences are easier to parse when the code-switched constituent follows the syntax of the matrix clause, providing complementary evidence to corresponding production data on code-switching.

CHAPTER 10
SIGN LANGUAGE TYPOLOGY

Participants:

Ulrike Zeshan (coordinator)

Waldemar Schwager

Sibaji Panda

Gede Marsaja

Ketut Kanta

Kang-Suk Byun

Eugenio Ravelo

Sergio Marmora de Andrade

Susan Fischer

Pamela Perniss

Joint research with other projects:

Space

Event Representation

Introduction

In 2005 the Sign Language Typology group continued to work on the documentation and typological comparative study of sign languages around the world. In addition to broadening its geographical scope by including new staff members from India and South America, a new thematic focus about sign languages used in village communities was established. Existing projects continued with new data contributed by deaf staff members from their own sign languages (Panda – India, Ravelo – Venezuela, Andrade – Brazil), as well as data gathered during fieldwork by Schwager in Indonesia. The crosslinguistic project on possession and existentials progressed from the pilot stage to the data collection stage in 2005. Due to important political developments, the applied linguistics projects focused on Turkey.

10.1 Crosslinguistic project: Possession and existence

This project is coordinated by Zeshan and was launched in 2004 with a pilot study and the development of stimulus materials, which were sent to co-researchers around the world. The major development in 2005 has been the collection of sign language data both by external partners and inside the Sign Language Typology group. A total of 28 sign languages are now represented in the project: 12 from Europe, 1 from Australasia, 9 from Asia, 5 from the Americas and 1 from Africa. The project has been able to recruit new participants from several regions that were previously not represented at all, such as South Africa, the Arab World and Iran, as well as adding South American sign languages from the research group's own staff members.

10.1.1 Contributions by external partners

After adding a number of new project members, the partnership now has 21 external members in the following countries and regions: Australia, Austria, Belgium, Catalonia, Croatia, Finland, France, Greece, Hong Kong, Iran, Israel, Jamaica, Japan, the Netherlands, Poland, Quebec, South Africa, Spain, Taiwan, the UK, the US and Venezuela. Most of these partners were engaged in data collection for the project during 2005, working with either the stimulus materials for elicitation or with the typological questionnaire or both. During the data collection phase that is done locally by each partner, the usual course of action has been to use the stimulus materials (game activities involving pictures and other visual materials) with pairs of deaf signers. The signers were filmed while being engaged in the game activities, which had been designed to elicit various target structures in the domain of possession and existence. Either subsequently or in parallel, the local research teams worked with the typological questionnaire also provided by the Sign Language Typology group. While

answering the questionnaire for their own sign language, local research teams referred back to the elicited video data to cross-check their answers and find examples for each target structure from the video data. These examples together with the questionnaire answers are forwarded to the project coordinator to be compiled and comparatively analyzed. By the end of 2005, the first such responses were received from Catalonia, Austria, Spain and the UK. Zeshan and Perniss have begun compiling these data systematically and will continue to do so in 2006.

10.1.2 Internal contributions

After fieldwork in Germany and South Korea in 2004, the stimulus materials were again used for further data collection in 2005 by several members of the Sign Language Typology group. Panda collected data from Indian deaf signers in Mumbai in February/March. In December, the game materials were used by a previous staff member (Dikyuva) in Turkey and by a future staff member (Hendriks) in Jordan. The Venezuelan project participant (Ravelo) joined the Sign Language Typology group for two months in 2005 and worked directly with Zeshan on the questionnaire in addition to analyzing video data recorded in Venezuela. The new deaf Brazilian staff member Andrade worked on the questionnaire with guest researcher Fischer, resulting in four hours of videotaped discussions and example utterances. The next step in the development of this project will now be to create an optimal system for compiling and categorizing all the data, so that the comparative typological analysis can proceed in 2007 in the last stage of the project.

10.2 Village sign languages

The Sign Language Typology group began a new thematic focus of research in 2005, the study of village-based sign languages. These are sign languages used in village communities with an unusually high percentage of deaf people over a long period of time due to genetic reasons. The first such case documented in the literature was the island of Martha's Vineyard in the US (Groce 1980), which was, however, never linguistically documented and has since died out. Since then, a number of such "deaf villages" have been reported on, and some have been documented from an anthropological and socio-cultural point of view. However, the linguistic documentation of grammatical structures of the sign languages used in these village communities has only just begun in recent years. Known "deaf villages" exist all over the world, for instance in Ghana, Thailand, Israel, and Mexico. The Sign Language Typology project (Marsaja, Kanta, Zeshan) intensively studied such a village sign language in northern Bali.

10.2.1 Kata Kolok in Bali

Kata Kolok (literally "deaf language") is used in a village population of about 2,500 people in northern Bali, among which there are currently 48 deaf persons. In this village the incidence of deafness, which is hereditary and carried by a recessive gene, is thus 40 times higher than would normally be expected. All deaf people in the village are monolingual signers, while almost all hearing people are bilingual in the sign language and the spoken language(s) used in the village community. In order to study the structure of this language in detail, Marsaja and Kanta joined the Sign Language Typology group in 2005, arriving from Bali with about seven hours of video recordings from the village. Kanta is a hearing signer from the village itself and grew up using the sign language natively. In July 2005, Marsaja, Kanta and Schwager undertook another short focused field trip to gather additional Kata Kolok data. They integrated all video data into the sign language corpus, and Kanta transcribed substantial sections of these data using the ELAN software.

The analysis of linguistic structures of Kata Kolok undertaken by Zeshan and Marsaja focused on the use of the sign space and on selected morphological paradigms. These research domains intersect with other subprojects of the Sign Language Typology group (see 10.3.2 and 10.5.1). In addition to working with the data corpus, Kanta served as informant for further elicitation of particular target structures and examples, which were recorded in the project group's own filming lab.

In addition to the peculiar sociolinguistic situation in a "deaf village", which is very unlike the situation in urban deaf communities, Kata Kolok has added substantially new insights into the study of structural diversity across sign languages, which is one of the main target research areas of the Sign Language Typology project. The use of sign space in Kata Kolok is very different from what is known about other sign languages. Kata Kolok signers only use sign space to talk about spatial relationships but lack all metaphorical uses of space to talk about nonspatial relationships such as time, transitivity and logical relations. The latter use of space is common in all urban sign languages documented so far. Moreover, Kata Kolok signers make prominent use of absolute cardinal directions in their spatial system, which has consequences for several structural domains (see the chapter on Space in this annual report for details about the use of sign space in Kata Kolok). One of the purposes of the second field trip was to run an experiment on the use of absolute space in Kata Kolok. For this purpose, signers who had been filmed during the first field trip were asked to retell some of the same stories but sitting at a different location facing in a different direction. These experimental data confirm that Kata Kolok

signers do indeed use absolute spatial reference rather than assigning referents to arbitrary locations in sign space.

An initial appraisal of possessive structures in Kata Kolok suggests that this language also behaves differently from other sign languages known so far, although there are spoken languages that use equivalent structures. Kata Kolok does not have any specialized signs of possession or existence. Rather, Kata Kolok signers use what Heine (2000) has called the "locational strategy", that is, location, possession and existence are all expressed in the same way. The utterance HOUSE INDEX-POINTING can thus refer to either the location of the house, predicate the existence of the house, or indicate that the house belongs to someone, depending on the context of the utterance. So far Kata Kolok is the only sign language in the comparative project on possession to use the locational strategy to express possession. However, a detailed analysis of possessive and existential structures in Kata Kolok has yet to be undertaken in 2006. Interesting morphological paradigms collected for inclusion in the sign language typology database included color terms, kinship terms, and paradigms of quantification. The latter are of particular typological relevance in several respects, for instance, in the relative absence of morphologically complex forms that characterize numeral paradigms in most other sign languages and in the use of numbers, where numerals above 100 are used with reference to money only. Another interesting paradigm concerns the so-called "whole-entity classifiers", hand shapes that stand for certain referents such as an upright index finger representing a person or a flat open hand representing a vehicle. The movement and location of these entities can be mapped on the movement and location of the hands, and this is a common phenomenon in all known sign languages. Kata Kolok also has such classifiers, but their form and classification differs from other sign languages. In particular, the movement pattern (e.g., wavy vs. straight movement) is important in these Kata Kolok signs in addition to the hand shape in order to differentiate between classifier forms that have the same hand shape but different movement patterns.

10.2.2 Village sign languages and sign language typology

The first village sign language investigated in the Sign Language Typology project has already shown convincingly how important such deaf villages are for the comparative study of sign languages. The many crosslinguistically unusual features of Kata Kolok add greatly to the linguistic mosaic of sign languages around the world and are of great theoretical importance as well. The finding that entire subsystems are lacking Kata Kolok leads us to expect further discoveries of unusual linguistic structures in other village sign languages as well. This was the case with the metaphorical use of sign space, which had been

found in all urban sign languages and was previously considered a sign language universal. It is therefore imperative to document the linguistic structures of other sign languages as well. For this reason, the Sign Language Typology Group is planning to work on another village sign language from Ghana in 2006, and will also be hosting a workshop on village sign languages in April 2006 in order to stimulate further research in this area.

10.3 Sign language documentation

10.3.1 Sign language corpus

Schwager continued to act as corpus manager for the sign language corpus throughout 2005. New data are now processed entirely within the Sign Language Typology group using the MPI's new LAMUS tool for corpus management. Data collected in the group's sign language documentation project include those collected by Schwager in two regions of Indonesia (Jakarta and Makassar), data from Brazilian Sign Language collected by Andrade, and the Kata Kolok data from Bali. A new corpus node was established for the morphological paradigms that will be used for the typology database (see 10.3.2). The data from the possession project are currently not included in the Browseable Corpus because organizational issues first need to be resolved.

10.3.2 Sign language typology database

The collection of morphological paradigms for the sign language typology database continued in 2005. We now have standardized procedures for collecting these data from new project members. Data in the target domains (color terms, interrogatives, kinship terms, negatives, numerals, possession, and sensory perception) were collected from Kata Kolok, Venezuelan, Indian and Brazilian signers. This brings the number of sign languages up to nine, which is enough to begin constructing the actual database in 2006.

10.4 Applied linguistics projects

The Sign Language Typology project continues its commitment to providing social, political and educational impulses to deaf communities. In 2005, the focus of work was on Turkey because new disability legislation adopted in the summer recognized the need for Turkish Sign Language interpreter training and for the use of sign language in educational settings. Zeshan and Dikyuva obtained World Bank funding to run a sign language teacher training program as well as sign language classes for hearing people in several locations in Turkey. Training was organized in Istanbul, Ankara and Adana. In addition, Zeshan and Dikyuva consulted with Turkish government bodies in Ankara in October 2005 to help draft the implementation regulations for the new sign language legislation.

10.5 Collaboration with other projects

10.5.1 Space

The use of space in the Balinese village sign language Kata Kolok was investigated in association with the MPI's space project. For details, see section 10.2.1 and the chapter on Space in this annual report.

10.5.2 Reciprocals across languages

Zeshan and Panda continued their association with the "Reciprocals across Languages" project (Evans, U. Melbourne), a subproject of Event Representation where Zeshan is a co-investigator. After the first field trip in 2004, during which Zeshan collected data from Indian signers using the stimulus materials developed at the MPI, Panda undertook another field trip in October 2005 for more focused research on reciprocals, using the detailed questionnaire developed by Evans for this purpose. The first fieldwork data were coded and a number of constructions could be identified that are used to express reciprocity in Indian Sign Language. In addition to several constructions where the reciprocal relationship is only implied rather than explicitly encoded, there are two genuinely reciprocal construction types in this sign language. A verbal derivation expresses reciprocity by adding a reciprocal movement pattern to a transitive verb, resulting in a two-handed form with the second hand mirroring the movement of the first. However, this construction is restricted to a particular verb class of transitive verbs that move in sign space to show verb agreement for subject (starting point of the movement) and object (end point of the movement). Other predicates that cannot take this derivation can be combined with an auxiliary, the second reciprocal construction in Indian Sign Language. The reciprocal auxiliary has three distinct forms, single, repeated, and repeated alternating, each with a slightly different meaning. Both verbal derivations and auxiliary forms can take additional spatial modifications, thereby further increasing their morphological complexity. These data were coded on a standardized coding sheet and forwarded for statistical analysis in December 2005.

CHAPTER 11

OTHER RESEARCH

Overview

- 11.1 Field Work and analyses of Mon-Khmer languages
- 11.2 Child-adult differences in deriving regular linguistic representations
- 11.3 Natural logic of language and thinking
- 11.4 How to obtain perceptual judgments of intonational meaning
- 11.5 Project information structure: The marking and interpretation of focus in Dutch by children

11.1 Field Work and analyses of Mon-Khmer languages

Several members of the MPI are conducting field work and analysis of Mon-Khmer languages of Southeast Asia. Tufvesson's work on expressives in Semai, an Aslian language of Peninsular Malaysia, is reported on in chapter 7, Event Representation.

11.1.1 Tongues of the Semang

Burenhult and Levinson launched a new project entitled "Tongues of the Semang" as part of the DoBeS program (funded by the Volkswagen Foundation). This project aims to document and describe endangered Aslian (Mon-Khmer) languages spoken by groups of foragers in the Malay Peninsula, especially Jahai (ca. 1,000 speakers) and Lanoh (ca. 360 speakers). Burenhult conducted extensive data collection in the field in Perak, Peninsular Malaysia, focusing on subsistence activities and ecological knowledge, as well as associated stories and myths. He also initiated a survey of Northern Aslian languages and dialects, collecting basic linguistic data from Kintaq (ca. 240 speakers), Menriq (ca. 150 speakers) and two varieties of Kensiw (ca. 230 speakers).

11.1.2 Grammatical description of Kàrìì

Enfield continued descriptive field work on Kàrìì, a previously undescribed Vietic language spoken in upland Central Laos. An analysis of the phonological system reveals a complex vowel system, with nine vowel positions, each split into two by phonation register, heavy (marked with grave accent) versus light (marked by acute accent):

ì	ừ	ù
í	ứ	ú
è	ờ	ò
é	ớ	ó
è	à	ò
é	á	ó

Table 11.1.: Kàrìì vowel phonemes.

Kàrìì features productive derivational morphology, for example a set of infixes, including causative -a- (bsót 'to go out (of fire)' vs. básót 'to turn off, put out'); nominalizer -a- (ckááŋ 'hand span' vs. cákááŋ 'to measure something by hand spans'); nominalizer -rn- (kóó 'live' vs. krnóó 'house'). Basic constituent order

is SV/AVO, but there is free ellipsis of nominals, as well as pragmatically conditioned constituent movement, and thus heavy dependence on context for resolution of grammatical relations. There is extensive use of verb serialization as well as prepositions in constructing complex predications, as illustrated in this example from video stimulus elicitation:

píc	sithiàn	léě'	lǒõh	děěw'	nóój	
pull.out		candle	take	exit	from	place

'(She) pulls the candle out from (its) place.'

Like other Mon-Khmer languages (see Tufvesson's entry in the Event Representation chapter, Diffloth 1972), Kàrì has rich lexico-grammatical resources for elaborative and expressive meaning: e.g., *húút* 'tobacco' vs. *húút hóój* 'tobacco and that sort of thing'; *cùj* 'rain' vs. *cùj phĩĩ-phĩĩ* 'rain very lightly, drizzle, unceasingly'.

In the nominal system, a five-way set of spatial demonstrative distinctions is characteristic of a pervasive system of spatial orientation based on the parameters 'up(stream)' versus 'down(stream)' versus 'away/across' (as well as a more basic 'here' and 'away' distinction). This system is closely integrated with the physical environment (a single river valley) and the design of Kàrì houses. Descriptive field work continues.

11.2 Child-adult differences in deriving regular linguistic representations

Birdsong (U. Texas, Austin), Dimroth, and Narasimhan are collaborating in the development of an experimental study of child-adult differences in deriving regular (deterministic) linguistic representations under input conditions where grammatical morphemes occur inconsistently. Recent work (e.g., Hudson-Kam & Newport, 2005) suggests that adults acquire language veridically. That is, inconsistent input gives rise to variability in linguistic representations. In contrast, children appear to depart from the statistical structure of probabilistic input and create patterns of regularity in their linguistic representations. It is possible that children's tendencies to impose order on disorder in grammar learning underlie observed patterns of regularization in creolegenesis. It is also possible that some age-related differences in second language acquisition may be traced to a tendency toward veridical learning in adults and a countervailing tendency toward regularization among children. However, these possibilities have yet to be adequately addressed empirically – in particular, with tight procedural controls and large numbers of subjects. The study under development meets these desiderata. It involves Dutch native speakers of

different ages who are asked to learn a miniature grammar using novel lexical items whose pronunciation is consistent with Dutch phonotactics. Groups representing each of three age ranges (child, adolescent, and adult) are to be exposed to differing rates of occurrence (25% of the time, 50%, 75%, 100%) of a postverbal affix.

Birdsong is also working with de Ruiter on a statistical reanalysis of second language acquisition end-state data from several studies relating to age effects, using modeling techniques that have not heretofore been applied in this area.

