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PREFACE

Last year was a period of quiet and steady work, the results of which are described in Chapters 1 – 12 of this report. Occasionally, reference is made to earlier Annual Reports – you will find these, as well as other information about the Institute at www.mpi.nl. There were two organizational changes in the project structure. The two former Institute projects, "The Role of Finiteness" and "The Dynamics of Learner Varieties" were merged under the new name "The Comparative Study of L2 Acquisition" and the comparative analysis of sign languages, coordinated by Ulrike Zeshan, now has the status of an Institute Project under the title, "Sign Language Typology".

Wolfgang Klein

Nijmegen, April 2005

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Chapter 1

Phonological Learning for Speech Perception

Introduction

1.1 Phonological learning in infancy

1.2 Learning of auditory categories in adulthood

1.3 Native phonology in adult listening

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Joint research with other projects:

Decoding Continuous Speech

Introduction

The goal of the Phonological Learning for Speech Perception (PLSP) project is to understand how phonological regularities in speech are learned, and to determine the consequences of this learning for the comprehension of language. From its beginning in 2001, the project has included most of the work funded by the NWO-supported Spinoza award to Cutler. The research in the project divides into three principal themes: studies of phonological acquisition in infancy (section 1.1), studies of the computation and refinement of auditory categories in adulthood (1.2), and assessment of the role of native-language phonology in adult speech comprehension (1.3).

1.1 Phonological learning in infancy

1.1.1 Voice discrimination as a function of language familiarity

In the final-year undergraduate project of Westrek (U. Amsterdam), supervised by Johnson, the effects of language familiarity on voice and language discrimination were investigated in Dutch-learning 7-month-olds in two Visual Fixation experiments. Infants were habituated to three voices in one language and then tested on a new voice in the habituated language (Voice Change) and a new voice in a new language (Language Change). In Experiment 1 (Dutch versus Japanese) and Experiment 2 (Japanese versus Italian), infants dishabituated to Language Change trials. But only Dutch-habituated infants in Experiment 1 dishabituated to Voice Change trials. Thus voice discrimination in infants is affected by language familiarity, a finding with important implications for the study of voice encoding and identification. In a follow-up experiment, in collaboration with Nazzi (CNRS, Paris) these effects were further tested with Dutch and German, two rhythmically similar languages. As in Experiments 1 and 2, infants dishabituated to Language Change trials regardless of habituation. In addition, only Dutch-habituated infants tended to dishabituate to Voice Change trials. Taken together, these results support the notion that infants are more sensitive to voice changes in their native language than to voice changes in an unfamiliar language.

1.1.2 Sensitivity to prosodic boundaries

Johnson and Seidl (Purdue U.) used the Headturn Preference Procedure to investigate 6-month-olds' sensitivity to clause boundaries in fluent speech. Both Dutch- and English-learning infants were familiarized to the same string of words produced in two ways: as a prosodically well-formed clause (e.g., *Koude pizza smaakt niet zo goed* 'Cold pizza doesn't taste very nice') and as a prosodically ill-formed clause (... *koude pizza. Smaakt niet zo goed*. '... cold pizza. Doesn't taste very nice'). Both groups of language learners subsequently

preferred to listen to a passage containing this string of words produced as a prosodically well-formed clause over a passage containing this string of words produced as a prosodically ill-formed clause. The fact that English-learning infants extract and remember prosodically well-formed Dutch clauses more readily than prosodically ill-formed Dutch clauses could be taken as evidence that infants use language-general acoustic cues to break up their speech input into phrase-sized units. This in turn could impact for bootstrapping theories of language acquisition. However, follow-up experiments have suggested that Dutch- and English-learning infants use different types of cues to identify clauses in fluent speech. When the pauses associated with clause boundaries were removed, English- but not Dutch-learning infants continued to segment and remember clausal units in their native language better than non-clausal units. This suggests that Dutch-learning infants may be more reliant on pause cues than English-learning infants. Future work will further investigate this possibility, as well as examine Dutch- and English-learning infants' reliance on other cues to clause boundaries.

1.1.3 Crosslinguistic differences in infants' use of phonetic information in word learning

Dietrich and Swingley (U. Pennsylvania) continued their collaboration with Werker (U. British Columbia) investigating language-specific phonological effects in word learning (Annual Report 2003). Using an audiovisual habituation procedure, Dietrich and colleagues had found that Dutch 18-month-olds, but not Canadian-English 18-month-olds, interpreted vowel length variation contrastively. Thus, Dutch children were surprised to hear an object referred to first as a *tam* and then as a *taam*; Canadian children showed no such effect. Both groups were equally surprised to hear a switch from *tam* to *tem*. A follow-up study replicated the Dutch effect using the Canadian stimuli, and extended the results to a length contrast that is marginal in Dutch, namely long and short /e/. In both cases the Dutch infants noticed the switch in vowel durations, showing attention to length beyond the categories for which Dutch adults rely on this variable for contrast. These results support the notion that Dutch infants have learned an abstract linguistic feature that they treat as signaling contrast.

1.1.4 Word class and its role in phonological learning

With Shi (U. Quebec, Montreal) and Werker, Cutler continued the series of investigations of preverbal infants' processing of functors in continuous speech (Annual Reports 2002, 2003) with a study of 8-month-old infants' recognition and representation of high versus low frequency functors. Infants heard sequences containing a lexical word preceded by a high frequency functor *the*, versus a prosidically matched nonsense functor *kuh* which differed from *the* only

in the initial consonant. Another group of 8-month-olds heard sequences containing a lexical word preceded by a low frequency functor *its* versus a nonsense functor *ots*. Recognition of functors would be indicated by longer listening time to sequences containing real functors. The results revealed no differential listening time for real versus nonsense functors overall; however, words with *the* or *kuh* were listened to significantly more than words with *its* or *ots*. This finding suggests a preference for a weak form in functor position, and may suggest that 8-month-olds recognize the most frequent, familiar functor forms in continuous speech, albeit in phonetically underspecified form. Note that previous studies in this series (Annual Report 2003) suggest that detailed specification of functors is in place by 11 to 13 months.

Functor processing was also investigated by Johnson in Dutch-learning 28-month-olds. Dutch toddlers often omit the definite determiners *het* and *de* from their utterances, and even once they begin producing determiners, they can continue to make gender-marking errors for many years. These phenomena could be taken as evidence that they have not yet mastered the determiner system of their language. However, this would be at variance with results showing that English-learning infants perceive and process determiners long before they begin producing them. Using the Split-screen Preferential Looking Paradigm, Johnson therefore studied 28-month-olds' knowledge of gender agreement between Dutch determiners and nouns. Recognition of familiar nouns was tested in three different contexts: correct and informative gender (the picture was accompanied by a spoken description using correct gender and the other picture on the screen would require different gender), correct but uninformative gender (both pictures on screen have same gender), and incorrect gender. The results showed that Dutch-learning 28-month-olds recognize *de*-words most rapidly and accurately when the words are preceded by informative and correct determiners. No such effect was observed for the recognition of *het*-words. Vocabulary size did not affect this pattern of results for *de*- versus *het*-words. The asymmetry between toddlers' use of *het* and *de* suggests that toddlers may be sensitive to the many potentially important differences between the distribution and use of *het* and *de*; it is also interesting in the light of the fact that in production, Dutch children routinely substitute *de* for *het*, but not vice versa.

1.1.5 Phonological detail in infants' word learning

Swingley continued work on phonological aspects of young children's word learning. Previous experiments together with Aslin (U. Rochester) had shown that under equivalent conditions, 18-month-olds were unable to learn words that sounded similar to words the children already knew, but were able to learn

words that sounded unlike any familiar words (Annual Report 2001). The finding that phonological "neighbors" are harder to learn suggests that competition from familiar words can block encoding of novel forms. Swingley has now replicated and extended this effect in a group of Dutch 18-month-olds. In contrast to the previous study, here children were taught only one word rather than two, and again they showed learning only of non-neighbors. Exposure to a novel neighbor (like *dal*, resembling *bal*, 'ball') had two additional effects: first, infants' performance on recognizing *familiar* neighbors declined; for example, children taught *dal* became worse at recognizing *bal*. Second, exposure to the novel neighbor reduced children's tendency to consider the novel neighbor as an instance of the familiar neighbor. Thus, children not pre-exposed to *dal* considered *dal* an instance of *bal*; children with previous exposure to *dal* resisted this interpretation. The results shed new light on phonological competition processes operating during early word learning.

1.2 Learning of auditory categories in adulthood

Infant phonological learning contrasts with adult learning, which is also explored within this project, in particular with reference to the usefulness of explicit feedback for the adult learner (1.2.1) and the retuning of adult listeners' native phoneme categories (1.2.2).

1.2.1 Adult acquisition of phonetic categories

Both first and second language acquisition involve learning language-specific phonetic categories. Goudbeek's thesis work addresses adult category acquisition, in which the importance of trial-by-trial feedback in category learning is well-established: with feedback, adults can learn both unidimensional and multidimensional distinctions, but without feedback, they can only learn unidimensional category distinctions (Annual Report 2003). Such supervision via feedback is unavailable to infants, so their acquisition of phonetic categories must be unsupervised. In two new series of experiments, Goudbeek compared supervised versus unsupervised learning of nonspeech auditory categories in adult listeners. In both series, two acoustic dimensions, duration and the mean frequency of the spectral peak, were used to create complex inharmonic nonspeech sounds. Subjects were either given feedback on their category assignment or not. With unidimensionally defined categories, both supervised and unsupervised learning proved feasible, as did subsequent categorizing of previously unfamiliar stimuli according to the acquired category distinction. When the structure of the categories required the use of both dimensions in the categorization, however, performance levels decreased, for supervised as well as for unsupervised learning. Another experiment investigated unsupervised learning of Dutch speech categories with similar dimensions (vowel height and

duration), and with a unidimensional category structure, in Spanish listeners. Regardless of which dimension was the relevant one, listeners preferred to use the frequency of the spectral peak in their categorization.

1.2.2 Retuning of phonetic categories in adult listeners

Studies by McQueen, Cutler, and Norris (MRC Cognition and Brain Sciences Unit, Cambridge; see Annual Reports 2001, 2002, 2003) have shown an adjustment of the phonetic category boundary after exposure to unusual productions of speech sounds, mediated by lexical feedback. Experiments in Eisner's Ph.D. project (Annual Reports 2002, 2003) have further suggested that the process is highly specific to the voice of the exposure talker – the perceptual system does not mis-apply such an adjustment to speech produced by other talkers. A new experiment investigated another aspect of the specificity of this type of perceptual learning, namely that of the speech cues affected by learning. Specifically, it was tested whether an adjustment is made with respect to the processing of cues extrinsic to the critical phonetic category, such as general vocal tract characteristics, or, alternatively, to cues intrinsic to the category. As in the previous studies, listeners were exposed to perceptually ambiguous fricatives [labeled "?"] (lying at the [f]/[s] category boundary) embedded in either [f] – or [s]-biased lexical contexts, and subsequently categorized syllables from an [ef] – [es] continuum. Critically, in this experiment the [?] at exposure as well as the test syllables were produced by a talker other than the talker who had uttered the lexical carriers. A perceptual learning effect of equal magnitude to that in previous single-talker versions of the experiment was found. Listeners who had heard [?] in s-biased contexts at exposure categorized test syllables mostly as [s], while listeners with [f]-biased exposure categorized the same syllables largely as [f]. Since there was no information about the test talker present at exposure other than spectral cues of the [?] segments, the result suggests that this type of perceptual adjustment operates primarily on category-intrinsic cues.

In related work, Mitterer investigated whether this lexically conditioned category retuning effect might also contribute to vowel normalization. In the retuning experiments, listeners adjust their category boundaries over time as a function of exposure to existing words. In vowel-normalization studies, listeners adjust their category boundaries as a function of immediately adjacent context within a single sentence. The fact that vowel normalization is usually tested with meaningful phrases suggests, however, a link between the medium-term lexical effect and the more immediate effects of vowel normalization. Therefore, Mitterer tested vowel normalization following exposure to sentences consisting of either words or nonwords. This manipulation of lexical status did not influence

vowel normalization, suggesting an independence of short- and medium-term plasticity in speech perception. The results showed, however, that the short-term plasticity is vowel-specific: Listeners only adjust their vowel categories if exposed to similar vowels in a carrier phrase.

1.3 Native phonology in adult listening

Another continuing interest in the present project concerns the effects on comprehension of phonological differences between languages. New research in 2004 addressed effects of phonemic repertoire constitution on the way in which speech is perceived (1.3.1); the relative influence of mismatching dialect and language on vowel perception (1.3.2); language-specificity in procedures for segmenting continuous speech and how this affects perception of an unknown language (1.3.3); and the mapping from phonological to lexical processing in non-native listening (1.3.4).

1.3.1 Phonemic repertoire and the perception of speech sounds

Wagner continued her dissertation project on crosslinguistic differences in listeners' sensitivity to formant transitions as acoustic cues in native and non-native phoneme perception. The differences previously observed (Annual Report 2003) in the relevance of formant transitions for the identification of fricatives between listeners of Spanish and English on the one hand, and German and Dutch on the other, were further investigated with different listener groups. The hypothesis tested was whether listeners' attention to formant transitions is guided by the presence of the highly confusable dental fricative [θ] only (as in English and Spanish) or by the presence of more spectrally similar fricatives. The Polish fricative inventory includes the fricatives [f v s z ʃ ʒ ɕ ʑ x] but not the dental fricative [θ]. In a phoneme detection experiment, Polish listeners identified segments where the targets were surrounded by either misleading or correct formant transitions. They missed significantly more fricatives with misleading formant information. Thus, Polish listeners, like Spanish and English, but unlike German and Dutch listeners, do rely on formant transition as a cue for fricative identification. In contrast to Spanish and English listeners, Polish listeners were hardly affected by misleading formant transitions to the spectrally more diffuse labiodental fricative [f]. They relied more on the formant transitions to the alveolar [s]; in Polish, this fricative lies in a perceptual space close to other spectrally similar fricatives. This further confirms that listeners acquire their sensitivity to cues which are particularly important for all distinctions in their native phoneme repertoire.