11.3 Natural logic of language and thinking

Seuren worked on the question of the natural logic of language and thinking – a project that started in the year 2000. He has meanwhile developed a theory of the way humans deal cognitively with sets. The theory states that humans do not apply standard mathematical set theory in their natural thinking, but impose certain other restrictions, mainly:

(1) The null set and the universe of all objects are not natural sets and do not occur in cognition, though there is a notion of "contextually restricted universe of objects", which does correspond to a natural set. All standard set-theoretic definitions in which the notion "universe of objects" occurs should therefore be redefined for "contextually restricted universe of objects".

(2) When humans think of two (or more) sets, they think of sets that are distinct: IDENTITY is not a natural relation between sets (though IDENTIFICATION is a valid natural operation).

(3) The union of two (or more) sets is defined only for sets that are totally distinct, without intersection. This ensures that the cardinality of set A plus set B equals the result of the arithmetical operation of addition.

(4) The subtraction of a set A from a set B is defined only when A is a proper subset of B. This ensures that the cardinality of B-A equals the result of the arithmetical operation of subtraction.

(5) The intersection of two (or more) sets is defined only for sets that are partially distinct, so that intersection is always partial intersection.

Logical relations (entailment, contrariety, contradictoriness, subcontrariety) are then reduced to set-theoretic relations (inclusion, mutual exclusion, complement, and the relation "A united with B equals the universe of all objects") through Valuation Space Analysis. Now the restrictions (1)-(5) apply. It then results that the well-known discrepancies between mathematically based

formal logic and the natural intuitions of logical relations, disappear: natural logic now fits natural intuitions much better, which makes a pragmatic explanation along Gricean lines superfluous.

The semantic descriptions of the logical truth-functional and quantificational operators (not, and, or, all, some) are likewise reduced to set-theoretical operations (complement, intersection, union, proper inclusion), and again it results that the operators, thus restricted, fit natural intuitions much better than the standard operators, which again makes a pragmatic explanation along Gricean lines superfluous.

The book, now provisionally entitled "Cognitive Realism in the Study of Language", is now in an advanced state of preparation, and he hopes to complete it in 2006.

11.4 How to obtain perceptual judgments of intonational meaning

A. Chen and Rietveld (Radboud U. Nijmegen) finished an investigation of how to obtain perceptual judgments of intonational meaning. They reviewed available perceptual scales and illustrated their applications with examples from intonational research. A new study was conducted where they compared the suitability of three scales, Equal Appearing Interval Scale, Direct Magnitude Estimation Measurement, and Visual Analogue Scale. Results show that the VAS is most suitable in obtaining perceptual judgments of intonational meaning and the EAI outperforms the other scales in obtaining perceptual judgments of the physical make-up of intonation.

11.5 Project information structure: The marking and interpretation of focus in Dutch by children

The marking and interpretation of focus in Dutch by children

A. Chen began investigating how children mark a sentence constituent for focus in Dutch, and whether they can interpret intonationally marked focus. In Germanic languages, focus is marked via pitch accent in adult speech. Studies of prosodic production in young children have shown that children can successfully use accenting to mark contrastive focus (e.g., a black bear vs. a WHITE bear) by age 3 or 4. As semantic/pragmatic abilities are not fully developed by age 6, Cutler and Swinney (1987) argued that young children's use of contrastive accenting lay in universal physiological mechanisms as suggested by Bolinger. Specifically, greater excitation in the speaker leads to pitch rising; the semantically central parts of a sentence are expected to be associated with greater excitation. An alternative explanation can be drawn

from Gussenhoven's Effort Code. In line with these universals, children would mark non-contrastive focus via accenting. However, young children would not be able to interpret accenting to mean semantic significance.

Two pilot experiments were conducted with children aged 5 to 11 years and adults. The focus type under investigation was the presentational focus, defined as the answer to a question (e.g., *Wat drinkt Anna? Anna drinkt KOFFEE.*). On each trial, participants were presented with a question-answer dialogue between two robots about a picture over headphones. They were asked to retell the answer in experiment 1, where the pitch pattern of the answer was removed; and to reconstruct the question in experiment 2, where the question was converted to pitch hum. Correct interpretation of focus was assumed to be reflected in correct reconstruction of questions.

For each age group, about 65% of the reconstructed answers were judged as appropriate-sounding by Dutch listeners. Further analysis of these answers show that while adults uniformly accented focused words, children used accenting correctly only sometimes. Remarkably, they appear to make use of non-pitch related cues, independent of accenting. The 9 and 11-year olds employed word duration to distinguish focus (longer) from non-focus (shorter). The 5 and 7-year olds used vowel quality and less frequently, word duration. For example, high vowels were realized with a higher F1 and back vowels with a higher F2 when not in focus. These findings indicate that children are more successful in using accenting to mark contrastive focus than to mark presentational focus and that segmental cues are dominant in younger children. The use of vowel quality will be further examined for different vowels in future research.

Data from experiment 2 show that the 5 and 7-year olds correctly interpreted focus in 12% of the cases but the older children in 62% of the cases, approaching the adult-like performance (87% accuracy). This difference may be explained by the underdeveloped semantic abilities of the younger children. Because they make least use of accenting, their poor performance could also be related with their insensitivity to accenting in this context. Future work will further investigate both possibilities.

CHAPTER 12

TECHNICAL GROUP

Overview

Introduction

- 12.1 Externally funded projects
- 12.2 Computer systems and networks
- 12.3 Information systems
- 12.4 Archive Management
- 12.5 Linguistic Applications
- 12.6 Experimental facilities
- 12.7 Electronics and audio/video facilities
- 12.8 Other Activities of the Technical Group

Introduction

The Technical Group's (TG) tasks lie in seven major areas: server systems, desktop systems, electronic lab; experiments; information and database systems; archive management; and archive software development. The first five include the routine work required to support our researchers in carrying out experiments and observational studies and in analyzing the acquired data. Archive management has now established itself as one of the TG's major concerns and comprises a large part of its workload, due in part to the size of the language resource archive, which now contains approximately 15 TB of data, an increase of about 4 TB in 2005 alone.

In 2005 the TG continued to improve its tools and frameworks for archive creation, management and advanced utilization through externally funded projects. A number of projects started up at the beginning of the year to extend work to Grid and Semantic Web technologies. The DoBeS program, funded by the Volkswagen Foundation, remains most important for the TG. This endangered-language documentation program now includes thirty documentation teams, and the MPI has assumed the role of archivist. Some recent international meetings have shown that there is an increasing interest in the tools developed by the TG. This could create a maintenance problem in the long run, for which a solution must be found in the future.

12.1 Externally funded projects

In 2005 a number of new externally funded projects began (DAM-IR, LIRICS MPG, CATCH) and others, such as DoBeS and INL, continued.

Collaboration continued with the Dutch Institute for Lexicology (INL), which resulted in the fully operational Language Archive Management and Upload System tool (LAMUS). LAMUS can be seen as a content management system with advanced linguistic functionality (see sections 12.4 and 12.5) and already serves the function of gatekeeper for the archive to improve its consistency and coherence.

The Documentation of Endangered Languages archiving project (DoBeS) continued after an evaluation of the first four-year phase. Since the second phase will see the first fifteen documentation teams finish (approximately half of the teams involved), increasing support will undoubtedly be required to enable these teams to finish their subarchives and to integrate all their material, which will entail more and more conversions to archivable formats. It is obvious that researchers, driven by the need to work quickly and efficiently to finish their projects, are relying on tools they are accustomed to, resulting in disparate

formats such as MS Word. A mass of derived resources such as annotations, lexica, and grammatical descriptions are to be deposited at the end of the funding periods. Therefore, the archiving team changed its development focus to Web-based frameworks to allow for uploading new resources or new versions of existing resources (LAMUS) as well as frameworks to optimize accessibility of archived resources and to allow advanced utilization of the archival content (the framework for annotated media files (ANNEX); the flexible Lexical Markup Format (LMF) compliant lexicon tool (LEXUS); see sections 12.4 and 12.5). The ethical and legal requirements for access to the archive were revised in anticipation of increased incoming requests for access and the MPI team designed the necessary extensions to the Access Management System. First attempts were made at using a geographic paradigm as a way to access archival material. Google Earth was seen as a suitable platform, since the relevant data structures are user-defined and in XML, preventing a too heavy reliance on Google. All these efforts were financed in part by the DoBeS program. Work also began on the design of a new, more attractive Web site. The old version was based on exhibition design and had proven to be too complicated for many users and inappropriate for some types of monitors.

In addition to the existing Linguistic Advisory Board, an Archive Advisory Board was formed to monitor the stability of the archive in technological and archival terms. A DoBeS workshop and two training courses were organized in 2005. The one in October was attended mainly by non-DoBeS participants from as far away as Australia and the USA.

Distributed Access Management for Language Resources (DAM-LR), funded by the EU, started in January. Its goals are related to those of the Digital Endangered Languages and Music Archives Network (DELAMAN). Its goals are to develop technologies to draw together different language resource archives in such a fashion that users would see only one virtually integrated archive. Users would have one identity, and one login would be sufficient to operate within a federation of archives. It is obvious that DAM-LR is concerned with applying Grid technologies to the language resource domain. At the annual meeting of the EU European Strategy Forum on Research Infrastructures (ESFRI), the DAM-LR project was revealed to be the only new research infrastructures project funded in the humanities. Throughout 2005, basic technologies such as establishing a domain of trusted servers and services with the help of a Public Key Infrastructure, the creation of a joint metadata domain, the formation of a joint domain of unique and persistent resource identifiers that can also be used for referencing, and the creation of a joint authentication and authorization framework were all studied intensively, carefully designed, and partially

realized. A first version of a joint infrastructure can most likely be demonstrated in 2006.

The EU-funded Linguistic Infrastructure for Interoperable Resources and Systems (LIRICS) project strongly relates to work on standards for language resource management in ISO TC37/SC4. The work in the ISO subgroup is devoted to defining standards, for example, for a Data Category Registry (DCR), which is basically a registry of widely accepted linguistic concepts, to facilitate interoperability in the long run, and Lexical Markup Framework (LMF), a generic lexicon model and an appropriate flexible schema. The TG's task within LIRICS is concerned with implementing the emerging ISO standards, creating programming interfaces, establishing stable services and completing the DCR. The models for both the DCR and LMF were stabilized so that it was possible to build operational infrastructures and tools. The LMF model has already been implemented in the Institute's flexible LMF compliant lexicon tool (LEXUS). The DCR has been implemented as a Web service at the Laboratoire Lorrain de Recherche en Informatique et ses Applications (LORIA), and the LEXUS tool interacts with it via an Application Program Interface (API).

The Max Planck Society decided to fund work on extending Web-based exploitation frameworks such as the framework for annotated media files (ANNEX) as well as LEXUS by mechanisms that allow users to easily build, manipulate and use bottom-up ontologies to increase interoperability. A design for these frameworks was completed, an editing and manipulation tool for ontological knowledge is under development, and a flexible search engine is in preparation. This work is being conducted in collaboration with the MPI for Evolutionary Anthropology in Leipzig.

Finally, the TG is now collaborating with a number of Dutch cultural heritage institutions and universities, such as in the Continuous Access to Cultural Heritage (CATCH) projects Semantic Interoperability to Access Cultural Heritage (STITCH) for working on aspects of automatically mapping metadata concepts found in different ontologies and Charting the Information Landscape Employing Context Information (CHOICE) for working on aspects of automatically enriching poorly supplied metadata. Both projects are research focused, and it cannot yet be determined which methods will bring the most success or what the quality of the results will be. It is, however, obvious that both semantic Web-related technologies will also play an important role in the near future in the domain of linguistic resources.

12.2 Computer systems and networks

After completely renewing the central storage system, extending its capacity and turning to new server technology capable of dealing with media streaming in 2004, we turned to completely renewing the Windows and Web-server infrastructure in 2005. A number of Win2003 and Linux machines were installed, the Win2003 servers being responsible for user management, printer management, software distribution and other network wide services. Software distribution was substantially simplified by extensively use of SMI packages. The Linux servers are reserved for advanced archive-related and normal Web services. Frameworks such as LAMUS, ANNEX, LEXUS and the ISLE Metadata Initiative (IMDI), that support rapid search indexes require powerful and stable production servers. For this reason these Linux machines are equipped with 8 fast 2.2 GHz CPUs and 16 GB memories. A powerful development server for the developers was installed using VM-ware to separate the different development areas. This server will allow us to continue with the separation between production and development in the future.

The TG acquired two new core network switches to replace the old central switch that had started to create errors. These two core switches build a highly redundant switching network: if one of the switches fails or must be serviced, the Institute's network is still operable with only slightly reduced overall performance. Complete transition to these new switches will be completed in 2006 after extensive testing.

The local network was also extended with several radio LAN access points so that guests may now access the Internet everywhere in the Institute. To prevent security problems, users are connected to a special network domain separated from the MPI internal network. The TG produced new MPI security guidelines applicable to all users of the Institute's computer and network facilities.

12.3 Information systems

The TG finally launched the new MPI Web site based on a new design and the Zope/Plone content management system. On the one hand it simplifies Web-page authoring, since researchers and secretaries can now create and maintain Web sites without the intervention of TG staff. On the other hand much more specialist knowledge and effort is necessary to maintain the Zope/Plone system and to assist in nonstandard requests. All in all we cannot say that the transition to this Open Source system has been fully satisfactory, in particular since important functionality is lacking and since it is impossible to transform all existing applications that are mainly based on Perl and C into the required Python code.

After several years of working with a stable Oracle database framework and freezing the version, it was now time to move to a new version of Oracle. We expect that quite some effort will be necessary to port the many existing administration and scientific database applications to the new version.

12.4 Archive Management

One major development is that the Institute has decided to open its archive for external depositors. According to Schüller (Phonogrammarchiv Vienna), about 80% of recordings of languages and cultures are highly endangered. This means that if they are not soon transferred to other storage media, they may be lost forever. This dramatic situation is the major reason why the MPI came to this decision, however, it is imperative that some form of quality control be carried out by the boards governing the archive.

The digital language resource archive grew to 15 Terabytes over the past year. This increase was mainly due to the digitization of the audio and video recordings of both Institute and DoBeS researchers. In addition, the first external contributions were integrated, such as the data from the Dutch Bilingualism project. However, statistics showed that a dramatically increasing portion of the data is not well described by metadata, i.e., researchers often do not take the time necessary to categorize the resources with at least minimal metadata. This led to important discussions, the outcome of which was the establishment of a task force to include both researchers and technologists in seeking solutions to this problem. The Institute directors made it clear that they would not further allow what could only lead to a virtual data cemetery full of incompletely described resources. In a few years no one would be able to tell where and when these recordings had been made, and any effort to characterize these valuable resources later would be quite costly.

Four members of the TG have been continuously occupied with digitizing, cutting and integrating the recordings received. MPEG2 has until now been the preferred standard for video archiving, however, given the cost of available storage capacity at affordable prices, discussions were started as to whether the DV standard should not be used as backend format. DV is the format created by most modern digital video cameras and is a compressed format, but it has the disadvantage that it is proprietary, which means it can be subject to sudden change. It has a capacity six times that of MPEG2 and some specialists argue that the representational quality is slightly higher than that of MPEG2. Over the course of 2006 this issue will be further investigated and decisions made as to which standard should be used.

Much effort was invested into consolidating the content of the archive. New parsers for the CHAT and Shoebox formats were developed to clarify the nature of a number of textual representations in the archive. A systematic correction was carried out to synchronize the textual formats, the file extensions and the entries in the corresponding metadata fields. During these steps it became obvious that many researchers were not aware of the importance of the Shoebox "typ" files and that several of them use MSWord to create Shoebox and CHAT files. This has, as a consequence that the structure cannot be automatically detected, and in snowbox that often no structural consistency can be achieved in CHAT. A systematic removal was completed of previously introduced temporary open links, which can be misleading. All metadata fields were checked for correctness of controlled vocabularies and UTF8 Unicode character encoding, erroneous entries introduced by previous editor versions or the use of uncontrolled input tools such as Excel were corrected both automatically and manually. Since the ANNEX framework was ready, allowing MPEG4 streaming, we started to create MPEG4 streams for all video resources in the archive. All above-mentioned operations are based on a Java-based Spider tool that parses the IMDI tree and allows for easy plug-in of all sorts of archive check and correction routines.

It is also the intention to include all of these routines in the LAMUS archive management tool so that all checks can be immediately carried out at the stage of data upload. LAMUS is presently being used by archive managers in the expectation that the consistency of the archive will improve. To facilitate this, a configuration file was created that includes all accepted file types and, where available, pointers to parsers that check the correctness of the uploaded file. The archive will not refuse files per se, but we need to be sure that the uploaded files can be part of the index used for structured search and that tools such as ANNEX can present the data in a suitable way. We also want to be able to remind the users of missing auxiliary files in the case of complex data types as Shoebox, where the user will be reminded to upload the "typ" file when offering a Shoebox file.

Another positive development is that the Dutch Spoken Corpus annotations (CGN) were transformed to the EAF format, making it possible to include them in the global search index and to present them via ELAN/ ANNEX viewers. The syntax encoding of this corpus is based on the Tiger format, and we are currently busy adding this presentation functionality to ELAN and ANNEX.

12.5 Linguistic Applications

In this area, additional functionality was added to the well-established pillars ELAN and IMDI. In particular the development of the new tools LAMUS, LEXUS, and ANNEX was further intensified, so that first versions could be made available and be tested.

Tools created by the TG are available at www.mpi.nl/tools and corpora can be accessed via www.mpi.nl/corpora. All tools developed at the MPI will remain free of charge for use by academic institutions and are distributed under the open-source license model (GPL). For new tools such as LAMUS, LEXUS and ANNEX the strategy is to wait until the core code has been stabilized before making it available. We expect that also these sources of new tools will also become available by mid 2006.

12.5.1 IMDI Infrastructure

In 2005, four major extensions to this tool set were completed: (1) a full-text and structured search was added to the IMDI Browser and the HTML version; (2) a batch-mode modifier was added to the browser, (3) a new version of the IMDI profile was created in the ISO Data Category Registry, based on an evaluation within ISO and (4) a new browser applet was added to the HTML environment.

There are now two framework options for formulating structured and unstructured queries: (1) the IMDI Browser working on the native-linked XML files and (2) the HTML version based on on-the-fly transformations of the XML information to HTML. While both frameworks now offer the same search functionality, the Google-like unstructured HTML search is simpler to enter, but will not offer the precision that can be expected for structured queries using IMDI vocabulary. However, many users will accept a larger result set containing some inappropriate hits, since a structured search would require a deeper understanding of the vocabulary and would be somewhat more difficult to formulate. Another important step was the connection between metadata and content search. Using ANNEX it is now possible to do joint searches of both metadata and annotation contents, which is an extremely useful feature for researchers.

The new batch-modifier extension of the IMDI Browser is extremely important. It allows users to select a corpus node and specify with one command that the value of a certain metadata attribute for all resources below this node should have a certain value. Given the fact that metadata descriptions are not complete and contain inconsistencies, this is a powerful tool for both users and

managers to make metadata descriptions more complete and correct. Extensive discussion within ISO TC37/SC4 concerning the underlying model for specifying data categories and its application revealed that the existing metadata entries were not general enough. The term "name" for example occurs in different contexts in IMDI such as "session.name", "project.name", "actor.name" and "contact.name". To prevent a proliferation of over specific categories, it was agreed that the concept entered into the ISO DCR would be "name" and that it is up to the schema to refine the use of such a category within a given context. "Type" and "planning type", however, will remain different categories, since their semantic scope is completely different and since one cannot speak of a refinement of "type" in the case of "planning type". It is evident though that there will be cases where it will be difficult to determine the precise semantic relationship between two terms.

Finally, the HTML browsing version was extended by an applet that offers a similar look and feel as the IMDI Browser, and that allows the association of many functions to a corpus node that can be executed.

12.5.2 Access Rights Management

The Access Rights Management system was refactored, since the existing code was too complicated to be included in the LAMUS package that must be installed in several institutions in 2006. Its functionality remained basically the same, and the code has now become an integral part of the LAMUS package. The design for an upgrade was made to support the increased requirements especially those of the DoBeS program. Here it was agreed to add another step in the procedure to grant access permissions. According to this agreement the user must now complete an access request form, which is then sent on for approval. Once approval has been granted; the user must sign a declaration accepting all access conditions.

12.5.3 ELAN Multimedia Tool

The ELAN tool was further extended by a number of useful features: it now also runs under Linux; it now has a complete interlinear printing option; grid view information can now be exported to tables; the number of video streams that can be played synchronously has increased to four; additional media formats beyond "wav" and "mpeg" are now supported; video frames can be saved as images; a selection of annotations for a given time fragment can be saved; and begin and end times of annotations can easily be modified. Much work was invested in improving the import and export functionality. There are now better import/export modules for CHAT, Transcriber and Shoebox files. In particular the Shoebox modules were not easy to improve, since there is no schema for Shoebox files and researchers often forget to preserve the structure- and

character-encoding information, making correct conversion difficult if not impossible. An important step towards more efficient annotation is the possibility of simply hitting a button while playing. In doing so, a rough first segmentation can be created that can later be refined if necessary. Productivity can also be increased by using the new tier copy functions that allow copying a complete tier, either with or without filtering the annotation's contents.

A major step was the extension of search possibilities in multiple files. Now users can perform unstructured Google-like searches in multiple files. Since ELAN is, and will remain, a local tool, we decided that the domain of joint search will be a user-definable collection of single files and/or complete directories and subdirectories, i.e., all EAF files found will be included. In addition, a structured search component was developed, which was first implemented in ANNEX, the web-based variant of ELAN. In early 2006, this function will be integrated into ELAN.

ELAN will continue to be supported by the Institute and updates will become available on the tools page of the Institute Web site.

12.5.4 LAMUS Language Archive Management and Upload System

During the summer 2005, the LAMUS content management system was handed over to archive managers and a select group of users for use and testing. An intensive testing cycle began to iron out bugs and improve its functionality. The imperfections found led to a code refactoring of the access management component that was practically unavoidable if we hoped to create a maintainable software package. This aspect particularly important, since the universities of Lund and Buenos Aires and institutions in Iquitos and Leiden are very much interested in setting up their own archives based on LAMUS in 2006. All code is now in Java and closely integrated into the rest of the LAMUS code.

The archive managers of the Institute used the LAMUS tool extensively and prepared the installation of LAMUS at Lund U. together with the developers. Running a tool such as LAMUS in another institution will provide an even more severe test of the robustness and reliability of the software. We expect another round of necessary debugging and improvements after this first external installation. A first configuration file that defines acceptable file formats was integrated, and this must be extended to complex resources consisting of several files. A manual is already available.

12.5.5 LEXUS Lexicon Tool

The LEXUS tool, stabilized in 2005, is on its way to becoming a reference implementation for the LMF standard, which is a flexible and powerful model for representing lexica of different structures and content. It will certainly enter the formal ISO standardization process in 2006. The server-based LEXUS version can be used by registered users and offers a number of outstanding features such as adaptability with respect to structure and content, inclusion of multimedia contents, linking to data category (attribute) registries, printing features and import/export modules for some of the well-known lexicon formats such as CHAT and Shoebox. LEXUS is the first tool that can interact with the ISO Data Category Registry via a standardized and openly documented Application Programming Interface (API).

Due to its web-based design, it is excellently suited for the collaborative creation of a lexicon by team members working at different locations. In anticipation of this application, it is of great relevance to provide merging functionality. We can expect that team members will wish to extract copies of a lexicon to continue working on their notebooks, resulting in differences in structure and content between the different copies. The big question then is how to facilitate and optimize the process of merging the different versions into one master lexicon. LEXUS already possesses some basic functionality necessary in the most straightforward cases. However, merging can become very complex. Therefore, in 2005 we made a careful analysis of all merging features and designed a more generic technique that will be implemented in 2006.

LEXUS offers broad functionality at the schema and instance levels, which is required by users. Additional functionality can often complicate user interfaces, as had been the case with LEXUS as well. This increasing complexity was one of the reasons to completely redesign the user interface. From a schema-based preference in the presentation, we turned to an instance-based preference, i.e., the user is first confronted with lexical content and not with the underlying schema (structure). It turned out that even for many experienced linguists, structure is something implicit. This means that confronting them first with a structural view makes it harder for them to easily understand the tool.

Lexical relations of different sorts are very important, which is why LMF now takes this aspect into consideration. Relations can be used to encode linguistic dependencies (if a certain encoding in the syntactic information is chosen, this may constrain the semantic encoding), inheritance mechanisms, encyclopedic information, even at the level of strings found in explanations and examples, etc. Complex lexica, such as those of PAROLE, make use of relations. To comply

with LMF and to be able to import from lexica like PAROLE, LEXUS was extended by the addition of a relation mechanism to include mechanisms to create and visualize relations appropriately.

In February 2006, the first stable Web-based version will be offered to interested users. In 2006, we will also create a local version that can easily be installed on a notebook. The manual is currently being completely rewritten to reflect the many changes to the user interface and functionality.

12.5.6 ANNEX Annotation Utilization

This Web-based framework, allowing direct utilization of annotated media files with functionality similar to the well-known ELAN tool, has now reached maturity, so that we will make it officially available in February 2006. The underlying streaming server technology has stabilized, a stable production environment has been created and the tool itself now has all the features we more had wanted to implement for the first version. It has several stereotypic viewers for annotations and allows their selection. The user can determine the layout, point to fragments such as annotations or media segments and play them. All viewers are synchronize, however, and compared to the local ELAN tool, media presentation via the Web is not as smooth and controllable. This was the reason to first develop ANNEX purely as an analysis tool.

In addition, advanced search facilities were implemented and are now available. The search machine underlying ANNEX creates an index for all annotations in the archive that can be processed, i.e., for which we have suitable parsers such as EAF, CHAT and Shoebox. The following options are available: (1) the user can create a selection of the archival content and run a Google-like query on the selected annotations, such that the specified pattern will be matched against all matching texts, (2) the search engine presents a list of all tiers occurring in the selection and allows the user to define patterns for these tiers, (3) the user can combine an IMDI metadata query with a content query, which is a very powerful instrument. For all hits, there will be some information about the location and the reference provided. By clicking on the reference, ANNEX will be opened and the corresponding fragment can be viewed. Index creation and updating is carried out by LAMUS, that is, whenever a new resource is uploaded into the archive and when its format correctness is checked, the content is analyzed and included in the fast index.

As indicated above, ANNEX allows operation across corpus and project boundaries, so that one can expect a large variety in terminology for encoding linguistic phenomena. When entering a query the user must therefore perform a lot of implicit mapping, which is not very efficient. Of course, the user can save

his query including the implicit mappings, but, in the long run, ontological support should be given to increase interoperability. Together with the MPI for Evolutionary Anthropology we are working on an infrastructure that allows easy creation, manipulation and sharing of ontologies (concept definitions and relations) in a bottom-up driven fashion, i.e., driven by the data selected. A complete design was made and is currently being implemented. We expect initial results in May 2006. Due to the links with central ontologies such as those provided by ISO or GOLD, we hope to be able to offer ontology support that is on the one hand efficient and on the other flexible enough to meet the needs of researchers.

12.5.7 COMMEX Data Enrichment Tool

A preliminary design was undertaken for creating a Web-based framework that will allow users to make commentaries on archival content and to relate different information units presented on a screen via Web-based services. Over the course of 2005, we managed an analysis of the needs and technological problems involved and expect to start concrete implementation later in 2006.

12.6 Experimental facilities

A new laboratory supporting data glove recording and motion tracker devices was set up. It will be primarily used for sign language studies, but also other experimental paradigms may evolve. The lab allows the user to record and visualize hand and body movements including 3D presentations. The data glove setup was integrated into the NESU experiment framework so that experiments can be controlled with the help of this established experimental tool. In addition, the ELAN tool is currently being extended to operate with data glove- and tracker-generated time series.

With respect to the NESU tool, considerable effort was made to redesign completely the experiment builder to make it even simpler for researchers or student assistants to design and run experiments. A shift towards graphical elements reduces the need to fill in table-like structures. Further, an event-logging mechanism was added for fMRI experiments, an older eye-tracking analysis tool was ported to the new computer with newer software technology, and the remaining experimental rooms were equipped with new, more powerful Shuttle computers.

In general, support ran very smoothly for the many experiments running in parallel at the Institute.

12.7 Electronics and audio/video facilities

The number of field trips in 2005 decreased slightly to 20 from 27 in 2004, which reduced the support work load in April and May considerably. Also the system of registering and preparing field trips early enough in a step-by-step fashion further reduced the load. In total, experience with field-trip equipment was much better than ever before and far fewer errors occurred. It is assumed that this is due to more proven equipment, less time pressure in the preparation phase and better researcher preparation. Some researchers were also provided with special notebook setups that included GPS services and satellite-based e-mail exchange.

It is very important for field research to reduce the weight of equipment to a minimum while at the same time improving the processes involved. We are therefore always looking for new types of recording equipment and setups. In particular, in the area of audio-recording devices, many new solutions and a large amount of new equipment was on offer. New flash-memory recorders and USB-based devices were tested to see whether they could be used in the field, in other words, whether they were reliable enough and easy enough to use. Results appeared in the Language Archives Newsletter (LAN) and on relevant Web sites.

Although the need to develop electronic circuitry is much less compared to a few years ago, some adapters and extensions were necessarily provided to improve solar equipment, special audio/video setups in experiments, the baby lab and the gesture lab.

Much advice regarding equipment was provided not only to MPI researchers, but also to the DoBeS program and, increasingly often, to external researchers who lack sufficient technical support.

12.8 Other Activities of the Technical Group

The head of the TG group remained a member of the Central Computer Committee of the Max Planck Society. In this function he supported several activities important to the society as a whole and provided expert advice to a number of other institutes within the society.

The TG also participates in the publication of the Language Archives Newsletter (LAN).

12.9 Collaborations

DoBeS Project	<i>Dokumentation bedrohter Sprachen</i> – Tools and Infrastructure for the Documentation of Endangered Languages, funded by the Volkswagen Foundation.
LIRICS Project	<i>Linguistic Infrastructure for Interoperable Resources and Systems</i> (EC funded) – Laboratoire Lorrain de Recherche en Informatique et des Applications (LORIA) Nancy, U. Sheffield, Istituto di Linguistica Computazionale (ILC) Pisa, Institute for Language and Speech Processing (ILSP) Athens, U. Barcelona and others.
DAM-LR Project	<i>Distributed Access Management for Language Resources</i> (EC funded) – U. Lund, SOAS London, Instituut voor Nederlandse Lexicologie (INL) Leiden.
STITCH	<i>Semantic Interoperability to Access Cultural Heritage</i> – Methods for mapping metadata vocabularies in particular big thesauri used in cultural heritage institutions – Royal Dutch Library (KB), VU Amsterdam.
CHOICE	<i>Charting the Information Landscape Employing Context Information</i> – Methods for enriching metadata descriptions created in cultural heritage institutions – Dutch Audiovisual Archive Hilversum, Telematica Enschede.
MPG	<i>Max Planck Society</i> – Methods for advanced ontology based utilization – MPI for Evolutionary Anthropology, Leipzig.

CHAPTER 13

OTHER ACTIVITIES

Overview

- 13.1 Honors/Awards
- 13.2 Workshops organized
- 12.3 Nijmegen Gesture Centre (NGC)
- 13.4 Nijmegen Lectures
- 13.5 Formal Colloquia
- 13.6 The F.C. Donders Lectures on Cognitive Neuroscience
- 13.7 Presentations at conferences, congresses and workshops
- 13.8 Colloquia presented
- 13.9 Teaching

13.1 Honors/Awards

NICLAS BURENHULT, together with STEPHEN LEVINSON, was awarded a three-year DoBeS grant from the Volkswagen Foundation for documentation of language and ethnobiological knowledge among the Semang foragers of the Malay Peninsula, especially Jahai and Lanoh. The grant is hosted by MPI Nijmegen.

MICHAEL DUNN and GER REESINK, together with STEPHEN LEVINSON and PIETER MUYSKEN (Center for Language Studies, Radboud U. Nijmegen), were awarded a three-year grant from the NWO for the project "Breaking the time barrier: Structural traces of the Sahul past".

PETER HAGOORT received the 2005 NWO/Spinoza Prize. This is the highest scientific prize in the Netherlands and carries a research fund of 1,5 million Euros.

WILLEM LEVELT was awarded a Doctorate Honoris Causa of the University of Louvain.

NIELS SCHILLER, together with ALEXANDER SACK (Maastricht U.), was awarded a four-year Open Competition grant from the NWO for the investigation of the time course of cerebral activation during speaking using transcranial magnetic stimulation. Furthermore, he was appointed member of the Editorial Board of the Italian Journal of Linguistics.

FRANK SEIFART was presented with the 2005 Mary R. Haas Book Award of the American Anthropological Association during their January meeting in Albuquerque for his dissertation: "The structure and use of shape-based noun classes in Miraña (North West Amazon)".

13.2 Workshops organized

Workshop on Lexical Merging

Together with Nicoletta Calzolari, Peter Wittenburg organized a joint workshop on Lexical Merging for ICL-CNR and the TG of the MPI in Pisa in February. The workshop concerned the intricate requirements of complex lexical structures such as they are used in NLP and field linguistics and the challenges of merging different lexica.

Workshop on Prosody in Interaction

Taehong Cho and Tanya Stivers organized a workshop on Prosody in Interaction (February 3-4). Presenters were Johanneke Caspers (Leiden U.), Taehong Cho, Elizabeth Couper-Kuhlen (U. Potsdam), and John Local (U. York).

Workshop on Initial Reference to Persons in Interaction

Tanya Stivers organized a workshop on Initial Reference to Persons in Interaction (March 31 - April 2) at the Institute. Presenters from the Institute were Penelope Brown, Nick Enfield, Stephen Levinson, Gunter Senft, Tanya Stivers and Wietske Vonk. External presenters were Vicki Bruce (U. Edinburgh), William Hanks (U. California, Berkeley), John Haviland (U. California, San Diego), John Heritage (UCLA), John Lucy (U. Chicago), Leo Noordman (Tilburg U./ Radboud U. Nijmegen), Emanuel Schegloff (UCLA), and Jack Sidnell (U. Toronto).