The same phoneme detection experiment was then conducted with Italian listeners. These listeners were also affected by misleading formant transitions

for fricative identification, but their sensitivity to these cues did not significantly differ from any of the listener groups tested before. These results are slightly surprising because the Italian phoneme inventory contains only five spectrally distinct fricatives. According to the hypothesis derived from the results above, Italian listeners had been expected to be less sensitive than Spanish or English listeners to misleading formant transitions.

1.3.2 Vowel perception: Effects of mismatching dialect versus language

Cutler and Smits completed analyses of data on perception of American English phonemes in the project started by Cooper (see Annual Reports 1999, 2000). The final analyses concerned results from three groups of listeners for vowel identification in CV and VC syllables produced by an American English talker. The listeners were (a) native speakers of American English, (b) English-native listeners with another dialect (Australian), and (c) non-native listeners with another language (Dutch). The syllables were embedded in multispeaker babble at three signal-to-noise ratios (0 dB, 8 dB, and 16 dB). The identification performance of native listeners was significantly better than that of listeners with another native language but did not significantly differ from the performance of listeners with another dialect. Dialect differences did however affect the type of perceptual confusions which listeners made; for instance, the Australian listeners' judgements of vowel tenseness were more variable than the native listeners' judgements, which may be ascribed to cross-dialectal differences in this vocalic feature. These findings suggest that although listening difficulty can result when speech input mismatches the native dialect in terms of the precise cues for, and boundaries of, phonetic categories, the difficulty is very much less than that which arises when speech input mismatches the native language in terms of the repertoire of phonemic categories available.

1.3.3 Language-specificity in segmenting continuous speech

Speech segmentation was addressed in a crosslinguistic comparison undertaken by Tyler (U. Western Sydney) with artificial language materials. When listeners are exposed to nonsense syllable sequences, in which certain groups of syllables are repeated randomly as 'words', they can learn to segment the words of that artificial language using only conditional probabilities. That is, the first syllable of any given word is invariably followed by the second syllable of that word, and so on, whereas the final syllable can be followed by the first syllable of any other word in the artificial lexicon. Using this paradigm Tyler investigated whether lexical stress cues can improve word segmentation and learning and, more specifically, whether those cues already present in the native language are more effective than non-native cues. For example, speakers

of stress-timed languages (e.g., Dutch) may be more sensitive to stress cues than speakers of syllable-timed languages (e.g., French). In support of this idea, Vroomen, Tuomainen, and de Gelder (1998) found that the addition of a pitch accent, consisting of a linear rise in pitch over the first syllable and a linear return to baseline over the following two syllables, improved learning for Dutch but not French listeners. However, with a different set of stimuli Tyler showed that both Dutch and French listeners benefited from this cue. In fact, there was a trend towards a larger pitch-accent advantage for French than Dutch listeners. In a second experiment, with the original Vroomen et al. materials, Tyler found again that both French and Dutch listeners learned the words of the language better with the pitch accent than with no prosodic cue. These results could be taken to suggest that native-language rhythmic structure does not play a role in the learning of these artificial languages. However, it is more likely that the pitch accent used by Vroomen et al. (1998) was not appropriate for these language groups and that this question should be addressed using more linguistically motivated cues, such as vowel lengthening.

A final-year undergraduate project by Snijders (F.C. Donders Centre), supervised by Kooijman, Cutler and Hagoort, also addressed the issue of segmentation, with particular attention to the perceptual illusion that speakers of foreign languages often seem to talk faster than speakers in one's own language. This "foreign language effect", it is argued, arises from the brain's inability to segment continuous speech in an unfamiliar language into its component words. Their study compared the ability of Dutch and English adults to segment familiarized words from continuous Dutch speech. Electrophysiological responses were collected as the native and non-native adult listeners heard, first, several repetitions of a word in isolation, and then a series of sentences, some of which contained this familiarized word and some of which did not - in fact, the same stimuli used to investigate speech segmentation in infancy (Annual Report 2003). Both groups of listeners showed a changing response with increasing familiarity across the course of the isolated-word familiarization phase, and this response was not significantly different across groups. In the continuous-speech test phase, however, the responses of the non-native listeners were significantly slower. In fact the results suggested that a continuous speech context facilitates word recognition for native listeners, but delays word recognition for non-native listeners. The amount of input signal that the brain needs to initiate word recognition is more than six times greater in a non-native language than in the native language.

1.3.4 The mapping from phonological to lexical processing in non-native listening

When non-native listeners cannot distinguish phonemic contrasts, several consequences can ensue for lexical processing. First, pseudo-homophones may arise. Thus Dutch listeners have difficulty distinguishing the vowels of English *cattle* vs. *kettle*, because this contrast is subsumed by a single Dutch vowel category; in consequence, both words may be activated whenever either is heard. Cutler and Otake conducted a lexical decision study in English to explore this phenomenon by testing for repetition priming. The materials contained among 340 items 18 pairs such as *cattle/kettle*, i.e., contrasting only in those vowels, and 18 pairs contrasting only in r/l (e.g., *right/light*). These materials, spoken by a native American English speaker, were presented to fluent non-native speakers of English, 48 Dutch Nijmegen University students and 48 Japanese Dokkyo University students; the listeners performed lexical decision on each spoken item, and response time was measured. Dutch listeners responded significantly faster to one member of a *cattle/kettle* pair after having heard the other member earlier in the list (compared with having heard a control word), suggesting that both words had been activated whichever had been heard. Japanese listeners, however, showed no such priming for *cattle/kettle* words, but did show repetition priming across r/l pairs such as *right/light*. Non-native listeners' phonemic discrimination difficulties thus generate effective pseudo-homophony.

A second potential consequence is the activation of spurious lexical competitors – competing words which are activated for non-native listeners but not for native listeners. Broersma showed in a previous experiment (Annual Report 2001) that Dutch listeners recognized so-called "near words" as real English words more often than English listeners did. Near words were formed by swapping the vowels /æ/ and /e/ (*lamp – lemp*), which, as noted above, are difficult to distinguish for Dutch listeners (see also Annual Report 2003), or by replacing word-final voiced consonants with their voiceless counterparts or vice versa (*cheap – cheab*), a contrast which Dutch listeners perceive accurately (Annual Report 2003). A new cross-modal priming experiment investigated whether listeners activate a word when they hear a near word which was recorded embedded in another word. In the crucial trials, Dutch and English listeners heard words (e.g., *def* from *definite*) or near words (e.g., *daf* from *daffodil*), and then saw a word on a screen (*deaf*). Lexical decisions to the visually presented word assessed whether the auditory prime activated the word. For both Dutch and English listeners, recognition of a word (*deaf*) was facilitated by auditory presentation of the identical word (*def*). For the English listeners, recognition was not facilitated by auditory presentation of the near word (*daf*), whereas for

Dutch listeners recognition of the word was facilitated as much by the near word as by the word. Thus, for Dutch listeners the near word activated the word form as much as the real word did, whereas for English listeners the near word did not activate the word form. Another cross-modal priming experiment, using near words embedded across a word boundary (e.g., *lamp* from *equaL AMPlitude; lemp* from *eviL EMPire*), again showed that near words caused more activation of words for Dutch than for English listeners. Three phonetic categorization experiments using the words and near words from the three experiments described above provided further evidence that near words induce more lexical activation for Dutch than for English listeners.

CHAPTER 2

DECODING CONTINUOUS SPEECH

Introduction

2.1 Decoding segmental information
2.2. Decoding suprasegmental information
2.3. Morphology in lexical decoding
2.4 From word forms to word meanings

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Joint research with other projects:

Phonological Learning for Speech Perception
Utterance Encoding

Introduction

Members of the Decoding Continuous Speech project continued to examine how listeners extract speakers' messages from the acoustic information in spoken utterances. The role of the mental lexicon is central in speech decoding, and it remains central in the project. It has been investigated in four different ways. First, lexical access in comprehension entails extraction of segmental information from the speech signal (i.e., information which allows listeners to discriminate among different speech sounds). Work on the decoding of segmental information is covered in section 2.1. Research in the project suggests, however, that word recognition also involves the extraction from the signal of suprasegmental information (i.e., that which specifies prosodic and intonational structure; see section 2.2). A third line of research has focused on the role of the internal structure of words in lexical decoding (section 2.3). Finally, work has continued on how and when a word's meaning is activated during sentence processing, as described in section 2.4.

2.1 Decoding segmental information

Research on how listeners extract segmental information from the speech signal has focused on the way in which recognition of speech sounds depends on identification of neighboring speech sounds, and on the relative salience of different phonetic cues to segmental identity. A further subproject has examined how listeners recover when speakers fail to produce individual speech sounds.

2.1.1 The dependence of fricative identification on vowel perception

Mitterer followed up on Smits' investigation of compensation for coarticulation in fricative-vowel syllables (see Annual Report 1998, 1999). The frication noise spectra of /s/ and /ʃ/ differ in the location of the fricative pole (i.e., the frequency at which the most energy in the frication noise is concentrated), with a higher fricative pole for the perceptually sharper-sounding /s/. Smits found that Dutch listeners identify sounds on an /s/-/ʃ/ continuum with a lower fricative pole as /s/ in front of a rounded vowel /y/, compensating for the acoustic consequences of anticipatory lip-rounding in the fricative noise (i.e., a downward spectral shift). Smits claimed that this compensation depends on the phonological categorization of the vowel as rounded. Mitterer investigated this claim in two ways. Listeners identified ambiguous fricative sounds in fricative-vowel syllables as /s/ or /ʃ/ under two conditions: either using sine wave substitutes of the rounded vowel /y/ and the unrounded vowel /i/ (testing whether the compensation reflected low-level auditory processes), or giving listeners audio-visual input which combined ambiguous auditory vowels with visual /y/ or /i/ (testing for phonological effects while controlling for auditory

effects). Sine wave substitutes, which did not elicit the perception of a rounded vowel, failed to produce a compensatory effect on fricative identification, but fricative perception was influenced by the visual presentation of a rounded vowel. No matter whether auditory or visual input induced the perception of a rounded vowel, listeners adjusted their fricative boundaries accordingly, in line with Smits' claim that the categorization of the fricative depends on the phonological categorization of the vowel.

2.1.2 The relative salience of phonetic cues in Dutch and Korean listening

Cho and McQueen investigated how listeners of two unrelated languages, Dutch and Korean, process phonologically viable and nonviable sounds spoken in Dutch and American English. On the one hand, to Dutch listeners, *unreleased* word-final stop consonants (i.e., those with no release burst produced after the stop closure) are nonviable because word-final stops in Dutch are generally released when those words are spoken in isolation. On the other hand, to Korean listeners, *released* final stops are nonviable because word-final stops are never released in Korean. Two phoneme monitoring experiments showed a phonological effect: Dutch listeners detected released stops in both English and Dutch syllables more rapidly than unreleased stops whereas the reverse was true for Korean listeners. An acoustic-phonetic effect was observed in the accuracy data of the Korean listeners, however. When listening to English stimuli (i.e., a familiar language), Koreans detected released stops more accurately than unreleased stops. The effect was not observed when Koreans heard stimuli in Dutch (an unfamiliar language). It therefore appears that the acoustic-phonetic cues associated with released stops in English can be exploited by Koreans, hence improving their phoneme detection accuracy, but only when they are processing a familiar language. These results suggest that, in nonnative speech perception, phonological legitimacy in the native language speeds up phoneme recognition, the richness of acoustic-phonetic cues improves listening accuracy, and familiarity with the nonnative language modulates the relative influence of these two factors (for other research on the role of native phonology in nonnative listening, see the Phonological Learning for Speech Perception (PLSP) project, section 1.3). More generally, these findings suggest that both the phonological viability of speech material and the relative richness of acoustic-phonetic information influence segmental decoding processes.

2.1.3 Effects of segment deletion on word recognition

Mitterer and Ernestus started an investigation on /t/ deletion in Dutch word recognition. In most Germanic languages, word-final /t/ is prone to be deleted

when surrounded by other obstruent consonants (e.g., in Dutch, *Postbank*, 'Post Bank': /pɔstbaŋk/ → [pɔsbaŋk]). While the perception of the effects of connected speech processes, such as phonological assimilations or reduced forms, has been a focus of research in recent years, there has been little work on how listeners recover from segment deletion. Mitterer and Ernestus began with two corpus studies in order to estimate the challenge that /t/ deletion poses for listeners. In agreement with earlier studies on Germanic languages, it was found that /t/ is most likely to be deleted after /s/ and before /b/. However, /t/ deletion was found to be an optional and moreover graded process, giving rise to a large number of possible acoustic forms of word-final /t/. The potential loss of information due to /t/ deletion is thus partially countered by the contextual phonological constraints on /t/ deletion as well as by residual cues in the speech signal. For example, the [s] frication noise tends to have a longer duration in underlying simple /s/ codas (as in *gas*, 'gas', /xas/) than in /st/ codas (as in *gast*, 'guest', /xast/).

A series of perception experiments revealed that listeners use these cues to compensate for /t/ deletion. In a two-alternative forced choice task, listeners had to judge whether a nonword, embedded in a sentence frame, ended in a /C/ or a /Ct/ coda. The ends of the nonwords were of five different types, varying in the amount of information specifying a /t/. More /t/'s were reported if the (pen-)ultimate consonant was /s/ (e.g., *spes* vs. *spest*) than if it was /n/ (e.g., *spen* vs. *spent*), and if there were residual cues to the presence of an underlying /t/. A long [s] frication noise, however, discouraged listeners from reporting a /t/ at all. Mitterer and Ernestus also investigated whether, despite the presence of such "signal-based" cues, listeners also rely on lexical constraints to compensate for /t/ deletion. To this end, listeners were presented with target stimuli that were words if they ended either with a /Ct/ or with a /C/ coda. This influenced listeners' responses accordingly: a /t/ was more often reported after *orkes* [orkɛs] (based on *orkest* 'orchestra'; *orkes* is not a word in Dutch) than after *moeras* [muras] (based on *moeras* 'swamp'; *moerast* is not a Dutch word). In essence, these investigations show a new kind of context effect in speech perception. Listeners are more likely to infer an underlying /t/ after [s] than after [n]. This context effect further interacts with phonetic detail and lexical constraints. Future investigations will have to examine the extent to which language-specific, or even item-specific learning is involved in the effect.

Mitterer and Ernestus continued this line of research by examining the locus of the context effect. They conducted an oddball Event Related Potential experiment to investigate whether the effect arises in early, automatic perceptual processes. In such experiments, the MisMatch Negativity (MMN) in

the ERP record indicates the amount of perceptual mismatch between a standard and a deviant stimulus. Participants listened passively to a train of standard stimuli consisting of a nonword with a word-final [t], which accounted for 90% of all trials, and a deviant stimulus which accounted for the remaining 10% of trials. In the deviant stimulus the [t] was replaced by silence (the closure, but not the release of the [t] was thus retained). In the earlier identification experiments, both the release and the silence were interpreted predominantly as /t/ after [s], while, after [n], the silence condition gave rise to the percept of a simple /n/ coda. If this context effect arises in early perceptual processes, the MMN should be larger for the [n]-plus-silence deviant compared to the [nt] standard than for the [s]-plus-silence deviant compared to the [st] standard. Despite the same acoustic difference between standard and deviant in the [s] and [n] context, the MMN was smaller in the [s] context (see Figure 2.1), indicating an early perceptual locus of the context effect.

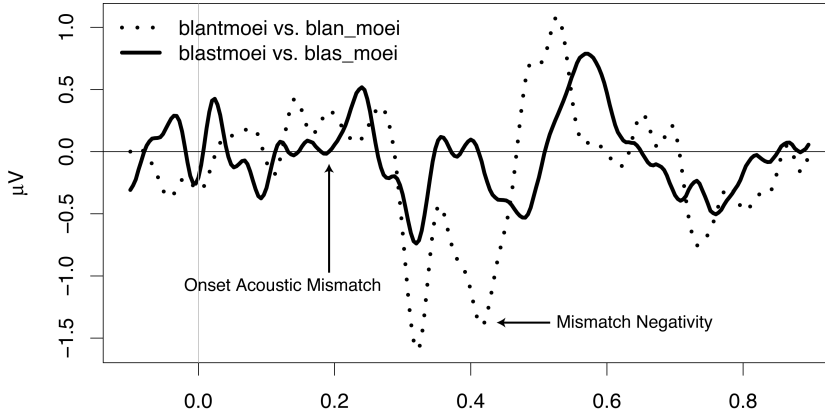

Figure 2.1: Mismatch Negativity at the Fz electrode (referenced to linked mastoid electrodes) to /t/ deletion after [n] and [s] in Dutch nonwords. From 100 to 300 ms after the identical acoustic mismatch (standard stimuli with [t] release versus deviant stimuli with [t] release deleted), there is an electrophysiological mismatch response after [n], but not after [s].

2.2 Decoding suprasegmental information

Research on how listeners use suprasegmental information in word recognition has examined three issues: how prosodic context modulates perception of the voicing contrast in German fricatives, what kind of prosodic fine detail is used to disambiguate lexically ambiguous two-word phrases in Dutch, and whether the activation of offset-embedded words is influenced by suprasegmental cues to their identity.

2.2.1 Effects of prosodic structure on word recognition: fricative assimilation in German

Kuzla continued her Ph.D. project on the influence of prosodic structure on speech production and perception in German. Her previous research (Annual Report 2003) showed that the phonetic realization of word-initial fricatives varies systematically with the preceding prosodic boundary. In particular, the phonological process of voicing assimilation (/v, z/ become devoiced after voiceless obstruents) was shown to be gradient and sensitive to the size of the preceding prosodic boundary (i.e., word boundary vs. phrase boundary), but also to be constrained by phonological oppositions. Voicing assimilation could make word recognition harder in the case of /v/, since there may be competing words beginning with /f/, but not for /z/, because initial /s/ in German is illegal. Indeed, /z/ underwent more devoicing than /v/. The degree of devoicing was larger across word boundaries than across phrase boundaries for /z/, but not for /v/, presumably in order to maintain the contrast with /f/.

A perception study was conducted to investigate what consequences these effects have for word recognition. German subjects identified stimuli beginning with sounds from /f-v/ and /s-z/ continua in either the word-word context *Felder-Wälder*, 'fields-forests', for /f-v/, or the nonword-word context **Ssenken-Senken*, nonword-'hollows', for /s-z/. These stimuli appeared in different segmental and prosodic environments. Listeners compensated for assimilation: Less voicing was required for voiced (/v,z/) judgments in the viable assimilation context (after *hat*, 'has') than in the nonviable context (after *hatte*, 'had'). Within the viable-context condition, a prosodic effect for /f-v/ was found: Less voicing was required for a /v/ judgment after a word boundary than after a phrase boundary. But there was no prosodic effect for /s-z/. This asymmetry is the reverse of the differences between /v/ and /z/ found in speech production, where /z/ was more variable in voicing than /v/. Speakers thus tend to maintain phonologically functional contrasts. Listeners in their turn appear to adjust their phoneme categories according to the prosodic context. These shifts apparently only take place, however, when discrimination between existing words is facilitated (i.e., in the /f-v/ word-word contrast).

2.2.2 Phrase-internal lexical boundaries in word segmentation

Recent findings have suggested that fine-grained phonetic cues to word boundaries may play an important role in word segmentation (Annual Report 2000-2003). Although the existence of bottom-up acoustic-phonetic cues to phrase boundaries is well established, attempts to demonstrate that phrase-internal lexical boundaries are similarly marked have met with mixed success. Cho and Johnson addressed this issue by recording six Dutch speakers

producing pairs of phonemically identical strong-weak-strong (SWS) strings with matching syllable boundaries but mismatching intended word boundaries (e.g., *dis#kopie*, 'table#copy', versus *disco#pi*, 'disco#pi', or, more broadly, $C_1V_1(C)\#C_2V_2(C)C_3V_3(C)$ vs. $C_1V_1(C)C_2V_2(C)\#C_3V_3(C)$. The most significant finding of this production study was that, although the perceptibility of lexical boundaries may be highly attenuated in the absence of higher-order linguistic cues and phrasal boundaries, several acoustic parameters were significantly influenced by the presence of a lexical boundary. An analysis of variance revealed three acoustic parameters that were significantly greater in S#WS items (C2 duration, Rime1 duration, and C3 burst amplitude) and five parameters that were significantly greater in the SW#S items (C2 Voice Onset Time, C3 duration, Rime2 duration, Rime3 duration, and V2 amplitude). Additionally, a Logistic Regression Analysis revealed that three of these parameters (Rime1, Rime2 and C3 duration) contributed most reliably to a S#WS versus SW#S classification. All of these acoustic correlates of lexical boundaries can be accounted for by prosodically-conditioned phonetic events such as domain-initial strengthening, domain-final lengthening, polysyllabic shortening, and predominant left-to-right accentual lengthening.

In a follow-up study, Johnson and Cho carried out a perceptual rating experiment to ask which (if any) of these cues influence listeners' perception of word boundaries. Listeners were able to use phrase-internal acoustic-phonetic cues to reliably discriminate S#WS utterances from SW#S utterances. In addition, listeners tended to rely most heavily on the same set of acoustic-phonetic cues that the speakers produced most reliably (Rime1, Rime2 and C3 duration).

2.2.3 Offset-embedded words

Shatzman continued her Ph.D. project on the role of prosodically-driven fine phonetic detail in word recognition. She conducted a study examining the activation of offset-embedded words, such as the word *bel* ('bell') in the carrier word *libel* ('dragonfly'). The eye movements of Dutch participants to four pictures displayed on a computer screen were monitored as they listened to short sentences. The subjects were instructed to move the picture that was mentioned in the sentence, which was always the carrier word. In one condition the embedded words were aligned with a syllable boundary. The embedded word was either stressed (e.g., *bel* in *libel*) or unstressed (e.g., the word *zon*, 'sun', in *bizon*, 'bison'). In a second condition, the embedded words were misaligned with the syllable boundary, that is, they started one consonant after carrier word onset (e.g., the embedded word *lip*, 'lip', in the carrier word *clip*, 'clip'). The spoken input that participants heard was manipulated such that the

embedded word either originated from a token of the word recorded as a monosyllabic word (e.g., the word *bel*; the cross-spliced condition, mean duration 260 ms) or from another token of the carrier target word (e.g., the sequence *bel* from another token of *libel*; the identity-spliced condition, mean duration 240 ms). In contrast to priming studies reporting the activation of offset-embedded words (Annual Report 1997, 2000), and eye-tracking studies on the activation of onset-embedded words (Annual Report 2000, 2001), there was no evidence of activation of offset-embedded words using the eye-tracking method. Participants looked at the pictures of the embedded words as often as at unrelated pictures, both in the aligned and misaligned conditions. Furthermore, the acoustic manipulation did not have any effect: Pictures of the embedded words were fixated as often in the identity-spliced condition as in the cross-spliced condition. Segmental and prosodic cues to offset-embedded words may have little impact on word recognition when there is already considerable bottom-up support for the speaker's intended words (i.e., the carrier words).

2.3 Morphology in lexical decoding

The internal structure of words can influence word recognition, and word production, in a number of ways. Research in 2004 has addressed how recognition of prefixed words is influenced by the number and nature of other words which have the same prefix, and how the acoustic realization of affixes varies as a function of word frequency and word predictability. Another line of investigation has asked whether single consonants which can be morphemes in Dutch are treated in the same way as nonmorphemic consonants in lexical segmentation.

2.3.1 The Conditional Root Uniqueness Point in the recognition of prefixed words

In collaboration with Wurm (Wayne State U.), and Schreuder and Baayen (IWTS/Radboud U. Nijmegen), Ernestus investigated the roles of lexical entropy and the Conditional Root Uniqueness Point (CRUP) in the comprehension of prefixed words. Lexical entropy is an information-theoretic measure of lexical competition that takes both the number and the frequency of competitors into account. The standard Uniqueness Point (UP) of a word is the point, moving segment by segment through that word, at which it becomes different from all other words. The CRUP is the UP of a word given only those lexical competitors that share the prefix with the target word. In so-called CRUP-words, the CRUP is earlier in the word than the standard UP, whereas in non-CRUP words, the CRUP and standard UP fall on the same segment. Ernestus and her collaborators studied the effects of entropy at three positions in Dutch words: (1) at two phonemes into the root (Pre-CRUP entropy); (2) at the CRUP in CRUP-words

and on comparable positions in non-CRUP words (CRUP entropy); and (3) at the final segment of the word (Late entropy). Dutch participants performed lexical decision on 160 morphologically complex words, including 20 CRUP and 20 non-CRUP prefixed words. As expected, recognition was facilitated by higher word frequency and greater morphological family size. More importantly, high Pre-CRUP entropies and Late entropies also facilitated lexical decision. Apparently, high lexical activation at the beginning of the speech signal strongly signals lexicality. The effect of Late entropy suggests that competition among morphologically related words speeds up lexical decision. In contrast, high CRUP entropy slowed listeners down. This may be because, close to the CRUP, the perceptual system is attempting to winnow the cohort down to a single candidate; this process appears to be inhibited by stronger lexical competition. The CRUP words appeared to be less sensitive to the effects of family size and CRUP entropy than the non-CRUP words, probably because once the CRUP has been reached, a more restricted conditional hypothesis about the identity of the word can be formed. Finally, for CRUP-words with high frequencies, response latencies decreased as the distance between the CRUP and the UP (in ms) shortened, indicating that both the CRUP and the UP have a role to play in word recognition. Moreover, since CRUP-UP distances are in general shorter in Dutch than in English, this may explain why the factor CRUP/Non-CRUP was not significant as a main effect in this experiment, whereas it was in several English experiments.

2.3.2 Frequency and predictability effects on reduction of Dutch affixes

Ernestus started a project in collaboration with Baayen and Pluymaekers (IWTS/Radboud U. Nijmegen) on the effects of word frequency on the production and perception of reduced word forms. The durations of four affixes (over 900 tokens) and their respective segments, taken from the spontaneous speech section of the Corpus of Spoken Dutch, were analyzed. Two prefixes (*ge-*, *ont-*) and one suffix (*-lijk*) were shorter in words with higher token frequencies, also after the effects of speaker characteristics, segmental context, and speech rate had been partialled out. Only one prefix (*ver-*) showed no frequency effects. In collaboration with Keune (IWTS/Radboud U.), van Hout (Radboud U.), and Baayen, Ernestus also investigated words ending in *-lijk* in more detail. A total of 946 tokens of 14 words ending in *-lijk*, again from the spontaneous speech section of the Corpus of Spoken Dutch, were selected. These tokens were classified as realized with high, medium, or no reduction. The degree of reduction appeared to be highly correlated with sociolinguistic factors, but, importantly, also with the word's predictability given the previous word. This predictability may play a role in word comprehension.

2.3.3 Morphemic consonants fail the Possible Word Constraint in lexical segmentation

McQueen and Mauth have continued a line of enquiry on lexical segmentation begun in Mauth's dissertation project (Annual Report 1998-2001). According to the Possible Word Constraint (PWC), (Annual Report 1995-2002), consonants are not viable residues in a parse of the speech stream because they are not possible words and thus could not be part of the speaker's message. In Dutch, however, the single consonants *–s* and *–t* are meaningful units in the speech stream: they are inflectional morphemes (*-s* is the plural suffix for some nouns; *-t* marks e.g. third person singular on verbs). The question thus arises whether such morphemic consonants are treated like nonmorphemic consonants in lexical segmentation. Mauth's previous attempts to answer this question using the word-spotting task revealed that, under some conditions, listeners adopt a strategy in the task of waiting until they have heard all of the speech input before responding.

In a new word-spotting experiment in Dutch, therefore, the contexts following the target words were made longer, and listeners were instructed to respond without waiting until they had heard everything. These conditions succeeded in removing the strategy. Listeners were faster to detect target words which were aligned with an unambiguous syllable boundary (e.g., *ventiel*, 'valve', in *ventiel. broghuul*) than to detect the same targets in contexts where there was a single consonant between the offset of the target and an unambiguous syllable boundary, both when the consonant was morphemic (e.g., [s] in *ventiels. boghuul*) and when the consonant was nonmorphemic (e.g., [f] in *ventielf. boghuul*). There was no difference between the morphemic and nonmorphemic consonant conditions. The same pattern of results was observed for a parallel set of stimuli with *–t*. Results from control lexical decision experiments in which the target words from these contexts were excised and presented in isolation confirmed that the latency differences between the syllabic alignment and consonantal misalignment conditions in word spotting reflected differences in segmentation difficulty across conditions. These results suggest that potentially morphemic consonants, like completely meaningless consonants, fail the PWC, that is, they are treated as nonviable residues in the speech stream, making word spotting in contexts with such residues harder. In turn, this suggests that the PWC mechanism is sensitive to phonological factors governing lexical viability, but not to higher-level factors such as morphemic status.