Joint workshop ACLA and MPI Acquisition Group

Penelope Brown organized a joint workshop of members of the Australian Aboriginal Child Language Acquisition Project (ACLA) and of the Acquisition Group of the Institute, which took place April 18 - 20 at the MPI in Nijmegen. The ACLA participants included Gillian Wigglesworth (U. Melbourne), Patrick McConvell (U. Melbourne), Karin Moses (U. Melbourne/La Trobe U.), Samantha Disbray (U. Melbourne), Felicity Meakins (U. Melbourne), and Carmel O'Shannessy (MPI Nijmegen/U. Sydney). MPI participants were Melissa Bowerman, Penelope Brown, Christine Dimroth, Marianne Gullberg, Bhuvana Narasimhan, and also Pieter Muysken (Radboud U. Nijmegen). The workshop was followed by a two-day CLAN workshop for the Australianists, organized by Romuald Skiba.

DoBeS training workshop May

Paul Trilsbeek was co-organizer of the DoBeS training workshop in May in Nijmegen, where approximately 35 participants from the DoBeS teams interacted on aspects of endangered language documentation.

DoBeS training workshop June

Paul Trilsbeek, Romuald Skiba and Peter Wittenburg organized a DoBeS training workshop in Nijmegen in June. Members of the Technical Group and Nikolaus Himmelmann (Bochum U.) gave presentations on technical matters related to the documentation and archiving of endangered languages. Most of the participants were members of DoBeS teams.

Workshop on Speech and Hearing Disorders

Miriam Ernestus organized the Workshop on Speech and Hearing Disorders, on behalf of the Nederlandse Vereniging voor Fonetische Wetenschappen at the Institute in Nijmegen in June.

Conference Session on "Endangered Languages – Endangered Cultures"

In cooperation with Marie Salaün (U. Paris V – Sorbonne), Gunter Senft organized the session on "Endangered Languages – Endangered Cultures" at the 6th International Conference of the European Society for Oceanists in Marseille, 6-8 July. Presenters were David Blundell (Taiwan National U.), Gabriele Cablitz (MPI Nijmegen), Winifred Crombie (U. Waikato), Heinz-Christian Dosedla (Deutsches Kunst Forum Stuttgart), Michael Ewing (U. Melbourne), Margaret Florey (Monash U.), Ingjerd Hoem (KonTiki Museum Oslo), Diane Johnson (U. Waikato), Arapera Bella Ngaha (U. Auckland), Sophie Nock (U. Waikato), Marie Salaün (U. Paris V – Sorbonne), Gunter Senft (MPI Nijmegen), Jaky Troy (U. New South Wales, Aboriginal Languages Research and Resource Centre), Michael Walsh (U. Sydney), and Darrell Tryon (Australian National U.).

The 2nd International Workshop on Language Production

Niels Schiller organized the 2nd International Workshop on Language Production at the Faculty of Psychology at the Maastricht U. in August (28-30). Speakers were Patrick Bonin (U. Blaise Pascal, Clermont-Ferrand), Manuel Carreiras (U. de La Laguna, Tenerife), Albert Costa (U. Barcelona), Fernanda Ferreira (Michigan State U.), Tecumseh Fitch (U. St. Andrews), Peter Hagoort (F.C. Donders Centre, Nijmegen), Randi Martin (Rice U., Houston), Antje Meyer (U. Birmingham), Asli Özyürek (MPI Nijmegen), Ardi Roelofs (MPI Nijmegen/Radboud U. Nijmegen), Patrizia Tabossi (U. di Trieste), Michael Vitevitch (U. Kansas) and Linda Wheeldon (U. Birmingham). A special issue of *Language and Cognitive Processes* published by Taylor & Francis will appear in 2007, including a selection of papers presented at the workshop.

DAM-LR workshop

Peter Wittenburg and Freddy Offenga organized a workshop on Distributed Access Management for Language Resources within the realm of the DAM-LR project in Nijmegen in July. Members of the collaborating institutions (SOAS London, Lund U., Dutch Institute for Lexicology, Leiden U.), were invited to this workshop to discuss technologies necessary for establishing a joint virtual archive.

The First A. Guiora Roundtable Conference 2005

Marianne Gullberg, Peter Indefrey, Wolfgang Klein (MPI Nijmegen), Peter Hagoort (F.C. Donders Centre), Alexander Guiora (U. Haifa), and John Schumann (UCLA) organized "The First A. Guiora Roundtable Conference in the Cognitive Neuroscience of Language: The Cognitive Neuroscience of Second Language Acquisition", held at the Institute, 20-21 September. This conference series is co-sponsored by the Institute and by *Language Learning – A Journal of*

Research in Language Studies. Invited presenters were David Birdsong (U. Texas, Austin), Harry Uylings (Dutch Institute for Brain Research), David W. Green (U.C. London), Antoni Rodriguez-Fornells (U. Barcelona), Lee Osterhout (U. Washington), Jutta Mueller (Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig), Peter Indefrey (MPI Nijmegen/F.C. Donders Centre), and John Schumann (UCLA). Invited discussants were Peter Coopmans (Utrecht U.), Peter Hagoort (F.C. Donders Centre), Kees de Bot (U. Groningen), Ton Dijkstra (Radboud U. Nijmegen), Doug Davidson (MPI Nijmegen/F.C. Donders Centre), Monique Lamers (Radboud U. Nijmegen), and Laurie Stowe (U. Groningen). A volume of proceedings will appear as a supplement to *Language Learning* and as a volume published by Blackwells Publishers.

Workshop on Expressives

Niclas Burenhult and Nick Enfield organized a workshop on Expressives (September 22 at the MPI Nijmegen). The workshop included presentations by Jan-Olof Svantesson (Lund U.), Arthur Holmer (Lund U.), Damrong Tayanin (Lund U.), Nick Enfield (MPI Nijmegen), Sylvia Tufvesson (MPI Nijmegen) and, Niclas Burenhult (MPI Nijmegen).

DoBeS training workshop October

Paul Trilsbeek, Romuald Skiba and Peter Wittenburg organized another DoBeS training workshop in Nijmegen in October. Members of the MPI Technical Group and Nikolaus Himmelmann gave presentations on technical matters related to the documentation and archiving of endangered languages.

10th Winter Conference of the Dutch Psychonomic Society

James McQueen and Niels Schiller co-organized the 10th Winter Conference of the Dutch Psychonomic Society (Nederlandse Vereniging voor Psychonomie; NVP), 16-17 December, Egmond aan Zee.

Archive Advisory Board meeting

In December Peter Wittenburg organized a meeting in Amsterdam with the Archive Advisory Board concerning the tasks of digital archives, the state of the MPI's archive and the technologies for digital archives. Well-known experts in the domains of archives, grid-technologies and the semantic Web were invited to participate.

Challenges Workshop

In December Peter Wittenburg and Daan Broeder organized the workshop in Amsterdam "Challenges for Digital Resource Management in the Humanities". This allowed the opportunity to hold a strategic meeting to coincide with the Archive Advisory Board meeting on future directions in digital resource

management in the humanities at which fifteen leading experts from various European countries were invited to work out a roadmap for future activities.

Workshop on Ontologies

Peter Wittenburg organized a workshop about usage scenarios for ontologies for advanced searching in language resource archives. External participants were Edward Hovy (ISI, US), Antoine Isaac and Lourens van der Meij (CATCH - STITCH), and Hennie Brugman and Luit Gazendam (CATC -CHOICE).

13.3 Nijmegen Gesture Centre (NGC)

During the year, the Nijmegen Gesture Centre (NGC), coordinated by Asli Özyurek and Marianne Gullberg, hosted a series of talks in the framework of the Nijmegen Gesture Centre Lecture series. Speakers were Richard Ashley (Northwestern U.), [Formal Colloquium]; Adam Kendon (U. Pennsylvania and U. Naples Orientale); Charles Goodwin (UCLA), [Formal Colloquium]; Timo Sowa (U. Bielefeld); Lorenza Mondada (U. Lyon 2); Spencer D. Kelly (Colgate U.); David Kemmerer (Purdue U.), and Jeroen Arendsen (Technical U. Delft).

13.4 Nijmegen Lectures

This year's Nijmegen Lectures were given by Núria Sebastián-Gallés (U. Barcelona). The title of the series was "Babelians". The series included three morning lectures: "Growing up in Babel", "Life in Babel", and "Cursed or blessed?" The discussants of the afternoon seminars were Anne Christophe (CNRS Paris), Rosemarie Tracy (Mannheim U.), Janet van Hell (Radboud U. Nijmegen), Vivian Cook (U. Newcastle upon Tyne), Peter Indefrey (F.C. Donders Centre), and Guillaume Thierry (U. Wales, Bangor). The lectures were organized in collaboration with the Interfaculty Research Unit for Language and Speech (IWTS) of the Radboud U. Nijmegen. The series was organized by Elizabeth Johnson, Pieter Muysken, Leah Roberts, and Nanjo Bogdanowicz.

13.5 Formal Colloquia

The Formal Colloquium Series 2005 was organized by the Colloquium Committee (Nick Enfield and Jan Peter de Ruiter).

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| January 25 | RIC ASHLEY, Northwestern U., Chicago "Music, Gesture, and Space: The pragmatics of musicians' gestures." |
| February 22 | CHARLES GOODWIN, UCLA "Multimodality in discourse." |
| March 15 | NICK CHATER, U. Warwick "Statistical language learning: Analysis of an 'Ideal' language learner." |

- April 20 DAVID BIRDSONG , U. Texas, Austin "Nativelikeness in second language acquisition theory."
- May 17 NICK EVANS, U. Melbourne "View with a view: Towards a typology of double perspective in natural language."
- June 14 ERIC PEDERSON, U. Oregon "Investigating the role of attention in phonetic learning."
- September 13 GYÖRGY GERGELY, Hungarian Academy of Sciences, Budapest: "Beyond imitative learning: Human 'pedagogy' as a mechanism of cultural transmission."
- October 18 ROBIN DUNBAR, U. Liverpool "Language in evolutionary perspective."
- November 15 DAN SPERBER, CNRS, Paris: "Articulating cognition and culture in an evolutionary perspective."

Many informal lectures were also presented by long-term and occasional visitors to the Institute.

13.6 The F.C. Donders Lectures on Cognitive Neuroscience

In the F.C. Donders Lecture Series on Cognitive Neuroscience, outstanding researchers in the field of brain and cognition present their work and ideas to a broad audience of scholars with a diversity of backgrounds, ranging from neuroscience to psychology and linguistics. The lecture series is jointly organized by the Max Planck Institute for Psycholinguistics and the Nijmegen Institute for Cognition and Information (NICI).

- April 29 JONATHAN COHEN, U. Princeton: "The vulcanization of human decision making."
- July 1 BRUCE MCNAUGHTON, U. Arizona, Tucson: "What sets the scale of the hippocampal code?"
- October 7 HANS-JOCHEN HEINZE, U. Magdeburg: "Flexibility of perceptual control: Temporal, spatial, and operational aspects."
- November 25 MARTA KUTAS, U. California, San Diego: "An electrophysiological view of prediction and integration in language."

13.7 Presentations at conferences, congresses, and workshops

Aarts, E., Lamers, M., Verhoef, K., & Roelofs, A. "The reverse Stroop effect in switching between color naming and word reading." 14th Meeting of the European Society for Cognitive Psychology (ESCOP-2005). Leiden, September.

Aarts, E., Roelofs, A., & van Turenout, M. "Response and task conflicts in medial and lateral prefrontal areas." 10th Winter Conference of the Dutch Psychonomic Society (NVP). Egmond aan Zee, December.

Allen, S., Kita, S., Brown, A., Furman, R., & Ishizuka, T. "Is syntactic packaging of manner and path language-specific at age 3?" 10th International Conference for the Study of Child Language. Berlin, July.

Ameka, F. K. "Training linguists for language documentation." International Symposium on Endangered Languages of Ethiopia. U. of Addis Ababa, April.

Ameka, F. K. "Grammars in contact in the Volta Basin (West Africa): On contact induced grammatical change in Likpe." International Workshop on Grammars in Contact. Research Centre for Linguistic Typology, La Trobe U., June.

Ameka, F. K. "Direct and indirect speech in Ewe." Workshop series 2005, Research Centre for Linguistic Typology, La Trobe U., July.

Ameka, F. K. "Topological relations coded in verbs: The case of Likpe." Seminar on Dynamique du Langage. U. de Lyon 2, December.

Andics, A., McQueen, J.M., & van Turenout, M. "fMRI evidence on phonological categories in the brain" [poster]. 4th Dutch Endo-Neuro-Psycho Meeting. Doorwerth, June.

Andics, A., McQueen, J.M., & van Turenout, M. "Dissociating acoustic and phonological processing of speech sounds using fMRI" [poster]. 9th International Conference on Cognitive Neuroscience (ICON9). Havana, September.

Bercelli, F., Rossano, F., & Viaro, M. "Patients' storytellings as responses to therapist's elaborations." 9th International Pragmatics Conference (IPrA). Riva del Garda, July.

Berck, P., Russel, A., Kemps-Snijders, M., & Wittenburg, P. "Advanced web-based language archive exploitation and enrichment." 2nd Language & Technology Conference. Posen, April.

Bien, H., Baayen, R.H., & Levelt, W.J.M. "Was uns Frequenzeffekte über komplexe Wörter verraten." 47. Tagung experimentell arbeitender Psychologen (TeaP2005), Regensburg, April.

Bien, H., Baayen, R.H., & Levelt, W.J.M. "The role of frequency information in compound production." 14th Meeting of the European Society for Cognitive Psychology (ES COP-2005). Leiden, September.

Bowerman, M., "Crosslinguistic perspectives on the construction of semantic categories." Workshop on Australian Aboriginal Child Language Acquisition Project (ACLA). MPI Nijmegen, April.

Bowerman, M., "Event categorization: A crosslinguistic perspective" [Plenary lecture]. 9th International Cognitive Linguistics Conference (ICLA 9). Seoul, July.

Bowerman, M., Majid, A., Gullberg, M., & Narasimhan, B. "The semantic categorisation of placement events across languages." 9th International Cognitive Linguistics Conference (ICLA 9). Seoul, July.

Bowerman, M. "Operating principles and beyond: Exploring language acquisition with a crosslinguistic toolkit." Symposium in honor of Dan Slobin, 10th International Congress for the Study of Child Language. Berlin, July.

Braun, B. "Meaningful variation in the scaling and alignment of accents: Thematic contrast in German" [invited talk]. Phonetics Institute, U. Cologne, May.

Braun, B. "Stable attractors in intonation: Evidence for discrete choices in English prosody." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Braun, B. "Production and perception of thematic contrast in German" [invited talk]. Linguistics Institute, U. Leipzig, December.

Brown, A., & Gullberg, M. "Convergence in emerging and established language systems: Evidence from speech and gesture in L1 Japanese". 7th Annual International Conference of the Japanese Society for Language Sciences. Tokyo, June.

Brown, A., & Gullberg, M. "Interactions between dual language systems in a single mind: Evidence from gesture." Interacting bodies. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Brown, A., & Sloetjes, H. "Introduction to ELAN (EUDICO Linguistic Annotator)" [invited talk]. Interacting bodies. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Brown, A., & Gullberg, M. "Convergence in established and emerging language systems: Evidence from speech and gesture." 2nd International Conference on First Language Attrition. Amsterdam, August.

Brown, P. "Cultural factors in learning an absolute spatial system." [invited talk]. Workshop on Developmental Studies in Spatial Language and Cognition. Geneva, February.

Brown, P. "Multimodal interaction with prelinguistic infants: A comparative project" [invited talk]. Workshop on Developmental Studies in Spatial Language and Cognition. Geneva, February.

Brown, P. "Minimal or nonminimal? Initial reference to persons in Tzeltal conversation." Workshop on Person Reference in Conversation. MPI Nijmegen. March.

Brown, P., Gentner, D., & Braun, K. "Initial acquisition of nouns and verbs in Tzeltal speaking children." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Brown, P., de Léon, L., Pye, C., Pfeiler, B., & Mateo, P. "Roots or edges? A comparative study of Mayan children's early verb forms." 10th International Congress for the Study of Child Language (IASCL). Berlin, July.

Brown, P., & Levinson, S.C. "Comparative response systems." 104th American Anthropological Association Meeting. Washington, DC, December.

Broeder, D., Offenga, F., & Wittenburg, P. "Distributed solution - working on a federated archive." Workshop on Distributed Access Management for Language Resources. MPI Nijmegen, July.

Broeder, D., Offenga, F., & Wittenburg, P. "A local prototype for distributed access management for language resources." Workshop on Distributed Access Management for Language Resources. MPI Nijmegen, July.

Broeder, D., & Wittenburg, P. "Distributed access management: The State." 3rd Annual Meeting of the Digital Endangered Languages and Musics Archive Network on Managing access and intellectual property rights (DELAMAN III). U. Texas, Austin, November.

Burenhult, N. "Exploring expressiveness in Jahai." Workshop on Expressives. MPI Nijmegen, September.

Chen, A. "The role of pitch accent type on interpreting information status." 41st Annual Meeting of Chicago Linguistic Society (CLS 41). Chicago, April.

Chen, A., & den Os, E. "Effects of pitch accent type on interpreting information status in synthetic speech." 9th European Conference on Speech Communication and Technology (Interspeech 2005). Lisbon, September.

Chen, J. "Learning the lexical semantics of state-change predicates in Mandarin: A crosslinguistic perspective." 11th International Conference on Processing Chinese and Other East Asian Languages (PCOEAL 2005). Chinese U. of Hong Kong, Hong Kong, December.

Chen, J. "Learning to encode and categorize 'cutting and breaking' events in Mandarin." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Chen, J. "Learning how to encode "'cutting and breaking' events in Mandarin." 17th North America Conference on Chinese Linguistics. Monterey, CA, June.

Chen, J. "Learning to interpret state-change: A case study of Mandarin." 13th Annual Meeting of the Association of Chinese Linguistics. Leiden U., June.

Chen, J. "Sister cry-run brother, who cries and who runs?: Learning the argument structure of Mandarin resultative verb compounds." 3rd Cambridge Postgraduate Conference in Language Research. Cambridge U., March.

Christoffels, I. K., Formisano, E., & Schiller, N. O. "The neural correlates of verbal feedback: An fMRI study employing overt speech." 12th Annual Meeting of the Cognitive Neuroscience Society. New York, April.

Christoffels, I. K., Formisano, E., & Schiller, N. O. "Verbal feedback and the shared neural correlates between comprehension and production: Overt speech in fMRI." Psycholinguistics in Flanders. Leuven, May.

Christoffels, I. K., Formisano, E., & Schiller, N. O. "The neural correlates of verbal feedback: An fMRI study employing overt speech." 2nd International Workshop on Language Production. La Bonbonnière, Maastricht, August.

Christoffels, I. K., Formisano, E., & Schiller, N. O. "Investigating the shared neural correlates of speech comprehension and production using fMRI." 14th Meeting of the European Society for Cognitive Psychology. Leiden, August/September.

Claus, A., Wittenburg, P., & Broeder, D. "Language archive management and upload system." 2nd Language & Technology Conference. Posen, April.

Cutler, A. "De ontdekking van gesproken taal." Conference on Early Detection of Hearing, Speech and Language Disorders: The Next Steps. Nijmegen, February.

Cutler, A. "Listening in a second language." 6th Schloessmann Seminar on Cognitive Neuroscience of Human Ontogeny. Doelln, June.

Cutler, A. "Lexical statistics of competition in L2 versus L1 listening." 150th Meeting of the Acoustical Society of America (NOISE-CON 2005). Minneapolis, October.

Cutler, A. "No speech recognition without abstract phonological knowledge." Workshop on models of L1 and L2 phonetics/phonology. Utrecht, November.

Davidson, D. J., & Indefrey, P. "ERP and joint time-frequency responses to grammatical and semantic violations in Dutch-English bilinguals." 4th Dutch Endo-Neuro-Psycho Meeting. Doorwerth, May/June.

Davidson, D. J. "The time course of object recognition prior to multi-component utterance generation." 2nd International Workshop on Language Production. Maastricht, August.

Davidson, D. J., & Indefrey, P. "ERP and joint time-frequency responses to grammatical and semantic violations in Dutch-English bilinguals." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Davidson, D. J., & Indefrey, P. "ERP and joint time-frequency responses to grammatical and semantic violations in Dutch-English bilinguals." 46th Annual Meeting of the Psychonomics Society. Toronto, November.

Davis, C., Kim, J., & Cutler, A. "Masked priming of spoken word judgments." 32nd Australasian Experimental Psychology Conference. Melbourne, April.

Deusen Phillips, S. van, Özyürek, A., Sancar, B., & Mylander, C. "Ordering of semantic elements in young home signers' gestures in four cultures." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Dimroth, C. "The acquisition of negation and finiteness. Mise en perspective des resultats." Conference on The Comparative Approach to L2. Berder, March.

Dimroth, C. & Starren, M. "Diskursprinzipien im Zweitspracherwerb. Werden Grenzen der Kommunikation überwunden oder unüberwindbar?" Symposium Nederland-Duitsland: Grenzen van de communicatie. Kleve, May.

Dimroth, C. & Lindner, K. "Finiteness in impaired L1 acquisition and untutored L2 acquisition of German." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Dimroth, C., Gullberg, M., & Roberts, L. "What do you know after seven minutes

of exposure to a new language?" The European Second Language Association 2005 Conference (EuroSLA 15). Dubrovnik, September.

Dimroth, C. "L2-Erwerb bei Kindern und Jugendlichen: Eine Longitudinalstudie zu Finitheit und Negation." Workshop on Kinder mit Migrationshintergrund – Spracherwerb und Fördermöglichkeiten. Berlin, November.

Duffield, N., Matsuo, A., Roberts, L., & Stojanovic, D. "The dog in the nighttime [again]: On the curious acceptability of ungrammatical sentences." The European Second Language Association 2005 Conference (EuroSLA 15). Dubrovnik, September.

Eisner, F., & McQueen, J.M. "Talker-specific perceptual learning in response to idiosyncratic speech production." Meeting of the Experimental Psychology Society. London, January.

Enfield, N. J. "Language and culture in Laos: An agenda for research." 1st International Conference on Lao Studies. DeKalb, Illinois, May.

Enfield N. J. "Pointing: Forms and functions, generic and local." In panel 'Interaction across cultures: local practice, generic organization.' 104th American Anthropological Association Meeting. Washington, DC, December.

Ernestus, M. "Systematic analogical effects in regular past-tense production in Dutch: adult production and children's acquisition." Conference of the Linguistic Society of America. Oakland, January.

Ernestus, M., Lahey, M., Verhees, F., & Baayen, R.H. "Lexical frequency and voice assimilation." Taalkunde in Nederland-dag 2005. Utrecht, January.

Ernestus, M. "De MAND in de psycholinguïstiek." Taal en Tongval Symposium. Nieuwe Dialectatlasprojecten en -producten. Ghent, April.

Ernestus, M., Lahey, M., Verhees, F., & Baayen, R.H. "Lexical frequency and voice assimilation." European Society for Cognitive Psychology 2005. Leiden, September.

Ernestus, M. "Waarom zelfs regelmatige werkwoorden zo moeilijk te spellen zijn." Discussiedag Nederlandse Spelling. Oestgeest, December.

Fikkert, P., Levelt, C. C., & Schiller, N. O. "Can we be faithful to stress?" 2nd Old World Conference in Phonology (OCP2). Tromsø, January.

Furman, R., Özyürek, A., Allen, S., & Brown, A. "What do gestures reveal about children's causal event representations?" "Interacting bodies." 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Gaby, A. "Relatively absolute gestures in Kuuk Thaayorre (and what they reveal about spatial cognition)." Australian Linguistics Society Annual Conference, Monash U. Melbourne, September.

Gaby, A. Anderson S., Brown, L. & Lecarne, J. "Life on the edge: There's morphology there after all." 5th Mediterranean Morphology Meeting. Villa Clythia, Fréjus, September.

Gaby, A. "Nominal coordination in Kuuk Thaayorre." 4th Blackwood Workshop on Australian Aboriginal Languages. U. of Sydney. March.

Ganushchak, L., & Schiller, N. O. "Effects of time pressure on verbal self-monitoring." 12th Annual Meeting of the Cognitive Neuroscience Society. New York, April.

Ganushchak, L., & Schiller, N. O. "Effects of auditory interference and time pressure on verbal self-monitoring." Psycholinguistics in Flanders. Leuven, May.

Ganushchak, L., & Schiller, N. O. "Effects of auditory distractors on verbal self-monitoring." 2nd International Workshop on Language Production. La Bonbonnière, Maastricht, August.

Ganushchak, L., & Schiller, N. O. "Effects of auditory distractors on verbal self-monitoring." 14th Meeting of the European Society for Cognitive Psychology. Leiden, August/September.

Gullberg, M. "L1-L2 interactions at the semantic-conceptual level. What gestures can tell us about the acquisition of event representations" [invited talk]. Nijmegen Bilingualism Group, January.

Gullberg, M. "A first step towards studying the processing of code-switching" [invited talk]. Workshop on Code-Switching. Mannheim, April.

Gullberg, M., Indefrey, P., & Muysken, P. "How you might study the processing of code-switching." Australian Aboriginal Child Language Acquisition Project (ACLA) Workshop. MPI Nijmegen, April.

Gullberg, M. "To mean what you say: Gestures, placement events, and advanced second language acquisition." Interacting bodies. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Gullberg, M. "Transfer at hand: Gestures and topological relations in learner production." 14th World Congress of Applied Linguistics (AILA). Madison, July.

Gullberg, M., Indefrey, P., & Muysken, P. "Mi ta kom over mane mi ta verbaasd. Towards studying the processing of code-switching in production" [invited talk]. Nijmegen Bilingualism Group, October.

Gullberg, M., Dimroth, C., & Roberts, L. "Vad vet man efter 7 minuters kontakt med ett nytt språk? (What do you know after 7 minutes of contact with a new language?)" [invited talk]. Workshop on Early SLA. Uppsala, November.

Haun, D.B.M. "Spatial concepts in nonhuman great apes and human children." Workshop on Developmental Studies in Spatial Language and Cognition. Geneva, February.

Haun, D.B.M. "Impact of language acquisition on spatial cognition" [invited talk]. U. Miami, April.

Haun, D.B.M. "Lost for words: Language impact on spatial cognition" [invited talk]. U. South Carolina, April.

Haun, D.B.M. "Does language retool our cognition?" [invited talk]. U. Portsmouth, June.

Hellwig, F.M. "Affix ambiguity and lexical decision." TABU-dag 2005. Centre for Language and Cognition Groningen (CLCG), June.

Horemans, I., & Schiller, N. O. "Do we monitor the verbal outfit [...uhm...] output of others?" Psycholinguistics in Flanders. Leuven, May.

Horemans, I., & Schiller, N. O. "Do we monitor the verbal outfit [... uhm ...] output of others?" 2nd International Workshop on Language Production. La Bonbonnière, Maastricht, August.

Horemans, I., & Schiller, N. O. "Do we monitor the verbal outfit [...uhm...] output of others?". 14th Meeting of the European Society for Cognitive Psychology. Leiden, August/September.

Huetting, F., & McQueen, J.M. "Integrating language and vision: The time-course of the mapping of lexical representations onto concurrent visual objects." 13th European Conference on Eye Movements. Bern, August.

Indefrey, P. "Hirnaktivierungen bei syntaktischer Verarbeitung in einer Fremdsprache" [invited talk]. 33. Jahrestagung des Fachverbandes für Deutsch als Fremdsprache. Jena, May.

Indefrey, P., Hellwig, F.M., Davidson, D., & Gullberg, M. "Native-like hemodynamic responses during sentence comprehension after six months of learning a new language." 11th Annual Meeting of the Organization for Human Brain Mapping. Toronto, June.

Indefrey, P. "Cerebral activation patterns in bilingual speakers and listeners" [invited talk]. The First A. Guiora Annual Roundtable Conference in the

Cognitive Neuroscience of Language: The Cognitive Neuroscience of Second Language Acquisition. MPI Nijmegen, September.

Indefrey, P. "Hemodynamic correlates of syntactic parsing in second language learners" [invited talk]. 2nd Multilingual Acquisition and Processing Workshop. Potsdam, September.

Janzen, G., Wagenveld, B., & van Turenout, M. "Effects of time and practice on the neural representation of navigationally relevant objects." 12th Annual Meeting of the Cognitive Neuroscience Society (CNS 2005). New York, April.

Janzen, G., Haun, D.B.M., & Levinson, S.C. "Neural correlates of intrinsic and relative frames of reference." 14th Meeting of the European Society for Cognitive Psychology (ESOP-2005). Leiden, September.

Janzen, G. "Neural representation of landmarks" [invited talk]. U. Tübingen, November.

Johnson, E.K. "The developmental time course of speech segmentation in Dutch." Workshop on Early Word Segmentation: A Crosslinguistic Approach Taking Advantage of Europe's Linguistic Diversity. CNRS Paris, February.

Johnson, E.K., & Seidl, A. "A crosslinguistic investigation of 6-month-olds' clause segmentation strategies." ISCA Workshop on Plasticity in Speech Perception (PSP2005). London, June.

Johnson, E.K., & Diks, M. "On-line processing of grammatical gender in Dutch-learning toddlers." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Johnson, E.K., & Cutler, A. "The human infant as a speech-perceiving animal." Workshop on Animal models in cognitive neuroscience. Leiden, October.

Johnson, E.K. "Current methods in infant language research." 2nd Workshop on Experimental methods in language acquisition research (EMLAR II). Utrecht Institute of Linguistics, November.

Jolink, A. "De verwerving van semantische en morfologische finietheid bij normaal ontwikkelende kinderen en kinderen met een specifieke taalstoornis." Anéla Juniorendag. U. Amsterdam, January.

Jolink, A. "Finite linking in normally developing Dutch children and children with Specific Language Impairment." Conference on The Comparative Approach to L2. Berder, March.

Jolink, A., & Lindner, K. "On their way to finiteness: How Dutch- and German-learning children with SLI cut up the language acquisition task." 9th Conference

of the European Group for the Study of Child Language Disorders (EUCLDIS).
Abbaye de Royaumont, May.

Kemps-Snijders, M., & Wittenburg, P. "LEXUS: A flexible web-based lexicon tool interacting with the ISO data category registry." Workshop on Lexical databases and digital tools. MPI Nijmegen, April.

Kemps-Snijders, M. "LEXUS – a LMF compliant tool." ISO TC37/SC4 Meeting, Warszawa, September.

Klein, W. "Eine Analyse der deutschen Satznegation." Colloquium "Verständigung zwischen Sprachen und Wissenschaftskulturen." Humboldt U. Berlin, February.

Klein, W. "Finitheit." Plenary lecture at the 25th Jahrestagung der Deutsche Gesellschaft für Sprachwissenschaft. Cologne, February.

Klein, W. "Scope problems of negation." Conference on The Comparative Approach to L2. Berder, March.

Klein, W. "Es ist nicht nur die Sprache." Conference on Die nationale und internationale Vertretung der deutschen Sprache. Berlin, May.

Klein, W. "Fünf Thesen zu nützlichen Textcorpora." Conference on Die Geisteswissenschaften im europäischen Forschungsraum. Villa Vigoni, Menaggio, June.

Klein, W. "Ursprung und die Organisation der menschliche Sprache." Symposium Natur und Kultur. MPI für Entwicklungsbiologie, Tübingen, July.

Klein, W. "Die Eigenschaften des Brotes sind nicht die Eigenschaften des Bäckers" [keynote address]. Zentrum der Sprachwissenschaft. Hamburg, November.

Kooijman, V., Hagoort, P., & Cutler, A. "Word segmentation from continuous speech. An ERP study with 10-month-old infants" [invited talk]. Workshop on early word segmentation: A crosslinguistic approach taking advantage of Europe's linguistic diversity. CNRS Paris, February.

Kopecka, A. "Représentations linguistique et cognitive du mouvement: Un dilemme méthodologique" [invited talk]. Journée d'étude « Trajectoire ». Laboratoire Dynamique du Langage, Université Lyon 2, June.

Kopecka, A., & Purcell, S. "Figuring out figures' role in motion conceptualization." 9th International Cognitive Linguistics Conference (ICLA 9). Seoul, July.

Kopecka, A. "Diachronic aspects of lexicalization patterns in French." 21st Scandinavian Conference of Linguistics. Trondheim, June.

Koppenhagen, H., & Schiller, N. O. "Solving conflict in lexical access: An event-related potentials study." 12th Annual Meeting of the Cognitive Neuroscience Society. New York, April.

Koppenhagen, H., & Schiller, N. O. "Solving conflict in lexical access: an Event-Related Potentials (ERP) study." 2nd International Workshop on Language Production. La Bonbonnière, Maastricht, August.

Koppenhagen, H., & Schiller, N. O. "Solving conflict in lexical access: An event-related potentials (ERP) study." 14th Meeting of the European Society for Cognitive Psychology. Leiden, August/September.

Kuzla, C., Mitterer, H., & Cutler, A. "Lexical status effects on compensation for fricative assimilation." 150th Meeting of the Acoustical Society of America (NOISE-CON 2005). Minneapolis, October.

Lamers, M., & Roelofs, A. "Role of Gestalt grouping principles in visual attention: Evidence from the Stroop task." 10th Winter Conference of the Dutch Psychonomic Society (NVP). Egmond aan Zee, December.

Levelt, W.J.M. "Verslag van een ontdekkingsreis." Delivered lecture on the occasion of an honorary doctorate of the University of Louvain, September.

Levinson, S. C. "Spatial relationships in Oceania: Language, mind and culture." 104th American Anthropological Association Meeting. Washington, DC, December.

Majid, A. "How words categorize the human body." Workshop on Words and the world: How words capture human experience" [invited talk]. Lehigh U. Bethlehem, June.