2.4 From word forms to word meanings

Cutler and McQueen, in collaboration with Norris and Butterfield (MRC Cognition and Brain Sciences Unit, Cambridge) have continued to investigate, using the cross-modal priming task, how and when the conceptual attributes of a word are accessed during sentence processing. Previous experiments had shown form-based identity priming (e.g., faster lexical decisions to the visual target *date* after the auditory prime *date*) for primes in isolation and embedded in sentence contexts, and meaning-based associative priming for the same primes (e.g., faster responses to visual *time* after auditory *date*) for primes in isolation but not in sentence contexts (e.g., *They planned a date and place to meet with the ambassador*), unless sentence prosody involved contrastive accents (Annual Report 1997, 2000). These findings suggest that associative priming may depend on whether listeners are encouraged to incorporate the prime's semantics into their ongoing interpretation of an utterance (as when the prime is spoken in isolation and thus is the entire utterance, or when the sentence contains a contrastive accent). If this conclusion is correct, it ought to be possible to take the sentences in which there was previously no associative priming and induce priming by terminating the sentences at the acoustic offsets of the primes (hence encouraging listeners to attend to the primes and their meanings). Exactly that was done in a new experiment (i.e., with sentence fragment primes such as *They planned a date*), and indeed an associative priming effect was found. The results from this series of experiments suggest that the phonological and conceptual representations of the words being considered during sentence processing are separate, that activation of the phonological representations is driven mandatorily by the speech signal (hence the consistent identity-priming results), but that activation of the conceptual representations is not an automatic consequence of spoken word recognition (hence the variable associative-priming results).

CHAPTER 3

UTTERANCE ENCODING

Introduction

3.1 Encoding single-word utterances

3.2 Encoding multiple-word utterances

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Joint research with other projects:

Decoding Continuous Speech

Introduction

The Utterance Encoding project investigates how thoughts are encoded into speech. The skill of encoding single words is an essential component of the ability to encode larger utterances. Both single- and multiple-word utterances have been central research topics in the past few years and continued to be examined in 2004. Moreover, the relationship between encoding speech (production) and decoding speech (comprehension) was examined for both single- and multiple-word utterances.

In 2004, Cholin completed her dissertation on the role of syllables in the encoding of spoken utterances, and Meeuwissen finished her dissertation on the encoding of complex spoken numerals for time and space.

3.1 Encoding single-word utterances

Over the past 15 years, a theory of the encoding of single words has been developed within the project. The theory has been computationally implemented in a model called WEAVER++. According to the theory, word encoding proceeds from conceptual preparation via lemma retrieval to word-form encoding and syllabary access. The research in 2004 concentrated on a number of aspects of word-form encoding. According to the theory, word-form encoding involves encoding the word's morphological structure and its phonological and phonetic forms.

3.1.1 Role of frequency in morphological encoding

Morphological encoding involves retrieving one or more morphemes and serially ordering them. In a Ph.D. project supervised by Baayen and Levelt, Bien continued her work on the role of morpheme frequency in encoding morphologically complex words. In morphologically simple words, morpheme frequency has an effect on the naming latency of the word. The latency decreases with increasing morpheme frequency, as shown by previous work in the project (Annual Report 1992:5). Morphologically complex words include several morphemes. For example, the Dutch compound *marktvrouw* 'market woman' is composed of the morphemes *markt* 'market' and *vrouw* 'woman'. Each constituent has its own frequency of usage as has the compound as a whole. By independently varying the frequencies of the first and second constituents as well as the frequency of the compound itself, Bien was able to assess their individual effects on the compound encoding latencies. In a series of experiments, pairs of Dutch noun-noun compounds were selected as targets, such that there was a maximal contrast for one type of frequency (e.g., the frequency of the first morpheme) while matching for the other two types of frequencies (e.g., the frequencies of the second morpheme and the whole

compound). In a position-response association task, participants first learned to associate a compound with a visually marked position on a computer screen (see Annual Report 2002:30). Participants then had to produce a compound in response to the appearance of the associated position mark, and the speech onset latencies were measured.

The results showed that the production latency of a compound is determined by the frequencies of its constituting morphemes, but not by the frequency of its occurrence as a whole compound. The effect of constituent frequency was further examined by a regression analysis of the joint data of earlier experiments by Bien (Annual Report 2003:32). Morphemes can be in first or second position in a noun-noun compound. For example, *markt* is the first morpheme of *marktvrouw* but the second of *vismarkt* 'fishmarket'. The regression analyses revealed that the positional frequency predicted the compound naming latencies better than did the position-independent frequency of the constituents. Taken together, the results provide further evidence for decompositional models of speech production, in which both the constituent morphemes and their serial position determine the production latency of a compound.

3.1.2 Morphological encoding in Mandarin Chinese

WEAVER++ has been developed for languages such as Dutch and English. It is important to examine, however, whether the claims for word-form encoding in these Indo-European languages generalize to languages that are very different, such as Mandarin Chinese. In her Ph.D. project supervised by J.-Y. Chen (National Chung-Cheng U., Taiwan) and Roelofs, T.-M. Chen investigated for Mandarin Chinese some of the issues that were examined by Bien for Dutch. Chen used Meyer's preparation paradigm (Annual Report 1988) to investigate whether morphologically decomposed representations are employed in the production of Chinese disyllabic transparent compounds. In experiments run in Taiwan, Mandarin Chinese speaking participants produced words in sets where they shared nothing in common or in sets where they shared the first tonal syllable. The shared syllable was a morpheme or it was not. The results showed that sharing a syllable yielded a preparation benefit: Response latencies were shorter when a syllable was shared among the responses in a set than when nothing was shared. Importantly, the magnitude of the preparation effect was the same for syllables that were morphemes and syllables that were not. Thus, there was no additional morphological preparation effect. Control experiments ruled out orthographic and semantic influences in the experiment. Other preparation experiments showed that, unlike what has been observed for Dutch, morpheme frequency does not play a role in Mandarin Chinese. These results

suggest that word-form encoding in Mandarin Chinese does not operate on morphologically decomposed form representations, unlike what is the case in Dutch.

3.1.3 Role of orthography in phonological encoding

Presenting a written word prime speeds up the naming of a picture or the reading of a target word if there is phonological overlap between the prime and the target. Schiller continued his research on this orthographic priming effect (Annual Reports 2001:26 and 2002:28). In a new series of word reading experiments, he observed that not only the amount of segmental overlap between prime and target plays a role (i.e., more overlap leads to a larger priming effect), but also the position of the overlapping segments and the amount of mismatching segments. Moreover, contrary to earlier results in the literature (Kinoshita 2000), onset priming did not depend on the syllabic status of the onset (simple vs. complex).

Orthographic priming is effective because phonological encoding mechanisms are shared between picture naming and word reading, for which Roelofs obtained explicit evidence (Annual Report 2002:29). This raises the question whether the orthography of a word mandatorily affects spoken word production or only when the processing of a prime or target involves reading. On an interactive view, the spelling of a word constrains spoken word production regardless of its relevance, whereas on WEAVER++'s modular view, the spelling constrains word production only when it is relevant. Damian and Bowers (2003) reported effects of spelling in word production that was not reading-based using Meyer's preparation paradigm (Annual Report 1988). English speakers first learned sets of prompt–response pairs and then produced a response when given a prompt. Spoken word preparation was disrupted when the response words in a set shared initial phonemes that differed in spelling, supporting the interactive view. Roelofs conducted a series of experiments that tested for spelling effects in Dutch using word production tasks in which spelling is relevant (oral reading) or irrelevant (picture naming and prompt-response word production). Response preparation was disrupted by spelling inconsistency only in oral reading, suggesting that the spelling of a Dutch word constrains word production only when it is relevant for the task at hand. The difference in the role of spelling between English and Dutch needs to be examined in future research.

3.1.4 Relationship between speech encoding and decoding

In her Ph.D. project supervised by Roelofs and Levelt, Özdemir (néé Gross in Annual Report 2003) continued to examine the relationship between spoken word encoding and decoding. WEAVER++ implements the claim that the form

representations involved in speech encoding and decoding are separate but closely linked. Moreover, the self-monitoring of speech planning is accomplished via the speech comprehension system. This view implies that it should be possible to find speech-comprehension-specific effects in a production monitoring task. In contrast, if the self-monitoring of internal speech operates on production representations only, such comprehension specific effects should not be obtained. Participants performed a picture naming task and an internal phoneme monitoring task based on the picture names. In a first block of trials, participants simply had to name the pictures. In a second block of trials, the participants had to press a button when the picture name contained a critical target phoneme. The target phonemes varied with respect to the distance from the picture names' uniqueness point (i.e., the phoneme at which a word becomes uniquely identifiable in the language). The target phoneme was either the uniqueness point of the picture name or it was one or two phonemes after the uniqueness point. The pictures were matched for object recognizability and ease of articulation. Earlier speech comprehension research has shown that phoneme monitoring latencies for real speech are shortest after the uniqueness point of a word. The question addressed by Özdemir is whether the same holds for monitoring internal speech (which would support self-monitoring via the speech comprehension system) or not (supporting production-internal self-monitoring).

The results showed that subjects were faster in detecting the target phoneme in their internal speech when it was further down the way from the uniqueness point. Moreover, the distance from the uniqueness point did not affect the naming latencies for the pictures. Thus, only when self-monitoring comes into play does the uniqueness point have an effect. This supports the idea that the self-monitoring of internal speech is accomplished via the speech comprehension system.

3.1.5 Neural correlates of the attentional control of encoding operations

An important ability of speakers is to encode utterance plans in the face of distraction, which is called "attentional control". Attentional control plays an important role in the picture-word interference task, which has been intensively used in previous research in the project. In picture-word interference and other Stroop-like tasks, participants have to name targets (e.g., a picture) and ignore distractors (e.g., a superimposed word). Neuroimaging studies in the literature showed that the presence of conflicting response alternatives increases anterior cingulate cortex (ACC) activity, indicating that the ACC is involved in attentional control. However, the exact nature of the ACC function is still under debate. The prevailing conflict hypothesis maintains that the ACC is involved in performance

monitoring (Botvinick et al. 2001). According to this view, ACC activity reflects the detection of response conflict and acts as a signal that engages attentional control processes subserved by lateral prefrontal brain regions. On an alternative view, implemented in WEAVER++ (see Annual Report 2002:27), the ACC is involved in attentional control itself. Roelofs, in collaboration with van Turennout and Coles (F.C. Donders Centre for Cognitive Neuroimaging) conducted a functional magnetic resonance imaging (fMRI) study to test between these views on ACC function. A critical prediction made by the conflict hypothesis is that ACC activity should be increased only when conflicting response alternatives are present, whereas conflict per se is not essential according to the attentional control hypothesis.

Participants were scanned while performing a manual arrow-word version of the Stroop task. On each trial, participants were presented with an arrow-word combination and they indicated by button-press the direction denoted by the word (word task) or arrow (arrow task). Trials were blocked by task. On incongruent trials, the word and the arrow designated opposite responses. On congruent trials, the word and arrow designated the same response. On neutral trials in the word task, a word was presented in combination with a straight line, so only one response was designated by the stimulus. On neutral trials in the arrow task, an arrow was presented in combination with a row of Xs, so also on these trials only one response was designated by the stimulus. Congruent, incongruent, and neutral trials were presented rapidly, in a randomly intermixed order to prevent participants from anticipating and changing strategies for the different event types.

Response time data showed that, consistent with earlier findings in the literature, responses to words were much slower on incongruent than on neutral trials, and fastest on congruent trials. Responses to arrows were only slightly slower on incongruent than on neutral and congruent trials, while no difference between neutral and congruent trials was obtained. Functional imaging data demonstrated that activity in the ACC was larger on incongruent than on congruent trials when participants responded to the words (there were no differences for the arrows). Importantly, ACC responses were larger for neutral than for congruent stimuli, in the absence of response conflict. This result demonstrates the engagement of the ACC in attentional control itself. Computer simulations showed that the GRAIN model of Botvinick and colleagues, which implements ACC conflict detection, fails to account for the findings, whereas the WEAVER++ model accounts for the data.

3.2 Encoding multiple-word utterances

The encoding of multiple-word utterances requires the speaker to recurrently perform lexical access. Multiple access not only takes place during the encoding of multiple-word utterances, but presumably also happens during the encoding of complex numerals, such as clock times and house numbers.

3.2.1 Computation and retrieval in encoding complex spoken numerals

Sprenger, in collaboration with van Rijn (U. Groningen), conducted a series of five experiments to examine the influence of computational load and ease of lemma retrieval on subjects' speech latencies for complex numerals. In the first two experiments, they measured the latencies for digital clock time naming for all minutes of the hour. Both experiments replicated earlier findings by Meeuwissen, Roelofs, and Levelt (Annual Report 2001:29). Naming latencies for clock times ending on zero or five (the "standard times") were a linear function of the type of utterance referent (full/half hour) and the distance to the reference point. Meeuwissen et al. interpreted their findings in favor of a procedural semantics for clock time naming. However, by including all possible time points of the hour, Sprenger and van Rijn could show that the linear distance effect is in fact restricted to the standard times. That is, naming latencies for all other minutes are much higher than those of their surrounding five or ten minute time points. These findings suggest that the clock time naming task shows the conjoint effect of computational load (invoked by the calculations necessary to derive the correct answer) and the ease of lemma retrieval. Specifically, the findings suggest that standard times are represented as fixed expressions and thus can be accessed faster than clock times that need to be constructed on-line (see also Sprenger 2003). Consequently, the distance effect that was found by Meeuwissen et al. can partly be explained by superlemma competition: Although speakers of Dutch prefer to name clock times from nine minutes to the half hour till nine minutes past the half hour with reference to the half hour, the time points just before and after that are not so unequivocal. For example, 3:20 can either be encoded as "ten before half four" (preferred) or as "twenty past three".

The first two experiments differed with respect to the reference point for two sets of time points (i.e., the times from 16 to 20 minutes past the full hour, and 10 to 14 minutes past the half hour, the "variable sets"). By comparing the latencies for these sets between experiments, Sprenger and van Rijn could assess the difference in computational load that is related to the two different arithmetic operations required by the task (addition to or subtraction from 0/60 or 30, respectively), but also to preference. First analyses showed an interaction between experiments, with the variable sets in the first experiment being more

difficult than those in the second experiment.

A third experiment was designed to isolate effects of lexical (and possibly superlemma) retrieval from those of mental arithmetic. Subjects were given simple arithmetic problems that represented each time point (x:y) on the Dutch clock (including the variable sets): 0+y, 30-y, y-30, 60-y. Subtraction was expected to be more difficult than addition and subtraction of numbers ending on zero or five to be more easy than subtraction of other instances. Most importantly however, no differences in reaction times were expected between numbers ending in zero or five. First results supported this hypothesis, suggesting that the distance effect found by Meeuwissen et al. cannot be attributed to effects of mental arithmetic.

The fourth experiment was a control experiment that replicated the effects found by Meeuwissen et al. when subjects were instructed to name the stimuli as house numbers. As expected, speech onset latencies varied only by morpheme frequency and numeral length.

In the fifth experiment, subjects were presented with analog clocks instead of digital clocks. Due to the visual "Gestalt" of the stimulus, clock times can be read directly from the visual input, rendering mental arithmetic unnecessary, or greatly reduced. In addition, Sprenger and van Rijn predicted faster latencies for standard times, due to faster visual recognition, but also as result of a superlemma effect. The latter should be manifested in a replication of the distance effect. First analyses of the data supported these predictions.

3.2.2 Determiner selection in encoding noun phrases

Schiller continued his work on determiner selection in noun phrase encoding (see Annual Report 2002:32). In collaboration with Greupink and Dijkstra (both Radboud U. Nijmegen), he showed that Dutch common gender nouns (e.g., *de stoel* 'the chair') and neuter gender nouns (e.g., *het boek* 'the book') behave differently when they are produced in the plural (e.g., *de tafels* 'the tables' or *de boeken* 'the books', respectively). In the case of common gender nouns, the determiner is identical in the singular and the plural (i.e., *de*), whereas for neuter gender nouns, the determiner changes from singular (*het*) to plural (*de*). Results showed that this change in determiners is connected to a cost in production latency, which can be accounted for by a competition effect. Neuter gender nouns (e.g., *het boek*), when produced in the plural (e.g., *de boeken*), not only activate the appropriate determiner form *de*, but also automatically activate their singular determiner form *het*. Therefore, at some point two different determiner forms compete for selection. To resolve this competition, the speech production system needs time. There is no such competition for common gender nouns, because they activate the same determiner in the

singular or in the plural (*de stoel* – *de stoelen*). These results replicated and extended earlier data from Janssen and Caramazza (2003). Schiller, Greupink, and Dijkstra obtained similar results in German (*die Tür* 'the door' – *die Türen* 'the doors' vs. *das Buch* 'the book' – *die Bücher* 'the books') replicating data by Schiller and Caramazza (2003) and Schriefers et al. (2002). Interestingly, Dutch-German bilingual speakers show the effect in both languages using the same pictures even when the congruency for a particular picture is different in the respective languages (e.g., *de auto* 'the car' – *de auto's* vs. *das Auto* 'the car' – *die Autos* or *het pistool* 'the pistol' – *de pistolen* vs. *die Pistole* 'the pistol' – *die Pistolen*). This may pose a problem to models assuming that syntactic features, such as gender, are activated via the phonological level, i.e., via the word form. Dutch-German homophonic cognates which share their word form, e.g. /kabəl/ 'cable', are connected to different syntactic features, namely common gender (in Dutch; de kabel) and neuter gender (in German; das Kabel). However, unless there is an additional mechanism, the model cannot "know" which of the two features to select.

Schiller also continued his work on compound production. In collaboration with Zumach and Dijkstra (both Radboud U. Nijmegen), he manipulated existing noun-noun compounds such that the two morphemic constituents had either the same genders and determiners (e.g., *de stoom*$_{[com;\ de]}$*trein*$_{[com;\ de]}$ 'the steam train' or *het gas*$_{[neu;\ het]}$masker$_{[neu;\ het]}$ 'the gasmask') or different genders and determiners (e.g., *het koffie*$_{[com;\ de]}$filter$_{[neu;\ het]}$ 'the coffee filter' or *de stro*$_{[neu;\ het]}$*hoed*$_{[com;\ de]}$ 'the straw hat'). Participants saw pictures of these compounds and produced them in the singular and in the plural. When participants were required to produce the compounds in the plural, they were either in a congruent condition (e.g., *de stoomtrein – de stoomtreinen* or *de strohoed – de strohoeden*) or in an incongruent condition, where the words took the determiner *het* in the singular but the determiner *de* in the required plural (e.g., *het gasmasker – de gasmaskers* or *het koffiefilter – de koffiefilters*). Based on earlier results in the literature (Schriefers et al. 2002; Janssen & Caramazza 2003), it was predicted that the difference between the singular (e.g., *de stoomtrein*) and the plural (e.g., *de stoomtreinen*) should be smaller in the congruent than in the incongruent condition because in the latter condition two different determiners compete for selection, whereas this is not the case for the former condition. Dutch participants indeed showed this pattern of results (significant interaction between the factors gender/determiner and number), whereas monolingual English speakers – as predicted – did not show this effect for the same pictures since English does not distinguish different genders or determiners. Furthermore, for identical pictures, bilingual Dutch-English participants showed the congruency effect in Dutch but not in English.

3.2.3 Parallelism of grammatical encoding and decoding

The on-line assembly of syntactic structures (grammatical encoding) is not only part and parcel of utterance encoding but also of sentence comprehension (grammatical decoding). According to standard assumptions, these tasks are subserved by separate cognitive processing resources with widely differing operating characteristics – the *Heterogeneous Independent Resources* (HetIR) *architecture*. However, psycholinguistic research has uncovered substantial similarities between grammatical encoding and decoding:

- Similar control structures: e.g., both processes can be characterized as lexically guided, incremental, near-deterministic, and constraint-based.
- Similar empirical profiles: e.g., syntactic priming affects the two processes similarly, and so does grammatical (in)congruency.

In accounts for these and other commonalities, it has been proposed that the structure assembly resources share their working memory. This proposal is unsatisfactory, though, because it does not address the control structure similarities. Instead, the following theoretical options look more promising:

- The *Homogeneous Independent Resources (HomIR) architecture:* Grammatical encoding and decoding tasks are performed by two exemplars of the same type of structure assembly resources. This architecture comes in two varieties: The exemplars can be operative simultaneously (parallel processing: HomIR-P) or only alternatingly (HomIR-A).

The *Shared Resources (SR) architecture:* Grammatical encoding and decoding are two "modi operandi" of the same structure assembly resources. Resources recruited for encoding purposes cannot be assigned to decoding, and vice-versa. Consequently, the system cannot function in both modalities simultaneously (unless maybe for extremely simple structures) but has to alternate between them.

How can we distinguish between these alternatives experimentally, in particular between the parallel architecture (HomIR-P) on the one hand and the non-parallel ones (HomIR-A and SR) on the other? Parallel architectures should allow language users to assemble and maintain in working memory two distinct syntactic trees simultaneously, one for a perceived input sentence and one for a self-produced output sentence. (Theories of self-monitoring during speaking usually work from this assumption, e.g., Levelt's (1989) Perceptual Loop theory.) Nonparallel architectures predict that speakers, while grammatically encoding an utterance, cannot analyze and keep track of the grammatical structure of a perceived sentence simultaneously.

Kempen designed a vocal RT task ("Reading and Paraphrasing", RaP) requiring participants to encode and decode in parallel, without implicating divided attention – i.e., without having to monitor two input channels or to deal with two different sentence meanings simultaneously. Participants read aloud a sentence presented word-by-word or in fragments spanning a few words – e.g., the Dutch version of (1), where slashes mark the fragments.

(1) The headmaster/complained: /"I have/seen/a nasty cartoon/of/myself/in the hall."

In each trial, the participants saw two rectangles, respectively left and right of the center of a computer screen. Each input fragment was presented for 1200 msec within the left-hand rectangle while the right-hand rectangle remained empty. In some trials, however, it was the right-hand rather than the left-hand rectangle that contained a fragment – always the subordinator *that*, signaling the onset of the paraphrasing task: Henceforth, the sentence should be completed as indirect speech. That is, in response to type-(1) sentences, the participants actually produce semantically identical but syntactically different type-(2) sentences:

(2) The headmaster/complained/that/he had/seen/a nasty cartoon/of/himself/ in the hall.

The measurement of central interest was the RT to the reflexive *myself*, which should be replaced by *himself*. In half the trials, the input sentence was presented with *himself*, which is incorrect and unexpected given current input but, after *that he*, fits the output sentence perfectly.

In a control task ("Reading and Correcting", RaC), participants read aloud type-(2) sentences featuring a correct (*himself*) or an incorrect reflexive (*myself*), with the instruction to rectify any morphological or syntactic errors on-line.

The predictions are summarized in the table below, where each √-sign indicates a decoding or encoding problem that delays RTs. (Asterisks in the second column mark ungrammatical input pronouns.) The pattern of average RTs clearly supported nonparallelism – notice, in particular, the fact that the ungrammatical reflexives went unnoticed in the RaP task (short RT).

		Predicted Problems				
Task	Input Reflexive	Parallel Architecture		Nonparallel Architecture		RT
		Decoding	Encoding	Decoding	Encoding	
Paraphrasing direct speech (RaP)	*myself*		√	√	√	long
	**himself*	√				short
Reading indirect speech (RaC)	**myself*	√	√	√	√	long
	himself					short

Apparently, while grammatically encoding the to-be-uttered sentence, speakers cannot keep the resulting syntactic structure distinct from the structure of a simultaneously decoded input sentence. Further experiments are needed to discriminate between the nonparallel SR and HomIR-A architectures.

3.2.4 Linearization in the encoding of spatial descriptions

Previous research has shown that speakers employ various strategies when talking about space. This means that speakers use different ways to encode a multidimensional mental spatial representation into a strictly one-dimensional (linear) verbal description. Levelt (1982) labeled the encoding step that must be completed when shifting from space to language *linearization*.

The aim of Schmiedtová's research project was twofold: First, to identify the strategies speakers employ when dealing with the linearization problem. This was tested by means of a living space description task. The second aim was to investigate how well listeners of that description were able to comprehend what was described to them. This research project was carried out within the COMIC (Conversational Multimodal Interaction with Computers) project .

In order to tackle these questions, Schmiedtová designed a study consisting of three experiments. In Experiment one (production), German informants first gave a detailed description of a bathroom that they knew well. After that, they had to draw a blueprint of the same bathroom. For Experiment two (perception), she selected several descriptions representing the main strategies used by German speakers in the first experiment. These descriptions were presented to a group of German listeners whose task it was to make a blueprint based on their comprehension of the presented description. In Experiment three (evaluation), the similarities/differences of the original blueprints created from

Experiment one and those drawn in Experiment two were evaluated by several judges. The results of the first experiment are reported here.

Seventy-one German native speakers studying at the university of Heidelberg, Germany were tested. Two key strategies were observed in the data: tour and list. Speakers using the tour strategy either gave a *gaze* tour or a *real* tour. In the first case, they placed themselves in the door and depicted their bathroom by clustering the relevant objects together according to their function and/or placement. That is, objects were grouped in a hierarchically organized structure. In the second option objects were encoded as they were encountered. In such a description, the individual objects (e.g., sink, shower, etc.) were connected by spatial adverbials and/or prepositions. Speakers usually started on the right and moved along the walls to the left (from their point of view–standing in the doorway).

Speakers using the list strategy provided a list of objects that were part of their bathroom. However, they did not give information about the objects' spatial arrangement (placement). Despite the absence of the crucial spatial information, some regularities were detected in this strategy. First, variables (i.e., objects that vary and therefore, must be mentioned) were always brought up before fixtures (i.e., objects that were standard and hence expected by the listener to be part of the described bathroom, even though they were not mentioned). In other words, objects such as the shower or bathtub (variables) came before toilet or sink (fixtures). With respect to fixtures, speakers showed a strong tendency to follow the Gricean principle "*Do not mention what is obvious*". Instead, other specific information was verbalized (e.g., the relative location in space). Also, in contrast to tour descriptions, lists can include objects that are missing from the bathroom. In addition to these findings, an interaction of gender by strategy was found: Female informants preferred making use of the list strategy, while male subjects favored the gaze tour.

Chapter 4

Multimodal Interaction

Introduction

4.1 Roots of human sociality
4.2 Multimodality: dyadic route negotiations with and without pen gestures
4.3 Feedback
4.4 Questions
4.5 Confirmations
4.6 Person reference: name taboo in Yélî Dnye
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4.8 Ways of speaking: Kilivila situational varieties

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Joint research with other projects:

Space

Introduction

The Multimodal Interaction project adopts an interdisciplinary approach to the study of human interaction and its cognitive, linguistic, and cultural underpinnings. Members of the project continued the construction of transcribed corpora of video-recorded conversation from field sites around the world (Australia, China, Italy, Laos, Mexico, Namibia, the Netherlands, Papua New Guinea, USA). Further analysis of previously transcribed data continued. In parallel with the ethnographic, corpus-based work, laboratory activity also continued, with the design and running of experiments, and brain-imaging research (see Özyürek's contribution to the Space project). Two international symposia were held, dealing with topics central to the conceptual and theoretical framework of the project.

A general observation driving the activities of the project is that the organization of human interaction is quite unlike that of interaction elsewhere in the animal world. Human interaction is highly cooperative, flexible and adaptable to different situations and sociocultural contexts. It has roots in the attribution of intentions (communicative and otherwise) to others, and has properties at least partly independent of language. The Multimodal Interaction project investigates properties of interaction both at a general level, concerning its relation to human cognition and its universal properties, and at a more specific level at which locally particular patterns of interaction may be related to properties of languages, cultures and cognition.

A hypothesis being pursued in the project is that the special mode of human interaction is possible thanks to the co-existence of a number of organizational systems which co-determine and interlock in both structure and function. The three systems of interest are located in individual cognition, shared culture, and emergent structure, respectively. The individual brings many specific skills to interaction, including 'mind-reading' or intention recognition skills, the ability to bind multimodal signals into coherent utterances, and capacities to participate in the co-construction of sequences of actions. Culture provides massive inventories of linguistic signs, conventional sequences of action, and detailed expectations about the conduct of interaction and communication. The emergent properties of interaction, including both the unforeseen contingencies and the recurrent stable strategies, may account for many of the advantages that accrue to this mode of social life. Work in the project tries to disentangle these sources of structure, for example, looking at early infant interaction for clues to our native endowment in this domain, or comparing the structure of interaction crossculturally for clues to the relative contributions of culture, individual capacities, and converging outcomes or emergent structure.