McQueen, J.M., & Huettig, F. "Semantic and phonological priming of auditory lexical decision by pictures and printed words." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

McQueen, J.M., & Huettig, F. "The time-course of shifts in overt attention towards visual objects during language-mediated visual search." 46th Annual Meeting of the Psychonomic Society. Toronto, November.

Menenti, L., & Indefrey, P. "L2 – L1 word association: A direct test" 1st Annual Rovereto Workshop on Bilingualism. Rovereto, October.

Mitterer, H., & Ernestus, M. "Lexikaler Zugang trotz /t/-Elision." 47. Tagung experimentell arbeitender Psychologen (TeaP2005). Regensburg, April.

Mitterer, H. "Compensation for coarticulation in fricative-vowel syllables is phonologically mediated." 14th Meeting of the European Society for Cognitive Psychology (ES COP-2005). Leiden, September.

Mitterer, H., & Ernestus, M. "Stimulus-Response compatibility in the shadowing task." 10th Winter Conference of the Dutch Society of Psychonomics (NVP). Egmond aan Zee, December.

Narasimhan, B., & Gullberg, M. "Lexical choice in encoding spatial perspectives in Tamil child language." Conference of the Linguistic Society of America (LSA). Annual Meeting. San Francisco, January.

Narasimhan, B., & Brown, P. "Containment expressions in Hindi and Tzeltal child language" [invited talk]. Workshop on Developmental Studies in Spatial Language and Cognition. Geneva, February.

Narasimhan, B., & Gullberg, M. "Animacy and orientation in Tamil children's use of placement expressions" [invited talk]. Workshop on Developmental Studies on Spatial Language and Spatial Cognition. Geneva, February.

Narasimhan, B., & Brown, P. "Learning containment terms in Hindi and Tzeltal" [invited talk]. Workshop on Australian Aboriginal Child Language Acquisition Project (ACLA). MPI Nijmegen, April.

Narasimhan, B., & Gullberg, M. "Placement expressions in early child Tamil: The role of animacy and orientation." Biennial Meeting of the Society for Research in Child Development (SRCD). Atlanta, April.

O'Shannessy, C., & Meakins, F. "The 4-M model and two Mixed Languages in Australia." Language Contact and Acquisition Workshop. Norwegian U. of Science and Technology, Trondheim, August.

O'Shannessy "Language separation and children's simultaneous acquisition of two optional ergative languages." 10th International Congress for the study of Child Language. Berlin, July.

O'Shannessy, C., McConvell, P., & Meakins, F. "Functional competition between elements from different source languages in two Mixed Languages in Australia." Conference on Creole language structure: Between substrates and superstrates. MPI for Evolutionary Anthropology, Leipzig, June.

O'Shannessy, C., McConvell, P., & Meakins, F. "Aboriginal Child Language

Acquisition Project (ACLA)" [invited talk]. MPI for Evolutionary Anthropology, Leipzig, June.

O'Shannessy, C. "Acquisition of word order and case marking in a multilingual context." Aboriginal Child Language Acquisition workshop. MPI Nijmegen, April .

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "Die Beziehung zwischen Spracherkennung und Sprachproduktion. [The relationship between speech recognition and speech production]." 47. Tagung experimentell arbeitender Psychologen (TeaP2005). Regensburg, April.

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "Perceptual uniqueness point effects in self-monitoring of speech." 2nd International Workshop on Language Production. Maastricht U., August.

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "The relationship between phonological forms in speaking and listening." 14th Meeting of the European Society for Cognitive Psychology (ESCoP-2005). Leiden, September.

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "Perceptual uniqueness point effects in self-monitoring of speech." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Özyürek, A. "Processing of multi modal semantic information in comprehension and production of utterances" [invited talk]. International Symposium on Communicating Skills of Intention. Kyushu U., Fukuoka, February.

Özyürek, A., Willems, R., & Hagoort, P. "Semantic processing of speech and gesture in the brain." Interacting bodies. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Özyürek, A., Goldin-Meadow, S., Gürcanli, Ö., & Göksun, T. "Gestural expressions of motion events with and without a language model." 10th International Congress for the Study of Child Language (IASCL 2005). Berlin, July.

Özyürek, A. "From gesture to language: How did a (sign) language emerge in Nicaragua?" [invited talk]. 1st Scottish-Dutch Workshop on Language Evolution. U. Amsterdam, August.

Özyürek, A. "How do our hands talk? Cognitive processes underlying speech and gesture production" [invited talk]. 2nd International Workshop on Language Production. Maastricht U., August.

Pourcel, S., & Kopecka, A. "Typological variation in the expression of motion events in French." 21st Scandinavian Conference of Linguistics. Trondheim, June.

Roberts, L. "Investigating L1-L2 interactions in the on-line resolution of subject pronouns in discourse" [invited talk]. 17th International Symposium on Theoretical and Applied Linguistics. Thessaloniki, April.

Roberts, L. "Investigating L1-L2 interactions in the on-line resolution of subject pronouns in discourse: Evidence from eye-tracking with Turkish-Dutch bilinguals." The European Second Language Association 2005 Conference (EuroSLA 15). Dubrovnik, September.

Roberts, L., & Felser, C. "Processing wh-dependencies in English as a second language: A cross-modal priming study." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Roelofs, A. "How do we direct our search for words and concepts in memory?" Symposium van de Utrechtse studievereniging voor Cognitieve Kunstmatige Intelligentie over What's on your mind? A Symposium on Concepts, Consciousness and Cognition. Utrecht, May.

Roelofs, A. "Cascading of activation in planning the production of spoken words." 2nd International Workshop on Language Production. Maastricht U., August.

Roelofs, A. "The role of response modality in Stroop-like tasks." 14th Meeting of the European Society for Cognitive Psychology (ESCOP-2005). Leiden, September.

Roelofs, A. "Dual-task interference from phoneme selection in picture naming." 10th Winter Conference of the Dutch Psychonomic Society. Egmond aan Zee, December.

Rossano, F. "When it's over is it really over? On the effects of sustained gaze vs. gaze withdrawal at sequence possible completion." 9th International Pragmatics Conference (IPrA). Riva del Garda, July.

Rossano, F. [invited discussant]. Workshop on Agency nell'interazione umana (Agency in human interaction). U. Milano Bicocca, October.

Rossano, F. "On sustaining vs. withdrawing gaze in face-to-face interaction." 91st Annual Convention of the National Communication Association (NCA). Boston, November.

Rossano, F. "On some functions of gaze in human interaction" [invited talk]. MPI for Evolutionary Anthropology, Leipzig, March.

Ruiter, J.P. de "Verbal and nonverbal signals of misunderstanding." Symposium on Miscommunication at the 27th Annual Meeting of the Cognitive Science Society (CogSci-2005). Stresa, July.

Ruiter, J.P. de "If eye-gaze frequency drops, its relationship with turn-taking disappears." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Schiller, N. O. "Fonologisch encodieren en self-monitoring bij taalproductie" [invited talk]. Dies Natalis, Maastricht U., January.

Schiller, N. O. "Verbales Monitoring und Sprachproduktion" [invited talk]. 47. Tagung experimentell arbeitender Psychologen (TeaP2005). Regensburg, April.

Schiller, N. O. "Aspects of word form encoding in language production" [keynote lecture]. Psycholinguistics in Flanders. Leuven, May.

Schiller, N. O. "To speak and to misspeak – why do we make so few errors during speaking?" [invited talk]. 4th Dutch Endo-Neuro-Psycho Meeting. Doorwerth, May/June.

Schiller, N.O., Groten, N., & Christoffels, I. K. "Facilitation and inhibition in speech production." 14th Meeting of the European Society for Cognitive Psychology (ESCoP-2005). Leiden, September.

Schiller, N. O. "The effect of letter position in a masked prime on naming pictures." 4th Tuscon Lexical Processing Workshop. U. Western Ontario, London, (Canada), November.

Schiller, N.O., Groten, N., & Christoffels, I. K. "The fate of nonproduced picture names." 46th Annual Meeting of the Psychonomic Society. Toronto, November.

Schwager, W. "Sociolinguistic aspects of Sign Language" [invited talk]. Conference on Deaf Education, Literacy, and Sign Language. National Institute for the Hearing Handicapped. Mumbai, February.

Schwager, W. "The sign and the word – current theoretical problems in Sign Linguistics." 6th Biennial Meeting of the Association of Linguistic Typology (ALT VI). Padang, West Sumatra, July.

Schwager, W. "Segmental, intrasegmental and suprasegmental morphology in Russian Sign Language" 8th International Workshop for Deaf Researchers in Sign Language (ECDRL 8). Jyväskylä, September.

Senft, G. "The Case: The Trobriand Islanders versus H. Paul Grice - Kilivila and the Gricean maxims of quality and manner." 9th International Pragmatics Conference (IPrA). Riva del Garda, July.

Senft, G. "Culture change - language change: Missionaries and moribund varieties of Kilivila." 6th Conference of the European Society for Oceanists (ESfO) on Pacific challenges: Questioning concepts, rethinking conflicts. U. de Provence, Marseilles, July.

Senft, G. "Language, culture and cognition: Frames of spatial reference" [invited talk]. Aluminidag Taalwetenschap en Wiskunde: Linksom of rechtsom. Radboud U. Nijmegen, October.

Senft, G. "Language, culture and cognition: Frames of spatial reference and why we need ontologies of space" [invited talk]. Dagstuhl-Seminar on Spatial Cognition, Specialization and Integration. Internationales Begegnungs- und Forschungszentrum für Informatik. Schloß Dagstuhl, December.

Shatzman, K.B., & McQueen, J.M. "Prosodic knowledge affects the recognition of newly-acquired words." 10th Winter Conference of the Dutch Society of Psychonomics (NVP). Egmond aan Zee, December.

Sloetjes, H. "ELAN – complex multimedia annotation in linguistic research." Colloquium on Social Science Research and Technical Innovations. London, March.

Sloetjes, H., & Brown, A. "Comparison of multimodal annotation tools." Interacting bodies. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Sprenger, S.A., & van Rijn, H. "Clock time naming: Complexities of a simple task." 14th Meeting of the European Society for Cognitive Psychology (ESCP-2005). Leiden, September.

Sprenger, S.A., & van Rijn, H. "Clock time naming: Complexities of a simple task." 4th Annual Summer Interdisciplinary Conference (ASIC-2005). Briarçon, July.

Sprenger, S.A., & van Rijn, H. "Clock time naming: Complexities of a simple task." 27th Annual Meeting of the Cognitive Science Society (CogSci-2005). Stresa, July.

Stevens, M.C., McQueen, J.M., & Hartsuiker, R. "Perceptual adaptation to accent characteristics." 10th Winter Conference of the Dutch Society of Psychonomics (NVP). Egmond aan Zee, December.

Stivers, T. "Alternative recognitional in initial references to persons." Workshop on Person Reference in Conversation. MPI Nijmegen, March.

Stivers, T. "Achieving alignment in story tellings: Nodding as a pre-alignment token." *Interacting bodies*. 2nd Congress of the International Society for Gesture Studies (ISGS). Lyon, June.

Stivers, T., & Majid, A. "Domains of knowledge and responsibility: Questioning in acute pediatric encounters." 14th World Congress of Applied Linguistics (AILA). Madison, July.

Stivers, T., & Majid, A. "Domains of knowledge and responsibility: Questioning in acute pediatric encounters." American Sociological Association Convenes Centennial Annual Meeting. Philadelphia, August.

Stivers, T. "Treatment as a negotiated outcome: The role of parents in antibiotic prescribing decisions." International Conference on Training the health professions applying interaction research in health educational settings, together with the Annual Meeting of the Nordic Network for Education in Medical Communication. Odense, October.

Stivers, T. "When doctors turn to children: Questioning in acute care pediatric encounters." 91st Annual Convention of the National Communication Association (NCA). Boston, November.

Srivastava, S., Budwig, N., & Narasimhan, B. "A case-study of the development of verb usage in a three-year-old Hindi-speaking child: A developmental-functional approach." Biennial Meeting of the Society for Research in Child Development (SRCD). Atlanta, April.

Tagliapietra, L., & McQueen, J.M. "Geminate and singleton consonant duration in Italian spoken-word recognition." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Trilsbeek, P. "Language Resource Archiving at the MPI." 2005-E-MELD Workshop on Digital Language Documentation. Michigan, July.

Trilsbeek, P. "Language resource archive utilization." 2005-E-MELD Workshop on Digital Language Documentation. Michigan, July.

Tuinman, A.E., Mitterer, H., & Cutler, A. "L1 knowledge and perception of reduced forms in continuous L2 speech." 10th Winter Conference of the Dutch Society of Psychonomics (NVP). Egmond aan Zee, December.

Tuinman, A., Mitterer, H., & Cutler, A. "Perceptie van gereduceerde woorden: Een uitdaging voor de tweetalige luisteraar?" Dag van de Fonetiek, Nederlandse Vereniging voor Fonetische Wetenschappen. Utrecht, December.

Verhagen, J. "The role of the auxiliary 'hebben' in Dutch as a second language: Methodological considerations in SLA research." The European Second Language Association 2005 Conference (EuroSLA 15). Dubrovnik, September.

Verhoef, K., Roelofs, A., & Chwilla, D. "Control over languages by bilinguals: Evidence from cued language switching in picture naming." 2nd International Workshop on Language Production. Maastricht U., August.

Verhoef, K., Roelofs, A., & Chwilla, D. "Language switching in bilingual speakers: Evidence from language-cued picture naming." 10th Winter Conference of the Dutch Psychonomic Society (NVP). Egmond aan Zee, December.

Warner, N. "Flapping and reduction of stops: Speech style, phonological environment, and variability." 150th Meeting of the Acoustical Society of America (NOISE-CON 2005). Minneapolis, October.

Willems, R. M., Özyürek, A., & Hagoort, P. "The comprehension of gesture and speech: A first fMRI study." 12th Annual Meeting of the Cognitive Neuroscience Society (CNS 2005). New York, April.

Willems, R. M., Özyürek, A., & Hagoort, P. "The neural integration of gesture and speech." 4th Dutch Endo-Neuro-Psycho Meeting. Doorwerth, May/June.

Willems, R. M., Özyürek, A., & Hagoort, P. "When language meets action: The neural integration of gesture and speech." 11th Annual Conference on Architectures and Mechanisms of Language Processing (AMLaP-2005). Ghent, September.

Willems, R. M., Özyürek, A., & Hagoort, P. "When language meets action: The neural integration of gesture and speech." 14th Meeting of the European Society for Cognitive Psychology (ESCoP-2005). Leiden, September.

Wittenburg, P., & Trilsbeek, P. "Browsable and searchable domain of language resources." E-MELD 2005 Workshop on Digital Language Documentation. Michigan, July.

Wittenburg, P. "DELAMAN, Asia Pacific advanced networks" eScience workshop on Towards a Semantic Web for Digital Data Archives. Bangkok, January.

Wittenburg, P., & Trilsbeek, P. "Documentation of endangered languages." 2005-E-MELD Workshop on Digital Language Documentation. Michigan, July.

Wittenburg, P., & Kemps-Snijders, M. "Lexical markup framework – a new model for representing lexica." Workshop on Lexical Databases and Digital Tools. MPI Nijmegen, April.

Wittenburg, P. "Metadata for language resources." Open Forum for Metadata Registries. Berlin, April.

Wittenburg, P. "Distributed access management for language resources: An overview." Workshop on Distributed Access Management for Language Resources. MPI Nijmegen, July.

Wittenburg, P. "ISO data category registry and metadata: State and perspectives." ISO TC37/SC4 Meeting. Warshawa, September.

Wittenburg, P. "Digitale Sprach-Archive und Langzeitarchivierung." Workshop of the Librarians of the Humanities Section of the MPS. MPI Nijmegen, November.

Wittenburg, P. "Language archiving at the MPI." 3rd Annual Meeting of the Digital Endangered Languages and Musics Archive Network on Managing Access and Intellectual Property Rights (DELAMAN III). Austin, November.

Wittenburg, P. "Challenges for digital resource management in the humanities." Workshop on Challenges for Digital Resource Management in the Humanities. Amsterdam, December.

Wittenburg, P., & Budin, G. "Standards for language resource management." Language Standards for Global Business. Berlin, December.

Zeshan, U., Gede Marsaja, I., & Kanta, K. "Kata Kolok – a village sign language in Bali." Workshop on Indonesian Linguistics. MPI for Evolutionary Anthropology, Leipzig, June.

Zeshan, U. "Sign Language Typology." Conference on Signa Volant - Sign Language Linguistics and the Application of Information Technology to Sign Languages. Milan, June.

Zeshan, U. "Aims and methods of Sign Language Typology: Case studies in interrogatives, negatives and possession." Association for Linguistic Typology 6th Biannual Conference. Padang, Indonesia, July.

13.8 Colloquia presented

The following members of the Institute presented colloquia at various institutions:

BRAUN, B. "Meaningful variation in the scaling and alignment of accents: Thematic contrast in German." Phonetics Institute, U. Cologne.

BOWERMAN, M. "Event categorization in language and cognition: The case of cutting and breaking." U. Stockholm.

BROWN, A. "When two languages meet: Loss or gain?" Boston U.