Studies conducted within the subprojects of the Multimodal Interaction project are concentrating on different components of this general theoretical framework, contributing to an overall exploration of the domain. Some of the subprojects (e.g., 4.2, 4.3, 4.7) examine the use and comprehension of multimodal signals in detail. Some of the subprojects (4.3.1, 4.3.3) use cross-cultural comparison to look for universal properties in the conduct of interaction, while others explore the details of recurrent patterns within a specific cultural milieu (4.2, 4.3.2, 4.4).

4.1 Roots of human sociality

Enfield and Levinson staged an international interdisciplinary symposium on the 'Roots of human sociality' (see Chapter 13).

Levinson's contribution explored the 'interaction engine', a proposed ensemble of individual abilities and collaborative properties that make interaction possible across cultures and communicative situations. Levinson began the investigation of an interactional system on Rossel Island, an isolated island off Papua New Guinea, where there are a handful of scattered deaf individuals. At least some of these adult 'home-signers' effectively communicate about quite abstract ideas using gesture and mime. (Figure 4.1).

Figure 4.1. Deaf home-signer on Rossel Island referring to the anti-sorcery god Nkaa by depicting his eagle avatar.

The turn-taking system for conversation, and systems of repetition and repair, are crucial to deaf and hearing interlocutors coming to a mutual understanding. The idea of an interaction engine offers an account of how it is possible to communicate without a shared conventional language, which otherwise remains a mystery. On this view, there are strong universals to be expected in the

underlying structure of face-to-face interaction, which provide a framework for the use, acquisition and construction of languages.

Enfield's contribution to the symposium considered the phenomenon of joint attention, i.e., the mutually aware sharing of attention (e.g., when someone points something out for another person). It is through joint attention that people come to share common ground and intersubjective awareness. This process is increasingly recognized to be fundamental to the development of cognitive abilities underlying human interaction, but its temporal properties and social consequences have been little investigated. Enfield's study used examples from Lao conversations to make the point that joint attention has a direct relationship to common ground (any joint attentional scene will increment the common ground of its participants), which in turn plays a fundamental role in Gricean implicature (any item of common ground is available for exploitation in conversational implicature). Gricean inferences are known to be central to linguistic meaning. They can only be made against a background of what is commonly known and expected by interlocutors. In this way, the common ground which either comes with the shared ethnographic background of speakers or is locally established by means of joint attention, figures directly in the processes of speech production and comprehension, and the design of utterances in conversation. Many practices which might otherwise be unexplained (e.g., interlocutors taking time to remember a person's name, when the name is irrelevant to the business at hand), or appear to be mere small talk are actually serving a purpose of 'putting money in the bank', i.e., investing common ground for when it may be useful or necessary in later interaction.

4.2 Multimodality: dyadic route negotiations with and without pen gestures

It is often assumed in Human-Human and Human-Computer Interaction research that making an additional modality available in interaction will increase the efficiency of communication, especially if the affordances of the added modality allows for easier encoding of representations relevant to the communicative task. De Ruiter found that this is not always the case. He used the Spatial Logistics Task (SLOT) laboratory (see Annual Report 2002) to create different conditions for task-oriented Dutch interactions, and investigated whether the use of an electronic pen to draw on a shared map during route negotiations would increase the efficiency of these negotiations. Perhaps unexpectedly, the ability to draw routes while talking about them did not reduce the amount of verbal interaction. Subjects who could use the pen produced the same amount of speech as those who couldn't. Also, having access to the pen

led to longer periods of silence in which neither speech nor pen gestures were produced, with the result that the negotiations were significantly *longer* when the pen modality was available. There was no difference in the quality of the negotiation solutions. A possible reason for the faster negotiations in the condition without the pen is that these subjects had less time to evaluate proposed routes because they did not have access to a perceptibly enduring representation of them in the form of a drawn route on the shared map. While subjects in the no-pen condition had to evaluate proposals that were stored in short term memory, subjects in the pen condition had access to external representations of the proposals, giving them more time to think about them.

4.3 Feedback

An important feature of any effective interactional system is the use of online information about the effects of one's actions. Feedback to an utterance during the course of its production can help determine its status as a contribution to the current interaction, or can contribute to alteration of its very shape and direction as it unfolds. An international workshop on 'Feedback in Conversation' was organized by the project at the MPI in February (see Chapter 13). Talks by project members and invited speakers discussed verbal and nonverbal means by which recipients signal their attention, stance, etc. to what speakers are doing, using data from conversation and task-oriented interaction in a number of different languages and settings. These include not only 'continuers' like 'uh-huh', but also eye gaze and laughter.

4.3.1 Response systems: comparison of Tzeltal and Rossel

P. Brown and Levinson's contribution to the Feedback workshop examined cultural differences in 'response systems', comparing the organization of conversation in Tzeltal (a Mayan language of Mexico) and Yélî Dnye (the language isolate of Rossel Island). A response system is a set of normative rules and expectations within a language/culture about how one is to provide minimal responses ('backchannel markers', 'continuers', etc.) during conversation (e.g., as a recipient while someone is producing an extended turn such as in a story telling). It is constituted by inventories of special response items, both audible (e.g., *mm, uh huh*) and visible (nods, gaze modulations, facial expressions), together with rules about who responds when and how to what. The Tzeltal and Yélî Dnye systems differ strikingly, partly with respect to different preferred bodily positions for interaction. Yélî Dnye speakers tend to squat in touching distance, eyeball-to-eyeball, with prolonged periods of mutual gaze, while Tzeltal participants tend to sit side by side, with less sustained gaze and even less frequent periods of mutual gaze (see Figure 4.2).

Figure 4.2: Typical positioning of interactants on Rossel Island (Panel A) vs. Tenejapa (Panel B).

Matching this, Tzeltal speakers have more elaborate verbal than visual minimal response elements (even nods are relatively rare), and the verbal responses may be echoed over multiple turns, as in the following example (responses, and responses to responses, are underlined):

1. TK:	*jich sakik mene*	"those ones were white"
2. AO:	*ai saki:k*	"Ai they were white"
3. TK:	*sakik*	"They were white"
4. AO:	*jii wa'ii*	"I see"
5. TK:	*jnn'*	"Hm"

Here, TK introduces new information in line 1, which is echoed in reduced form by AO in line 2, re-echoed by TK in line 3, which then receives a minimal response element by AO in line 4, which is itself received with such an element in line 5. About half of all turns receive more than one response, and a quarter receive three or more responses as in the example above. New propositions are thus flanked by response cycles.

In contrast, the Yélî Dnye system relies heavily on nonverbal responses, capitalizing on long periods of mutual gaze. 60% of all responses involve a signal in the visual modality. The visible responses include nods, significant blinks, eyebrow flashes, eye-points, and combinations of these. Significant blinks can be distinguished from reflex blinks by duration (significant blinks are usually over 250 ms, reflex ones under) and the pressure of the closure. Eyebrow flashes involve contraction of the frontalis muscle, raising both eyebrows for over 250 ms. Eye-points involve a momentary glance (ca. 300 ms) in the direction of a referent, with associated head movement if necessary. This visible response system allows for very rapid communication – a third of these responses occur before the speaker's turn is over.

The sequence of stills in Figure 4.3 shows an example of rapid feedback during speaking, as facilitated by these facial signals.

The speaker to the left is saying "You tell him", and by the time the utterance is over the recipient has signaled "Yes" by means of a blink followed by an eyebrow flash (the eyebrow flash functions without words as, e.g., a "yes" to a yes/no question). This practice makes salient the full action potential of visible signals during conversation, raising the possibility that visible signals may need to be incorporated into the turn-taking system on Rossel and elsewhere.

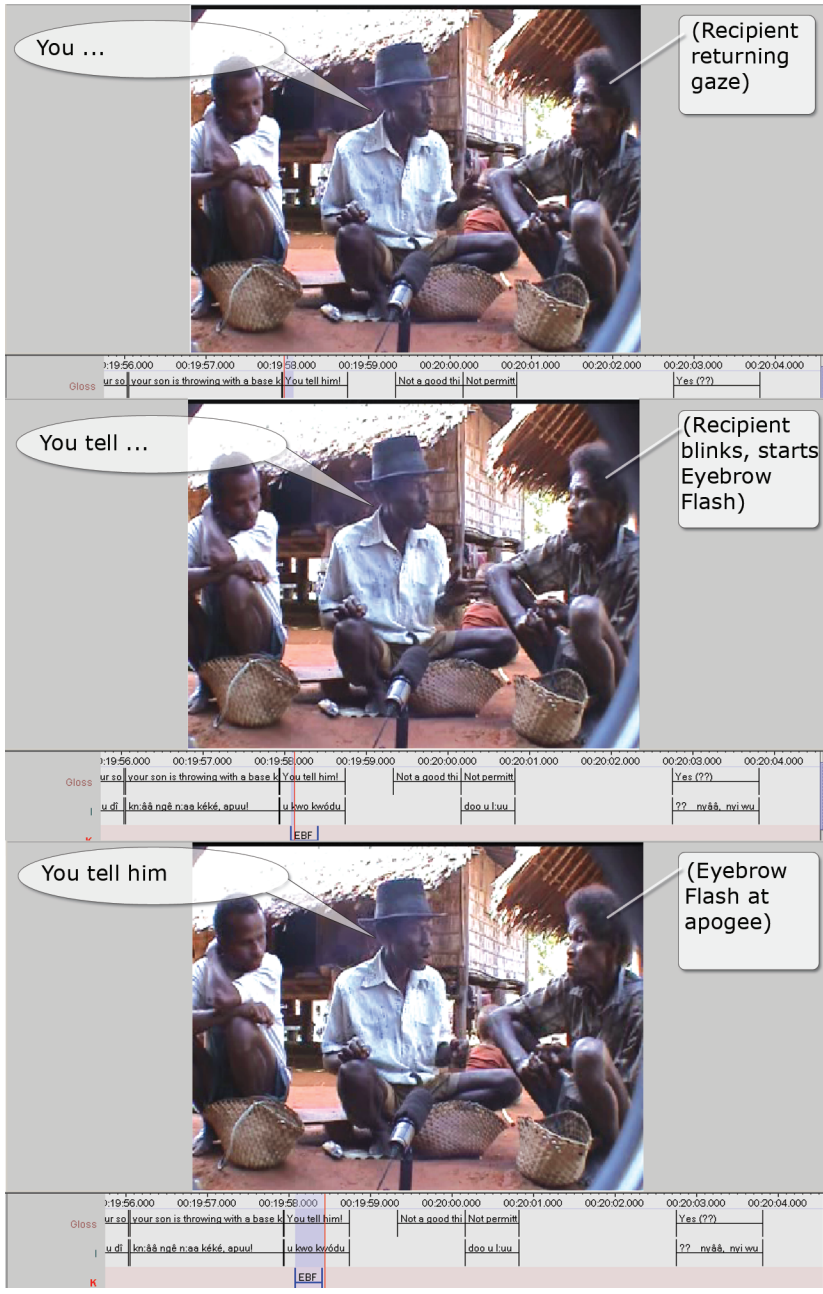


Figure 4.3: Sequence of stills showing overlap between speech and nonverbal responses in Rossel interaction.

4.3.2 Laughter

Another mode of supplying feedback to a speaker in conversation is with laughter. Enfield's contribution to the Feedback workshop investigated the role of laughter as feedback in video-recorded conversations in Lao (Laos). While laughter is nonlinguistic and apparently universal, it is nevertheless tightly integrated into the structure of both language and interpersonal interaction. It is a research blind-spot in psycholinguistics (as hand gesture was until recently). Enfield examined laughter as a type of recipient feedback, comparing it to linguistic signals such as 'uh-huh' and visual signals of recipiency such as the Lao 'head toss', a sharp 'up-nod' used to signal agreement among other things. While verbal continuers and nods have primarily cognitive meanings, expressive of understanding or conversational procedure (e.g., passing up a turn at talk), laughter is emotive and expressive of affective stance, typically mobilized for interpersonal (dis)affiliation. These findings are in line with findings about laughter from extensive investigation of conversation in English (Glenn 2003). Further research will need to investigate the degree to which the organization of laughter in interaction varies across cultures.

4.3.3 Gaze as a regulator in interactional organization

Rossano began his Ph.D. project on the organization of gaze behavior in interaction. His study is based on video recordings of naturally occurring ordinary face-to-face interactions in Italian and English. He collected field data from dyadic interaction using synchronous recordings with two cameras in order to obtain reliable gaze data from both interactants. His work relies mainly on the methodology of Conversation Analysis. Previous research on gaze in conversation has addressed issues such as displaying of attention, (dis)engagement in conversation (Goodwin 1981), or next speaker selection (Lerner 2003). Such work has examined gaze behavior in relation to the roles participants are enacting locally, (e.g., speaker or hearer) and in relation to the unit "turn" in the turn taking system (Goodwin 1981, Kendon 1967). Rossano is pursuing a hypothesis that gaze behavior is organized with reference to sequences of conversational actions (e.g., a request followed by a granting of the request or a farewell followed by another farewell), rather than structural units at the turn or utterance level.

De Ruiter used data from Dutch task-oriented dialogue (DIFF task interactions; see Annual Report 2003) to study whether eye-gaze at the facial region of the interlocutor (other-gaze) is used as a signal to regulate dialogue. Because the DIFF task involves attention to visual stimuli, the amount of other-gaze was low (only 7% of the time did either participant look at their interlocutor). There was no relationship between the timing of other-gaze and several interactionally

relevant variables such as the use of questions or the difficulty of references to the stimuli during the task. In addition, only very weak evidence was found for Kendon's (1967) claims that listeners perform other-gaze more frequently than speakers and that speakers perform more other-gaze towards the end of their turn. A more sensitive analysis using formal automaton models of turn-taking and other-gaze also revealed no relationship between turn-taking states and states related to other-gaze. Combined, these findings strongly suggest that other-gaze is not used as a signal to regulate turn-taking in situations where its frequency is low. These experimental results conform with the results of Rossano's observational analysis.

4.4 Questions

A highly frequent and apparently universal structural format in interaction involves questions and their responses. Current work is investigating the forms and functions of such sequences, and the extent and type of variation found across languages and cultures.

4.4.1 Interrogatives in Hai‖om

Hoymann's Ph.D. project focuses on the interrogative system of the endangered language Hai‖om, a Khoisan language spoken in Namibia. Hoymann is a member of the ǂAkhoe Hai‖om project (within the DoBeS program, funded by the Volkswagen Foundation; see Chapter 11.2), documenting the language and cultural practices of this small group of speakers in northern Namibia. Along with ongoing traditional grammatical field work on the syntax and pragmatics of Hai‖om questions, Hoymann is also employing techniques of Conversation Analysis. In the past year she made two field research trips. The initial field trip activities primarily involved liaison with the Hai‖om speech community, local schools, teachers' organizations, community development organizations and local academics. During both the first and second field research periods 70 hours of conversational data were collected on video. Most recordings capture everyday speech situations involving a variety of speakers. Two teachers from the local school were trained in how to transcribe the conversational materials.

4.4.2 Question-answer sequences in pediatric consultations

Stivers investigated question-answer sequences in a large corpus of conversations between pediatricians and parents during pediatric consultations. Her findings support the claim that questions perform a range of functions, including projection of the action sequence, and assertion of epistemic and interpersonal stance. Questions are seldom if ever simply neutral requests for information.

Stivers found that pediatricians design their questions in such a way as to convey their stance towards a child's illness symptom as either problematic (e.g., "Has he had a fever?") or nonproblematic ("So, no fever?"). When several questions are asked in a row, this can further project a diagnostic trajectory that is either problematic or nonproblematic. For instance, if a doctor asks several questions that are designed to presuppose "no problem" responses (e.g., "No throat pain? No ear pain? No fever?"), the doctor projects that the diagnosis of the child's illness will be of a nontreatable virus rather than a treatable bacterial illness.

One form of support for this analysis is that hearers treat speakers who produce questions as not only requesting some piece of information but also as effectively building a case for their forthcoming diagnosis. Thus, parents sometimes respond to questions by rejecting not the symptom inquired about but the projected diagnosis (e.g., "He doesn't have asthma" in direct response to a query about wheezing). Additionally, parents offer problematic symptoms in environments where they have supplied a "no problem" supporting answer (e.g., Q: "Does he cough a lot?"; A: "Not a lot but it's deep"). Here then, parents again show that question-answer sequences are heard as building a case against a problem diagnosis. Parents can attempt to mitigate this by pointing out problems their child *does* have.

In interaction, both question design and response can embody a negotiation over a larger activity, and thus requests for information are best understood not only for their grammatical role but for their role as tools for effecting social action.

4.5 Confirmations

Although confirmations are normally offered in response to questions, they can also occur in response to statements. Stivers studied a collection of confirmations taken from a corpus of naturally occurring conversation in American English. In these cases, one speaker makes an assertion, and a second speaker responds with a modified repeat of that assertion – e.g., A: "It takes hard work to be successful", B: "It *does*". Such modified repeats rely on both prosody (stress) and lexico-syntax (partial or full repetition). Stivers showed that when speakers confirm using a modified repeat, they communicate a stance that they have more, or at least equal, authority to make the claim than the person who originally made the assertion. This claim is based on a comparison of the modified repeats with cases in which assertions either drew no response or a simple agreement response (e.g., 'Yeah'). It was found that modified repeats are a marked form of response to an assertion. Evidence that

the practice is concerned with epistemic authority may be found in aspects of participant behavior which appear in the same contexts (e.g., coupling the modified repeat with another authority-challenging contribution, such as an insulting address term). Further, the use of modified repeats generally aligned with the differential epistemic authority associated with distinct social roles (e.g., teacher, physician, student) or interactional roles (e.g., story teller versus story recipient). The documentation of this practice adds to existing evidence that interactants are concerned not only with exchanging information, and agreeing/aligning with one another, but also with ownership of knowledge.

4.6 Person reference: name taboo in Yélî Dnye

Any strong universal framework for meaning-making and interaction has to accommodate striking cross-cultural differences. Levinson investigated such differences in a study of reference to persons in Yélî Dnye conversation. A well known generalization from research on English conversation (Sacks and Schegloff 1979) is that in referring to persons, speakers should simultaneously optimize two considerations: (1) persons should be referred to in such a way that they are identifiable to the recipient, if possible; (2) persons should be referred to using a minimal form, optimally a name. Constraint (1) is ranked above (2), hence English speakers often try a single name, then expand if necessary. In cultures like that of Rossel Island it cannot work in exactly this way, because the use of names of certain in-laws in Yélî Dnye is strictly tabooed. However, Levinson's analysis shows that, with some modifications, both rules can still be seen to be in operation. As researchers working on other languages in the project have found, the preference in (2) is for brevity of reference – e.g., a kin term or title – but not necessarily for a personal name. The Yélî Dnye practice however has a further constraint, namely (3), the speaker should not refer by name or direct kin tie to a tabooed relative (e.g., a man's sister-in-law). As a result, a speaker faced with the need to refer to a tabooed relative avoids the name or kin term, instead trying a short vague description (e.g., 'that girl'), backed up if necessary by pointing and further verbal or nonverbal clues. Yélî Dnye speakers try to optimize constraints (1) and (2) as well as they can given (3), and relax (2) successively until recognition is achieved, just as in English. Taboos on the use of names (common cross-culturally) can therefore be accommodated within the Sacks and Schegloff generalizations.

Research in the domain of person reference continues, with several project members conducting data collection and analysis in preparation for an international conference on the topic.

4.7 Spatial organization of interaction

Interacting individuals form territorial spaces, as described by Goffman, Kendon, and others. Creating and maintaining these spaces requires some work by interactants, such as rituals of access (as in greeting behavior) and negotiated separations (as in parting behavior). Some of the systematic effects of cross-cultural differences in preferred spatial positioning on the structure of verbal interaction have been explored in the comparative study of Tzeltal and Rossel response systems, described above. Research on the spatial organization of interaction is relevant to both the Space and Multimodal Interaction projects.

Senft began documenting proxemic behavior in social interaction on the Trobriand Islands. The study of distance maintenance in human interaction was dubbed 'proxemics' by Hall. Like other human ethologists, Hall held that distance in interaction reflects the balance between attraction and fear, and varies across cultures, and within cultures according to circumstances (e.g., public vs. more private). Senft's first results show that Trobriand Islanders commonly mark their personal space with objects like baskets, lime spatulae, bush knives, and other objects of daily use which they put between themselves and others with whom they sit together. With these objects they mark and delimit their personal space from the personal spaces of others. In the village Trobriand Islanders often sit side by side on the verandas of their houses or on the platforms of their small yam houses. Thus, although they seem to prefer face-to-face interaction, this is not necessarily the most frequent situation in conversation. If a third person wants to join an interacting dyad, s/he sits in the vicinity of this dyad and waits till s/he is addressed by one of the interactants or tries to get access by giving or requesting betel nuts or tobacco. Although a spatial rather than linguistic strategy is followed in seeking access, a verbal action is the most appropriate way to leave such a group:

Ku-sisu-(si) *ba-la.*
2-stay-(Pl) 1.Fut-go
'You stay I will go'.

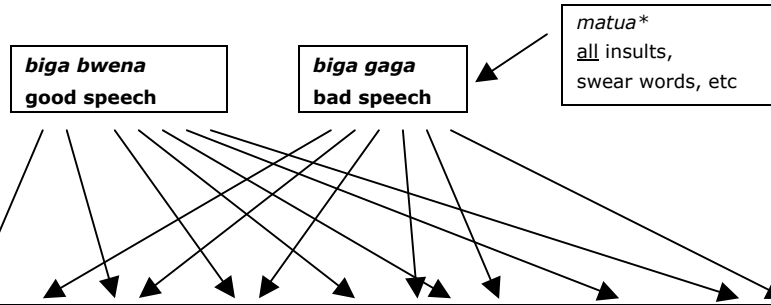
Initial investigation suggests that the Trobriand Islanders can be classified in Hall's terms as a 'contact' culture, preferring close interactional distance.

Enfield documented the traditional spatial layout of houses in the three villages of Mrka (Khammouane Province, Laos), whose 250 or so inhabitants speak the endangered Vietic language, Kri (see Chapter 11.4). The floor plan of a traditional Kri house is square with the two axes described as 'up' versus 'down' and 'in' versus 'out'. A fireplace is situated in the centre of the house, and forms

the focus of cooking, tea-making, and multi-party conversational interaction. The spatial layout of the house strictly determines (on the basis of status and kinship) where people can enter and where they can sit, and thus with whom they will be in most direct interaction. Thus, for example, in-laws will sit 'in', while guests will sit 'out'; older people will sit 'up', while younger people will sit 'down'. Extensive video recordings of conversations in this setting are being analyzed.

4.8 Ways of speaking: Kilivila situational varieties

Senft continued a project on the Trobriand Islanders' emic typology of Kilivila ways of speaking, exploring the notion that details of interactional behavior also appear to be a function of the interactive register being used. Senft described an emic typology of ways of speaking in Kilivila. Trobrianders distinguish not only dialects of Kilivila, but also "situational intentional varieties" (SIVs), i.e., registers that are produced in a given situation to pursue certain intentions. Eight such SIVs are differentiated and metalinguistically labeled. Two are general, subsuming all utterances that match, or mismatch, in style and lexicon the respective speech situation. Six SIVs are more specific. The Kilivila SIVs form the basic framework necessary for adequately describing genres in this Austronesian language. Table 4.1 summarizes the typology. During a 2004 field trip Senft collected additional data on some of these genres. Now - with the exception of the rather 'intimate' genres "personal speech" and "propositioning, seducing" – all Kilivila genres have been documented with illustrative examples.



Biga tommwaya biga baloma old people's speech / speech of the spirits of the dead	*Biga megwa* magic speech	*biga tapwaroro* language of the church	*biga taloi* greeting and parting speech	*Biga pe'ula/ biga mokwita* hard words/ true speech	*biga sopa* joking or lying speech, 'indirect' speech	*biga sopa* & *big mokwita* joking speech and true speech
wosi milamala songs of the harvest rituals	*megwa* magical formulae	*tapwaroro* Christian texts *wosi tapwaroro* church songs	*taloi* greeting forms and forms for opening speeches	*Yakala* litigations *kalava* counting baskets full of yams *kasolukuva* mourning formulae *liliu* myths	*sopa* joke, lie, trick *kukwanebu sopa* story as joke *kasilam* gossip *wosi* songs *butula* mocking songs *vinavina* ditty *matua** some insults etc. *sawila* harvest *shouts*	*Kukwanebu* story kavala personal *luavala* admonition *-kasemwala-* propositioning seducting *-nigada-* requesting

Table 4.1: *Situational intentional varieties* in Kilivila and their constituting *genre*

Chapter 5
Space

Introduction

5.1 Space in Neurocognition (SpiN)
5.2 Frames of Reference
5.3 Space in sign language
5.4 Gesture and speech in motion description
5.5 Body part terms
5.6 Landscape terms and toponyms

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Joint research with other projects:

Multimodal Interaction

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 of this report concerns progress in the neurocognition side of the project. The next section reports new findings on "Frames of Reference" (FoR), including further work in neurocognition. The following two sections concern multimodal expression of spatial relations: section three reports on the use of space in sign language; section 5.4 presents results of studies on gesture and speech in motion description. The final two sections discuss work on spatial classification: section 5.5 reports research results with respect to the classification of body part terms; section 5.6 reports on continuing research on landscape terms and toponyms in four languages and cultures.

5.1 Space in Neurocognition (SpiN)

The SpiN research group (Janzen, Haun, with Levinson, Levelt, van Turennout, and Hagoort) examined the neural basis of spatial memory and spatial language and their underlying frames of reference.

Haun continued his work on the role of environment-centered (allocentric) representations in spatial wayfinding behavior. In recent years influential models of human navigation theoretically reduced the function of allocentric spatial memory to a back-up mechanism for cases of disorientation. Initial experiments (see Annual Report 2003) had indicated that travelers integrate spatial information into a global allocentric representation of the environment: while navigating, subjects corrected for locally invisible global geometrical inconsistencies. In collaboration with the Institute of Cognitive Neuroscience at University College London, the SpiN-project devised three new large-scale virtual-reality environments, which are locally consistent but feature different levels of global geometrical inconsistency. The circular routes contained turns with a total of either 360^0 (Euclidean spaces), or 270^0 or 450^0 (non-Euclidean spaces) (see Figure 5.1).

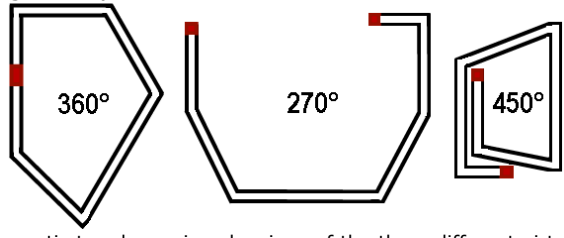


Figure 5.1: Schematic top down view drawings of the three different virtual realities, with sums of turns. The red rectangles indicate virtually equal coordinates (i.e., they appear to be the same location), without the disconnection shown in the two inconsistent maps above being apparent. Therefore all routes appear circular from the traveler's perspective.

Thirty participants (15 female, 15 male) studied these environments and estimated straight-line directions between object locations (i.e., locations of objects the subjects had seen in the environments) from memory. Participants' estimates were tested for biases towards a globally consistent geometric layout. If directions are computed via egocentric local path integration only, participants' estimates should not show any distortions towards a consistent global form. If spatial information is also integrated into a geometrically coherent allocentric 'mental map', biases towards a globally coherent form should be detectable. Participants' behavior revealed a bias towards a globally consistent geometric form for estimates across longer distances, while they were biased towards only locally coherent forms when estimating across shorter distances. This split in bias might indicate emphases on different qualitative types of representations dependent on task demands. Subjects corrected differentially for the different variants of inconsistencies and exhibited similar behavioral patterns in a comparable consistent environment. As indicated in earlier experiments of the SpiN project, participants did consider the geometric form on a global level even when not disoriented. The bias in volunteers' estimates is consistent with theories emphasizing the importance of global allocentric spatial representations in human spatial memory and navigation.