CHEN, A. "The role of pitch accent type in the interpretation of information status." Phonetisches Kolloquium, Cologne.

CUTLER, A. "Listening to spoken language: How second-language listening difficulty, native-language flexibility and the ease of language change all come down to word recognition." U. St. Andrews, Scotland.

CUTLER, A. "Pitfalls in understanding words in a second language." U. Amsterdam.

DIKKER, S. "Code-Switching. An experimental approach to theoretical considerations." U. Amsterdam.

DIMROTH, C. "Age effects on the process of Second Language Acquisition?" [invited lecture]. Trinity College, Dublin.

ENFIELD, N. J. "Social intelligence in language and cognition: new directions and implications for typology." Department of Linguistics/Psychology, MPI for Evolutionary Anthropology, Leipzig.

ENFIELD, N. J. "Speech-with-gesture: studies from Laos of the composition of utterances." Cognitive Science, Northwestern U., Chicago.

ENFIELD, N. J. "On the risk of over-supposing: gestural and syntactic strategies in Lao conversation." Department of Anthropology, U. Chicago.

ENFIELD, N. J. "Language contact and conceptual convergence: Implications of areal typology for language, culture, and cognition." Department of Linguistics, Stockholm U.

GABY, A. "Why Thaayorre reflexives and reciprocals seem to encode each other as well as themselves." Monash U., Melbourne.

GABY, A. "The diachrony of Thaayorre ergative morphology." Aarhus U.

- GULLBERG, M. "Crosslinguistic influence at hand: Placement events, gestures, and lexical semantics in advanced L2 production." U. Groningen.
- GULLBERG, M. "How target-like is target-like L2 speech? Placement events, semantics, and gestures in advanced L2 production." U. Essex.
- GULLBERG, M. "Kodväxling ur ett process-perspektiv. Ett första steg. [The processing of code-switching. A first step]." U. Uppsala.
- GULLBERG, M. "Vad gester avslöjar om andraspråksinläring. [What gestures can tell us about second language acquisition]." U. Uppsala.
- INDEFREY, P. "Lexical and prelexical processing in listening: A meta-analysis of brain imaging studies." U. Zürich.
- INDEFREY, P. "Neural correlates of syntax in first and second language speakers of Dutch." U. Groningen.
- INDEFREY, P. "Neurokognition des Sprechens." Philipps U. Marburg.
- JOHNSON, E.K. "The development of function word knowledge in Dutch." U. of Wales, Bangor.
- MCQUEEN, J.M. "How do listeners recognize words?" Department of Language and Speech, Radboud U. Nijmegen.
- MCQUEEN, J.M. "The use of phonetic detail in spoken-word recognition." U. Geneva.
- NARASHIMHAN, B. "Semantics and argument structure: A crosslinguistic and developmental perspective." U. Lincoln.
- NEDERHOF, M.-J. Lecturer in the International Ph.D. School in Formal Languages and Applications organized by Carlos-Martin-Vide, Tarragona.
- ROELOFS, A. "How do speakers control the planning of words?" Department of Language and Speech, Radboud U. Nijmegen.
- ROELOFS, A. "What determines the direction of our thoughts and actions?" Department of Psychology, Julius-Maximilian U. Würzburg.
- ROELOFS, A. "What determines the direction of our thoughts and actions?" Behavioural Brain Sciences Centre, School of Psychology, U. Birmingham.
- DE RUITER, J.P. "Production and comprehension in interaction." Master course program, Radboud U. Nijmegen.
- SENFT, G. "One head, many faces – a laudatio." Invited speaker for the presentation of J. Miedema's and G. Reesink's book. "One head many

faces: New perspectives on the Bird's Head Peninsula of New Guinea", organized by the International Institute for Asian Studies at the Rijksmuseum voor Volkenkunde, Leiden.

SENF, G. "Eine Inselgeschichte – 22 Jahre Feldforschung auf den Trobriand Inseln." Frobenius-Colloquium, Frobenius Institut, Johann Wolfgang Goethe-U., Frankfurt a. M.

SENF, G. "Eine Inselgeschichte – 22 Jahre Feldforschung auf den Trobriand Inseln." Arbeitsgruppe Ozeanien, Institut für Ethnologie, U. Heidelberg.

SENF, G. "Language, Culture and Cognition – the Space Project of the MPI for Psycholinguistics." U. d'Antananarivo.

SCHILLER, N. O. "Determiner, not gender congruency in language production: Crosslinguistic evidence from two gender-marking languages." Macquarie Centre for Cognitive Sciences, Macquarie U., Sydney.

SCHILLER, N. O. "From meaning to sound in language production." U. New South Wales, Sydney.

SCHILLER, N. O. "Information flow in language production." Macquarie Centre for Cognitive Sciences, Macquarie U., Sydney.

SCHILLER, N. O. "Phonologisches Enkodieren: Formaspekte während der Sprachproduktion." Universitätsklinikum, Neurolinguistik, Rheinisch-Westfälische Technische Hochschule Aachen.

STIVERS, T. "Patrolling epistemic territories: Alternative ways of agreeing in social interaction." Department of Language and Linguistics, U. Essex,

WITTENBURG, P. "Moderne Konzepte zur Sprachdokumentation und Spracharchivierung." Linguistics Department, U. Hannover.

13.9 Teaching:

Members of the Institute taught at the following institutions:

BOWERMAN, M. "Language acquisition and semantic typology." Block seminar, Masters' program in Cognitive Neuroscience, Radboud U. Nijmegen.

BOWERMAN, M. "Topics in psycholinguistics: Semantic development in first language acquisition." Free U. Amsterdam.

BOWERMAN, M. "Language acquisition and semantic typology." Mini-course, Department of Linguistics, U. Stockholm.

- DAVIDSON, D. "Advanced data analysis and source modeling of EEG and MEG data." Tutorial Tool-kit EEG/MEG 2005, F.C. Donders Centre, Nijmegen.
- DAVIDSON, D. "ERPs applied in cognitive neuroscience" & "EEG data analysis." Toolkit course, F.C. Donders Centre, Nijmegen.
- DIMROTH, C. "Der Altersfaktor im Spracherwerb." FB Sprach- u. Literaturwissenschaft, U. Osnabrück.
- ENFIELD, N. J. "Seminar on semantics and pragmatics in a crosslinguistic perspective." Radboud U. Nijmegen.
- INDEFREY, P. "Hemodynamic methods in cognitive neuroscience" and "Brain activations in language production and comprehension." Hersenen en Gedrag course, Radboud U. Nijmegen.
- INDEFREY, P. "Neurokognition der Syntax." Thematisches Seminar, Heinrich-Heine- U. Düsseldorf.
- INDEFREY, P. "The ins and outs of PET." Toolkit course, F.C. Donders Centre, Nijmegen.
- KLEIN, W. Institut für Deutsch als Fremdsprachenphilologie, U. Heidelberg.
- LEVINSON, S.C. "Semantics and pragmatics in a crosslinguistic perspective." Radboud U. Nijmegen.
- MCQUEEN, J.M. "The mental lexicon: Auditory Word Recognition." Masters' program in Cognitive Neuroscience, Radboud U. Nijmegen.
- NARASIMHAN, B. "Formal and functional perspectives on early grammatical development." Block seminar, Masters' program in Cognitive Neuroscience, Radboud U. Nijmegen.
- ROELOFS, A. "Cumulative computational modeling in cognitive psychology." Validity of Models course lecture, Radboud U. Nijmegen
- ROELOFS, A. "Neural correlates of cognitive control." Brain and Behavior course lecture, Radboud U. Nijmegen.
- ROELOFS, A. "Undergraduate practical in cognitive psychology: Motor behavior." Masters' program in Cognitive Neuroscience, Radboud U. Nijmegen.
- SCHILLER, N. "The mental lexicon" Lecture/seminar series as part of the Research Master on Cognitive Neuroscience, specialization "Psycholinguistics", Radboud U. Nijmegen.

- SCHILLER, N. "Psycholinguistics." LOT (Landelijke Onderzoeksschool Taalwetenschap [Dutch researchschool for linguistics]) Summer school, Leiden U.
- SCHILLER, N. "The neurocognition of language." Faculty of Psychology, Department of Cognitive Neuroscience, Maastricht U.
- SENF, G. Seminar on "Oceanic Languages." U. Cologne.
- SENF, G. Seminar on "Semantics and pragmatics in a crosslinguistic perspective." Radboud U. Nijmegen.
- ZESHAN, U. "Language Typology and Sign Languages." BA-level course, Radboud U. Nijmegen.

CHAPTER 14

PUBLICATIONS

- Ameka, F. K. (2005). Forms of secondary predication in serialising languages: Depictives in Ewe. In N. P. Himmelmann & E. Schultze-Berndt (Eds.), *Secondary Predication and Adverbial Modification: The Typology of Depictives* (pp. 335-378). Oxford: Oxford University Press.
- Ameka, F. K. (2005). Multiverb constructions on the West African littoral: Microvariation and areal typology. In M. Vulchanova & T. A. Åfarli (Eds.), *Grammar and beyond: Essays in honour of Lars Hellan* (pp. 15-42). Oslo: Novus Press.
- Ameka, F. K. (2005). "The woman is seeable" and "The woman perceives seeing": Undergoer voice constructions in Ewe and Likpe. In M. E. K. Dakubu & E. K. Osam (Eds.), *Studies in the Languages of the Volta Basin 3* (pp. 43-62). Legon: Department of Linguistics, University of Ghana.
- Bien, H., Levelt, W.J.M., & Baayen, R.H. (2005). Frequency effects in compound production. *Proceedings of the National Academy of Sciences*, 102, (pp. 17876-17881).
- Borgwaldt, S.R., Hellwig, F.M., & de Groot, A.M.B. (2005). Onset entropy matters – Letter-to-phoneme mappings in seven languages. *Reading and Writing*, 18, 211-229.
- Bowerman, M. (2005). Linguistics. In B. Hopkins (Ed.), *The Cambridge Encyclopedia of Child Development* (pp. 497-501). Cambridge, MA: Cambridge University Press.
- Bowerman, M. (2005). Why can't you "open" a nut or "break" a cooked noodle?: Learning covert object categories in action word meanings. In L. Gershkoff-Stowe & D. H. Rakison (Eds.), *Building Object Categories in Developmental Time* (pp. 209-243). Mahwah, NJ: Erlbaum.
- Braun, B. (2005). *Production and perception of thematic contrast in German*. Contemporary Series in Descriptive Linguistics. Vol. 9. Oxford: Peter Lang Publishing.
- Braun, B., Weber, A., & Crocker, M. (2005). Does narrow focus activate alternative referents?. *Proceedings of the 9th European Conference on Speech Communication and Technology (EUROSPEECH 2005)* (pp. 1709-1712), [CD-ROM].

- Broeder, D., Brugman, H., & Senft, G. (2005). Documentation of languages and archiving of language data at the Max Planck Institute for Psycholinguistics in Nijmegen. *Linguistische Berichte*, 201, 89-103.
- Broersma, M. (2005). Perception of familiar contrasts in unfamiliar positions. *Journal of the Acoustical Society of America*, 117, 3890-3901.
- Brown, A. (2005). [Review of the book *The Resilience of Language*]. *Linguistics*, 43, 662-666.
- Brown, A., & Gullberg, M. (2005). Convergence in emerging and established language systems: Evidence from speech and gesture in L1 Japanese. *Handbook of the 7th Annual International Conference of the Japanese Society for Language Sciences* (172-173). Tokyo: JSLS.
- Brown, A., Özyürek, A., Allen, S., Kita, S., Ishizuka, T., & Furman, R. (2005). Does event structure influence children's motion event expressions? In A. Brugos, M. R. Clark-Cotton, & S. Ha (Eds.), *A supplement to the Proceedings of the 29th Boston University Conference on Language Development*. Sommerville, MA: Cascadilla Press.
- Brown, P. (2005). Linguistic politeness. In U. Ammon, N. Dittmar, K. J. Mattheier, & P. Trudgill (Eds.), *Sociolinguistics: An International Handbook of the Science of Language and Society*, 2nd ed. (pp. 1410-1416). Berlin: Mouton de Gruyter.
- Brown, P. (2005). What does it mean to learn the meaning of words? [Review of the book *How Children Learn the Meanings of Words*]. *Journal of the Learning Sciences*, 14(2), 293-300.
- Burenhult, N. (2005). *A Grammar of Jahai*. Canberra: Pacific Linguistics.
- Burenhult, N. (2005). Landscape terms and toponyms in Jahai: A field report. *Working Papers* 51, 17-29. Lund: Department of Linguistics, Lund U.
- Chen, J. (2005). Interpreting state change: Learning the meaning of verbs and verb compounds in Mandarin. In A. Brugos, M. R. Clark-Cotton, & S. Ha (Eds.), *A supplement to the Proceedings of the 29th Boston University Conference on Language Development*. Sommerville, MA: Cascadilla Press.
- Chen, A. J., & den Os, E. (2005). Effects of pitch accent type on interpreting information status in synthetic speech. *Proceedings of the 9th European Conference on Speech Communication and Technology (EUROSPEECH 2005)* (pp. 1913-1917), [CD-ROM].

- Cho, T. (2005). Prosodic strengthening and featural enhancement: Evidence from acoustic and articulatory realizations of /a,i/ in English. *Journal of the Acoustical Society of America*, 117, 3867-3878.
- Cho, T., & McQueen, J. M. (2005). Prosodic influences on consonant production in Dutch: Effects of prosodic boundaries, phrasal accent and lexical stress. *Journal of Phonetics*, 33, 121-157.
- Cutler, A. (Ed.) (2005). *Twenty-First Century Psycholinguistics: Four Cornerstones*. Hillsdale, NJ: Erlbaum.
- Cutler, A. (2005). Why is it so hard to understand a second language in noise? *Newsletter, American Association of Teachers of Slavic and East European Languages*, 48, 16.
- Cutler, A. (2005). Lexical stress. In D.B. Pisoni & R.E. Remez (Eds.), *The Handbook of Speech Perception* (pp. 264-289). Oxford: Blackwell.
- Cutler, A. (2005). The lexical statistics of word recognition problems caused by L2 phonetic confusion. *Proceedings of the 9th European Conference on Speech Communication and Technology (EUROSPEECH 2005)*, (pp. 413-416), [CD-ROM].
- Cutler, A., & Broersma, M. (2005). Phonetic precision in listening. In W. Hardcastle & J. Beck (Eds.), *A Figure of Speech* (pp. 63-91). Mahwah, NJ: Erlbaum.
- Cutler, A., Klein, W., & Levinson, S.C. (2005). Cornerstones of twenty-first century psycholinguistics. In A. Cutler (Ed.), *Twenty-First Century Psycholinguistics: Four Cornerstones* (pp. 1-20). Hillsdale, NJ: Erlbaum.
- Cutler, A., McQueen, J.M., & Norris, D. (2005). The lexical utility of phoneme-category plasticity. *Proceedings of the ISCA Workshop on Plasticity in Speech Perception (PSP2005)* (pp. 103-107). London: University College London, [CD-ROM].
- Cutler, A., Smits, R., & Cooper, N. (2005). Vowel perception: Effects of non-native language versus non-native dialect. *Speech Communication*, 47, 32-42.

- Dimroth, C., & Lindner, K. (2005): Was langsame Lerner uns zeigen können: Der Erwerb der Finitheit im Deutschen durch einsprachige Kinder mit einer spezifischen Sprachentwicklungsstörung und durch Zweitsprach-lerner. *Zeitschrift für Literaturwissenschaft und Linguistik*, 140, 40-61.
- Dimroth, C., & Watorek, M. (2005). Additive scope particles in advanced learner and native speaker discourse. In H. Hendriks (Ed.), *The Structure of Learner Varieties* (pp. 461-488). Berlin: Mouton de Gruyter.
- Donselaar, W. van, Koster, M., & Cutler, A. (2005). Exploring the role of lexical stress in lexical recognition. *Quarterly Journal of Experimental Psychology*, 58A, 251-273.
- Dunn, M., Terrill, A., Reesink, G., Foley, R., & Levinson, S. C. (2005). Structural phylogenetics and the reconstruction of ancient language history. *Science*, 309, 2072-2075.
- Eisner, F., & McQueen, J. M. (2005). The specificity of perceptual learning in speech processing. *Perception & Psychophysics*, 67, 224-238.
- Enfield, N. J. (2005). Areal linguistics and mainland Southeast Asia. *Annual Review of Anthropology*, 34, 181-206.
- Enfield, N. J. (2005). The body as a cognitive artifact in kinship representations: hand gesture diagrams by speakers of Lao. *Current Anthropology*, 46 (1), 51-81.
- Enfield, N. J. (2005). [Review of book *Laughter in interaction*]. *Linguistics*, 43 (6), 1191-1197.
- Enfield, N. J. (2005). Comment on 'Explorations in the deictic field', by William F. Hanks. *Current Anthropology* 46(1), 51-81.
- Enfield, N. J. (2005). Micro and macro dimensions in linguistic systems. In S. Marmaridou, K. Nikiforidou, & E. Antonopoulou (Eds.), *Reviewing Linguistic Thought: Converging Trends for the 21st Century* (pp. 313-326). Berlin: Mouton de Gruyter.
- Enfield, N. J. (2005). Depictive and other secondary predication in Lao. In N. P. Himmelmann & E. Schultze-Berndt (Eds.), *Secondary Predication and Adverbial Modification: The Typology of Depictives* (pp. 379-391). Oxford: Oxford University Press.
- Ernestus, M., Mak, W.M., & Baayen, R.H. (2005). Waar 't kofschip strandt. *Levende Talen Magazine*, 92, 9-11.

- Gaby, A. (2005). Some participants are more equal than others: Case and the composition of arguments in Kuuk Thaayorre. In M. Amberber & H. de Hoop (Eds.), *Competition and Variation in Natural Languages: The Case for Case* (pp. 9-39). Amsterdam: Elsevier.
- Goudbeek, M., Smits, R., Cutler, A., & Swingley, D. (2005). Acquiring auditory and phonetic categories. In H. Cohen & C. Lefebvre (Eds.), *Categorization in Cognitive Science* (pp. 497-513). Amsterdam: Elsevier.
- Gullberg, M. (2005). L'expression orale et gestuelle de la cohésion dans le discours de locuteurs langue 2 débutants. *Acquisition et Interaction en Langue Etrangère (AILE)*, 23, 153-172.
- Haun, D. B. M., Allen, G. L., & Wedell, D. H. (2005). Bias in spatial memory: A categorical endorsement. *Acta Psychologica*, 118(1-2), 149-170.
- Hoop, H. de, & Narasimhan, B. (2005). Differential case-marking in Hindi. In M. Amberber & H. de Hoop (Eds.), *Competition and Variation in Natural Languages: The Case for Case* (pp. 321-345). Amsterdam: Elsevier.
- Janzen, G. (2005). Wie das menschliche Gehirn Orientierung ermöglicht. In G. Plehn (Ed.), *Jahrbuch der Max-Planck-Gesellschaft* (pp. 599-601). Göttingen: Vandenhoeck & Ruprecht.
- Janzen, G., & Hawlik, M. (2005). Orientierung im Raum – Befunde zu Entscheidungspunkten. *Zeitschrift für Psychology*, 213, 179-186.
- Johnson, E.K. (2005). Grammatical gender and early word recognition in Dutch. In A. Brugos, M. R. Clark-Cotton, & S. Ha (Eds.), *A supplement to the Proceedings of the 29th Boston University Conference on Language Development*. (Vol.1, pp. 320-330). Sommerville, MA: Cascadilla Press.
- Johnson, E. K. (2005). English-learning infants' representations of word-forms with iambic stress. *Infancy*, 7, 95-105.
- Johnson, E. K., Westrek, E., & Nazzi, T. (2005). Language familiarity affects voice discrimination by seven-month-olds. *Proceedings of the ISCA Workshop on Plasticity in Speech Perception (PSP2005)* (pp. 227-230). London: University College, [CD-ROM].
- Jolink, A. (2005). Finite linking in normally developing Dutch children and children with specific language impairment. *Zeitschrift für Literaturwissenschaft und Linguistik*, 140, 61-81.

- Kempen, G., & Harbusch, K. (2005). The relationship between grammaticality ratings and corpus frequencies: A case study into word order variability in the midfield of German clauses. In S. Kepser & M. Reis (Eds.), *Linguistic Evidence – Empirical, Theoretical, and Computational Perspectives* (pp. 329-349). Berlin: Mouton de Gruyter.
- Kemps, R. J. J. K., Ernestus, M., Schreuder, R., & Baayen, R. H. (2005). Prosodic cues for morphological complexity: The case of Dutch plural nouns. *Memory & Cognition*, 33, 430-446.
- Kemps, R. J. J. K., Wurm, L. H., Ernestus, M., Schreuder, R., & Baayen, R. H. (2005). Prosodic cues for morphological complexity in Dutch and English. *Language and Cognitive Processes*, 20, 43-73.
- Keune, K., Ernestus, M., van Hout R., & Baayen, R.H. (2005). Social, geographical, and register variation in Dutch: From written "mogelijk" to spoken "mok". *Corpus Linguistics and Linguistic Theory*, 1, 183-223.
- Klein, W. (Ed.) (2005), *Nicht nur Literatur*. Stuttgart: Metzler.
- Klein, W. (2005). Wie ist eine exakte Wissenschaft von der Literatur möglich? *Zeitschrift für Literaturwissenschaft und Linguistik* 137, 80-100. (shortened version under the title "Hoe is een exacte literatuurwetenschap mogelijk?" *Parmentier 2005*, 48-65).
- Klein, W. (2005). Vom Sprachvermögen zum Sprachsystem. *Zeitschrift für Literaturwissenschaft und Linguistik*, 140, 8-39.
- Klein, W. (2005). Söldner des Wissens. In R. M. Kiesow, R. Ogorek, & S. Simitis (Eds.), *Summa: Dieter Simon zum 70. Geburtstag* (pp. 319-332). Frankfurt am Main: Klostermann.
- Klein, W. (2005). The grammar of varieties. In U. Ammon, N. Dittmar, K. Mattheier, P. Trudgill et al. (Eds.), *Sociolinguistics. An International Handbook* (pp. 1163-1172). Berlin: Mouton de Gruyter.
- Klein, W. (2005). Über den Nutzen naturwissenschaftlicher Denkmodelle für die Geisteswissenschaften. In *Modelle des Denkens* (pp. 45-51). Berlin: BBAW.
- Klein, W., & Dimroth, C. (Eds.) (2005). Spracherwerb. *Zeitschrift für Literaturwissenschaft und Linguistik*, 140.
- Klein, W., & Schmitt, P. (2005). Der alte und der neue Grimm. In Grimm-Sozietät (Ed.), *Die Brüder Grimm in Berlin* (pp. 157-166). Stuttgart: Hirzel.

- Kooijman, V., Hagoort, P., & Cutler, A. (2005). Electrophysiological evidence for prelinguistic infants' word recognition in continuous speech. *Cognitive Brain Research*, 24, 109-116.
- Levelt, W. J. M. (2005). Habitual perspective: Discussion paper, *Language & Cognition (CogSci 2005)*. Stresa: Cognitive Society.
- Levinson, S. C. (2005). Comments on Everett 'Cultural Constraints on Grammar and Cognition in Pirahã'. *Current Anthropology*, 46, 37-638.
- Levinson, S.C. (2005). Living with Manny Schegloff's dangerous idea. *Discourse Studies*, 7, 431-453.
- Marinis, T., Roberts, L., Felser, C., & Clahsen, H. (2005). Gaps in second language sentence processing. *Studies in Second Language Acquisition*, 27, 53-78.
- Matsuo, A. (2005). [Review of book *Children's discourse: person, space and time across languages*]. *Linguistics*, 43, 653-657.
- McQueen, J. M. (2005). Spoken word recognition and production: Regular but not inseparable bedfellows. In A. Cutler (Ed.), *Twenty-First Century Psycholinguistics: Four Cornerstones* (pp. 229-244). Hillsdale, NJ: Erlbaum.
- McQueen, J. M., & Mitterer, H. (2005). Lexically-driven perceptual adjustments of vowel categories. *Proceedings of the ISCA Workshop on Plasticity in Speech Perception (PSP2005)* (pp. 233-236). London: University College London, [CD-ROM].
- McQueen, J.M., & Sereno, J. (2005). Cleaving automatic from strategic effects in phonological priming. *Memory & Cognition*, 33, 1185-1209.
- Meira, S., & Terrill, A. (2005). Contrasting contrastive demonstratives in Tiriyó and Lavukaleve. *Linguistics*, 43, 1131-1152.
- Mitterer, H. (2005). Short- and medium-term plasticity for speaker adaptation seem to be independent. *Proceedings of the ISCA Workshop on Plasticity in Speech Perception (PSP2005)* (pp. 83-86). London: University College London, [CD-ROM].
- Narasimhan, B. (2005). Splitting the notion of 'agent': Case-Marking in early child Hindi. *Journal of Child Language*, 32, 787-803.
- Narasimhan, B., Budwig, N., & Murty, L. (2005). Argument realization in Hindi caregiver-child discourse. *Journal of Pragmatics*, 37, 461-495.

- O'Shannessy, C. (2005). Light Warlpiri: A new language. *Australian Journal of Linguistics*, 25, 31-57.
- Özyürek, A., Kita, S., Allen, S., Furman, R., & Brown, A. (2005). How does linguistic framing influence co-speech gestures? Insights from crosslinguistic differences and similarities. *Gesture* 5, 216-241.
- Penke, M., Janssen, U., Indefrey, P., & Seitz, R. (2005). No evidence for a rule/procedural deficit in German patients with Parkinson's disease. *Brain and Language*, 95, 139-140.
- Pluymaekers, M., Ernestus, M., & Baayen, R.H. (2005). Lexical frequency and acoustic reduction in Dutch. *Journal of the Acoustical Society of America*, 118, 2561-2569.
- Pluymaekers, M., Ernestus, M., & Baayen, R.H. (2005). Articulatory planning is continuous and sensitive to informational redundancy. *Phonetica*, 62, 146-159.
- Rey, A., & Schiller, N. O. (2005). Graphemic complexity and multiple print-to-sound associations in visual word recognition. *Memory & Cognition*, 33, 76-85.
- Roelofs, A. (2005). The visual-auditory color-word Stroop asymmetry and its time course. *Memory & Cognition*, 33, 1325-1336.
- Roelofs, A. (2005). From Popper to Lakatos: A case for cumulative computational modeling. In A. Cutler (Ed.), *Twenty-First Century Psycholinguistics: Four Cornerstones* (pp. 313-330). Hillsdale, NJ: Erlbaum.
- Roelofs, A. (2005). Spoken word planning, comprehending, and self-monitoring. In R. J. Hartsuiker, R. Bastiaanse, A. Postma, & F. Wijnen (Eds.), *Phonological encoding and monitoring in normal and pathological speech* (pp. 42-63). Hove: Psychology Press.
- Scharenborg, O., Norris, D., den Bosch, L., & McQueen, J.M. (2005). How should a speech recognizer work? *Cognitive Science*, 29, 867-918.
- Schiller, N. O. (2005). Verbal self-monitoring. In A. Cutler (Ed.), *Twenty-First Century Psycholinguistics: Four Cornerstones* (pp. 245-261). Hillsdale, NJ: Erlbaum.
- Senft, G. (2005). [Review of the book *The art of Kula*]. *Anthropos*, 100, 247-249.

- Senft, G. (2005). Bronislaw Malinowski and linguistic pragmatics. In P. Cap & R. Janney (Eds.), *Pragmatics today* (pp. 139-155). Frankfurt am Main: Peter Lang.
- Senft, G. (2005). [Review of the book *The Art of Kula*]. *Anthropos*, 100, 247-249.
- Senft, G. (2005). [Review of the book *Odyssey of an Anthropologist*]. *Oceania*, 75, 302.
- Senghas, A., Özyürek, A., & Kita, S. (2005). Response to Comment on "Children Creating Core Properties of Language: Evidence from an Emerging Sign Language in Nicaragua". *Science* 309 (vol. 5731), 56c.
- Seuren, P.M.A. (2005). The origin of grammatical terminology. In B. Smelik, R. Hofman, C. Hamans, & D. Cram (Eds.), *A Companion in Linguistics: A Festschrift for Anders Ahlqvist on the Occasion of his Sixtieth Birthday* (pp. 185-196). Nijmegen: De Keltische Draak.
- Seuren, P.M.A. (2005). Eubulides as a 20th-century semanticist. *Language Sciences*, 27, 75-95.
- Seuren, P.A.M. (2005). The role of lexical data in semantics. In D.A. Cruse, F. Hundsnurscher, M. Job, & P.R. Lutzeier (Eds.), *Lexikologie/ Lexicology. Ein internationales Handbuch zur Natur und Struktur von Wörtern und Wortschätzen. Handbücher zur Sprach- und Kommunikationswissenschaft*, 21(2) (pp. 1690-1696). Berlin: Walter de Gruyter.
- Shapiro, K. A., Mottaghy, F. M., Schiller, N. O., Poeppel, T. D., Flüss, M. O., Müller, H. W., Caramazza, A., & Krause, B. J. (2005). Dissociating neural correlates for nouns and verbs. *NeuroImage*, 24, 1058-1067.
- Sharp, D.J., Scott, S.K., Cutler, A., & Wise, R.J.S. (2005). Lexical retrieval constrained by sound structure: The role of the left inferior frontal gyrus. *Brain and Language*, 92, 309-319.
- Sprenger, S.A., & van Rijn, H. (2005) Clock time naming: Complexities of a simple task. *Proceedings of the 27th Annual Meeting of the Cognitive Science Society* (pp. 2062-2067).
- Stivers, T. (2005). Nonantibiotic treatment recommendations: Delivery formats and implications for parent resistance. *Social Science & Medicine*, 60, 949-964.

- Stivers, T. (2005). Modified repeats: One method for asserting primary rights from second position. *Research on Language and Social Interaction*, 38, 131-158.
- Stivers, T. (2005). Parent resistance to physicians' treatment recommendations: One resource for initiating a negotiation of the treatment decision. *Health Communication*, 18, 41-74.
- Stivers, T., & Sidnell, J. (2005). Introduction: Multimodal interaction. *Semiotica*, 156, 1-20.
- Srivastava, S., Budwig, N., & Narasimhan, B. (2005). A developmental-functional view of the development of transitive and intransitive constructions in a Hindi-speaking child: A case-study. *International Journal of Idiographic Science*, 2.
- Trilsbeek, P., & Wittenburg, P. (2005). Archiving challenges. In J. Gippert, N. P. Himmelmann, & U. Mosel (Eds.), *Essentials of Language Documentation* (pp. 311-335). Berlin: Mouton de Gruyter.
- Verhagen, J. (2005). The role of the nonmodal auxiliary 'hebben' in the acquisition of Dutch as a second language. *Toegepaste Taalwetenschap in Artikelen (TTWiA)*, 73, 41-52.
- Verhagen, J. (2005). The role of the auxiliary 'hebben' in Dutch as a second language. *Zeitschrift für Literaturwissenschaft und Linguistik (LiLi)*, 140, 109-127.
- Warner, N., Kim, J., Davis, C., & Cutler, A. (2005). Use of complex phonological patterns in processing: Evidence from Korean. *Journal of Linguistics*, 41, 353-387.
- Warner, N., Smits, R., McQueen, J.M., & Cutler, A. (2005). Phonological and statistical effects on timing of speech perception: Insights from a database of Dutch diphone perception. *Speech Communication*, 46, 53-72.
- Willems, R., Özyürek, A., & Hagoort, P. (2005). Neural integration of speech and gesture comprehension: A first fMRI study. *Journal of Cognitive Neuroscience (Suppl.)*, 17, 231.
- Wittenburg, P., Skiba, R., & Trilsbeek, P. (2005). The language archive at the MPI: Contents, tools, and technologies. *Language Archives Newsletter*, 5, 7-9.

- Zeshan, U. (2005). Question particles in sign languages. In M. Dryer, D. Gil, & M. Haspelmath (Eds.), *World Atlas of Language Structures* (pp. 564-567). Oxford: Oxford University Press.
- Zeshan, U. (2005). Irregular negatives in sign languages. In M. Dryer, D. Gil, & M. Haspelmath (Eds.), *World Atlas of Language Structures* (pp. 560-563). Oxford: Oxford University Press.
- Zeshan, U., Pfau, R., & Aboh, E. (2005). When a wh-word is not a wh-word: The case of Indian Sign Language. In B. Tanmoy (Ed.), *The Yearbook of South Asian Languages and Linguistics 2005* (pp. 11-43). Berlin: Mouton de Gruyter.
- Zeshan, U. (2005). Sign Languages. In M. Dryer, D. Gil, & M. Haspelmath (Eds.), *World Atlas of Language Structures* (pp. 558-559). Oxford: Oxford University Press.
- Zeshan, U., & Panda S. (2005). *Professional Course in Indian Sign Language (VCD video & workbook)*. Mumbai: Ali Yavar Jung National Institute for the Hearing Handicapped (Ministry of Social Justice and Empowerment, Government of India).

DISSERTATIONS

- Broersma, M. (2005). *Phonetic and lexical processing in a second language*. Ph.D. dissertation. Radboud U. Nijmegen. MPI Series in Psycholinguistics, 34.
- Chen, A. J. (2005). *Universal and language-specific perception of paralinguistic intonational meaning*. Ph.D. dissertation. Radboud U. Nijmegen. LOT Dissertation Series, 102.
- Lüpke, F. (2005). *A grammar of Jalonke Argument structure*. Ph.D. dissertation. Radboud U. Nijmegen. MPI Series in Psycholinguistics, 30.
- Salverda, A.P. (2005). *Prosodically-conditioned detail in the recognition of spoken words*. Ph.D. dissertation. Radboud U. Nijmegen. MPI Series in Psycholinguistics, 33.
- Seifart, F. (2005). *The structure and use of shape-based noun classes in Miraña (North West Amazon)*. Ph.D. dissertation. Radboud U. Nijmegen. MPI Series in Psycholinguistics, 32.

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