The Space project has sustained interests in the role of language in spatial cognition. To further investigate this, Haun initiated a new research project examining spatial memory strategies in non-human primates. Through studying spatial cognition without co-existing spatial language, SpiN hopes to shed more light on basic conceptual categories. A first set of studies was conducted in collaboration with the Wolfgang Köhler Primate Research Center in Leipzig, Germany. Initial data from all four great apes – chimpanzees, orangutans, bonobos, gorillas – reveals a preference for place- over feature-based spatial memory strategies. Continued collaboration is planned for 2005.

Janzen and van Turennout continued their work on human memory for object location. A previous functional Magnetic Resonance Imaging (fMRI) study (Janzen & van Turennout, Annual Report 2002) showed that the human brain automatically distinguishes between landmarks placed at navigationally relevant (decision points) and irrelevant locations (non-decision points). In a present event-related fMRI study Janzen and van Turennout investigated whether this selective representation of navigationally relevant objects is modulated by time and practice. Twenty right-handed volunteers (10 male, 10 female) learned two film sequences through virtual mazes, each containing 72 objects equally assigned to decision and to non-decision points. One maze was shown one time and the other maze was shown three times, counterbalanced across participants

and mazes. After a one day delay, event-related fMRI data of the whole brain were acquired on a 3 Tesla Siemens Trio scanner (using the facilities of the F.C. Donders Centre for Cognitive Neuroimaging) during recognition of the objects in isolation. Participants decided whether they had seen the objects in the maze or not. Consistent with our previous results, increased neural activity in the parahippocampal gyrus was observed bilaterally for objects previously placed at decision points as compared to objects placed at non-decision points, independent of attentional demands (see Figure 5.2).

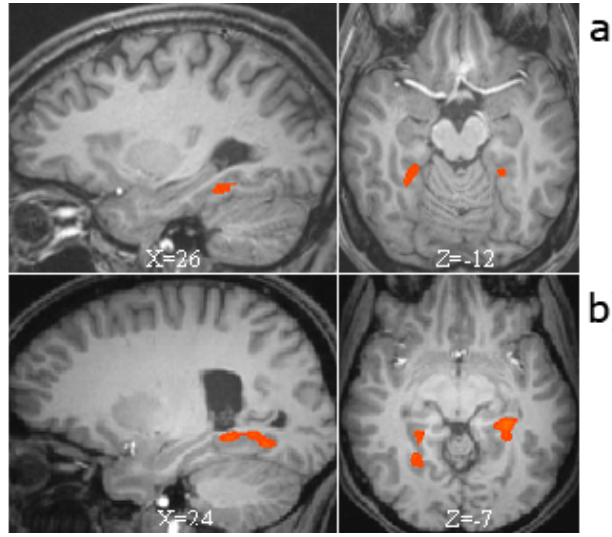


Figure 5.2:
a) Increased activity for recognizing relevant landmarks as compared to other objects in bilateral parahippocampal gyrus 20 min after learning a maze (Janzen & van Turennout 2004). b) Increased activity in bilateral parahippocampal gyrus for the same comparison 24 hours after learning a maze (Janzen, Wagensveld & van Turennout, in prep).

The selective increase in activity for decision point objects in the parahippocampal gyrus was larger following a long interval (one day in the present study) as compared to a short (previous study) time interval between maze learning and object recognition, suggesting consolidation of the effect. There was no effect of number of exposures to the maze. The results suggest a persistent representation of navigationally relevant information. These rapidly induced and long-lasting changes in object representation provide a basis for successful wayfinding.

5.2 Frames of Reference

Underlying spatial memory and linguistic representation of spatial layouts is a coordinate system often called a "Frame of Reference" (FoR). In language, three major types of reference systems can be distinguished (see Annual Report 2001): intrinsic (object-centered), relative (viewpoint-centered), and absolute (world-centered). Coding of space within different FoRs requires different cognitive processes. With an event-related fMRI experiment, Janzen, Haun and Levinson investigated the neural correlates of intrinsic and relative frames of reference (fMRI data of the whole brain were acquired on a 3 Tesla Siemens Trio scanner using the facilities of the F.C. Donders Centre for Cognitive Neuro-imaging). Fourteen participants saw pictures with intersections (see Figure 5.3).

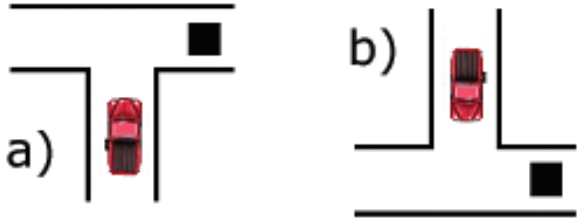


Figure 5.3: Intersections were presented for 2000 ms. Participants should either make a relative or an intrinsic decision. The correct answer for both reference frames could be the same as in (a) (relative task = right, intrinsic task = right), or different as in (b) relative task = right, intrinsic task = left.

Preceeding every trial participants saw a symbol that indicated whether they should decide from their own viewpoint (relative) or from the perspective of the car (intrinsic) if a right or left turn is needed to reach the black square. Increased neural activity for relative as compared to intrinsic trials was observed in the posterior (BA 31) as well as anterior cingulate gyrus (BA 32) and bilaterally in the parietal lobe. Intrinsic trials however showed increased activity in the left insula (BA 13) as well as in the precentral gyrus (BA 6). The present results show differential patterns for intrinsic and relative frames of reference and confirm earlier findings. Previous studies often find the parietal lobe involved in egocentric coding (e.g., Cohen & Andersen 2002) whereas the precentral motor area is involved in relating the location of one object to another (Olsen & Gettner 1995; Courtney et.al. 1998).

Further work has been carried out on the crosslinguistic typology of frame of reference expressions. Setting out from recently collected 'Man and Tree' data (a stimulus set for eliciting spatial descriptions, see Annual Report 1994) from Jahai (Mon-Khmer, Malay Peninsula) and Lavukaleve (Papuan isolate, Solomon Islands), Terrill and Burenhult investigated languages whose strategies for describing spatial relationships have proved difficult to classify in FoR terms.

Specifically, with regard to the spatial cues employed by such languages, strategies are seemingly diverse, unsystematic and non-conventionalized in relation to the three FoRs (intrinsic, absolute and relative). However, the results show that such languages are remarkably consistent in adhering to a descriptive strategy of *orientation*, whereby spatial relationships consistently draw on the coordination of facets of an entity with a spatial cue of some sort (including for example the viewer, ad-hoc landmarks or abstract bearings). The investigated 'Man and Tree' descriptions depend on reference to the man's inherent facets (e.g., 'the tree is in front of the man' and 'the man is facing east'), and there is an almost total lack of descriptions which locate the objects without reference to such facets (e.g., 'the man is east of the tree' or 'the man is to the left of the tree'). This suggests that a distinction needs to be made between orientation, which is faceted, and location, which is non-faceted, and that the two form conceptually different strategies whose detailed relationship with FoRs needs thorough investigation. A re-analysis of some of the languages whose FoRs have been investigated previously in the Space project reveals that the orientation strategy is not unusual: in addition to speakers of Jahai and Lavukaleve, we see Kilivila, Mopan, Jaminjung and Yélî Dnye speakers drawing heavily on orientational descriptions in solving the 'Man and Tree' task.

5.3 Space in sign language

In conjunction with the crosslinguistic study on reciprocals headed by Nick Evans of Melbourne University, data were collected by Ulrike Zeshan from Indian dialects of Indo-Pakistani Sign Language, and their analysis focuses on spatial mechanisms for reciprocal marking. The new research focus of the Sign Language Typology Research Group on village-based sign languages has begun with fieldwork by Gede Marsaja on the Balinese village Sign Language Kata Kolok in October – December 2004. One of the important issues here is the use of space in the grammar of this sign language (see also Chapter 10.3.1).

The investigation of the linguistic encoding of spatial relationships in German Sign Language (Deutsche Gebärdensprache, DGS) is the focus of Perniss' dissertation. A corpus of data consisting of static scene descriptions and dynamic event narratives was collected from German signers. Analysis of the first part of the corpus concerned signers' use of space to express location and orientation information about featured and non-featured objects. It confirmed that DGS signers conventionally map referent locations onto sign space from their own point of view. Orientation information was presented either simultaneously with location, using featured classifier forms (e.g., the two-legged entity classifier to represent humans), or sequentially using a direction of looking predicate after location specification via a non-featured entity classifier

form. In a second step, addressees were asked to construct a model of the spatial scene described to them. Addressees are skilled at interpreting location and orientation information produced egocentrically by the signer (i.e., produced from the signer's point of view). Nevertheless, allocentric interpretation of location and orientation (especially for pictures with more than two referents) occurred frequently, which is ascribed to the absence of a contextually provided bounded reference frame. The depicted scenes lacked such a reference frame and were often interpreted with respect to the room in which both participants were seated.

The questions that motivate the analysis of the second part of the corpus (i.e., event narratives) are: (1) what happens to spatial description when event dynamicity is introduced and (2) how is discourse coherence achieved with respect to spatial relationships in narratives? In particular, analysis of the event narratives focussed on the relationship between the representation of referents (mainly via so-called classifier forms) and signing perspective. Figure 5.4 represents the correspondences between signing perspective and classifier type:

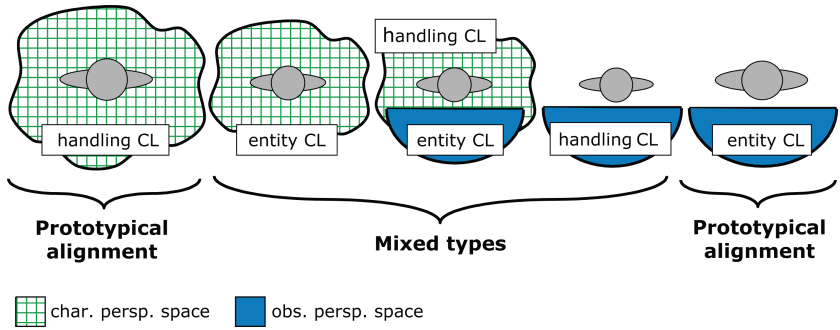


Figure 5.4: Correspondences between signing perspective and classifier forms

In character perspective, the signer 'constructs' (or 'acts out') the actions and attitudes of agents in the event. The prototypical manifestation of character perspective (left side of Figure 5.4) has:

- a life-sized event space (represented by the wavy line surrounding the signer),
- the occurrence of handle classifiers and large-scale size and shape specifiers,
- directionality along the sagittal axis.

In observer perspective, the signer maps entities diagrammatically onto sign space. The prototypical manifestation of observer perspective (right side of Figure 5.4) has:

- a reduced scale event space (represented in Figure 5.4 by the semicircle in front of the signer),

- the occurrence of entity classifiers and reduced-scale size and shape specifiers,
- directionality along the lateral axis.

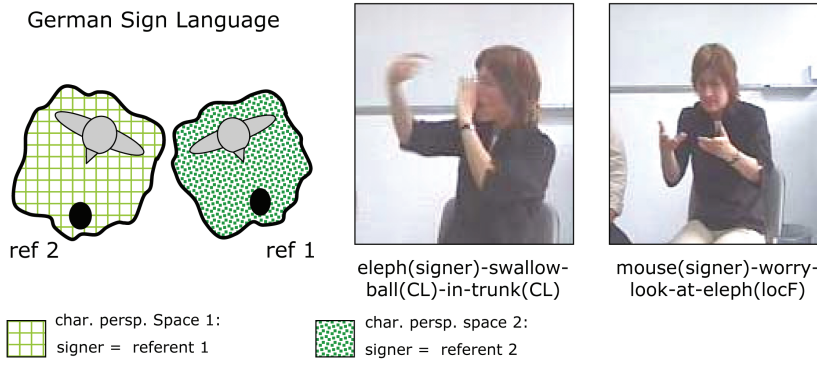
The correspondences schematized in the middle section of the figure represent "mixed types." It is the occurrence – in terms of frequency, form, and function – of these nonprototypical alignments that the dissertation is primarily concerned with.

The following example illustrates the most complex of the mixed types, in which an event is simultaneously represented from two different perspectives (central node in Figure 5.4). Figure 5.5 shows how the simultaneous use of both perspectives is achieved by the simultaneous representation of the event with two different articulators. The signer depicts a stimulus in which a protagonist throws a pancake forwards from himself but leftwards from the camera's vantage point. The right hand remains in place holding the pan in character perspective, while the eyes follow the path of the pancake to a goal location determined by observer perspective. The simultaneity explicitly expresses that the goal location of the pancake is a referent located opposite the signer (as agent) on the sagittal axis (in character perspective) and to the left of the signer (as external narrator) on the lateral axis (in observer perspective). In Figure 5.6, the pancake is depicted as moving between the two observer perspective referent locations opposite each other on the lateral axis.

Figure 5.5: Signer's representation of event of flipping pancake (from pan) between two referents. **5.5(a)** Character perspective. The signer represents a referent preparing to flip the pancake into the air. **5.5(b)** Character perspective. The signer's gaze follows the flipped pancake upward (along sagittal axis). **5.5(c)** Simultaneous character and observer perspective. The signer's gaze follows the flipped pancake down to the left (along lateral axis), while still holding the pan in place.

Figure 5.6: Pancake moves between observer perspective referent locations on lateral axis

A comparative study undertaken by Özyürek and Perniss investigated whether signers of German and Turkish Sign Language represent space in similar ways when asked to view and describe the same spatial relations in a narrative task. In particular, the study looked at (1) how signers use sign space and perspective shifts to represent spatial relationships between referents and (2) whether sign space is used differently in subject reference switches. It was found that both sign languages used two different perspectives for representing spatial relationships, but that German signers used character perspective much more often than Turkish signers, who, in turn, used much more observer perspective signing than German signers. Moreover, striking differences in the way Turkish and German signers used space for different perspectives were found, especially for marking different subject referents (see Figure 5.7). While German signers used distinct areas in signing space for different subject referents, Turkish signers used the same area of space and sometimes overlaid different perspectives in this same space. Differences in the use of space also had consequences for linguistic expression with respect to marking subject reference. Turkish signers preferred lexical marking, whereas German signers relied mainly on body shift mechanisms and classifiers.



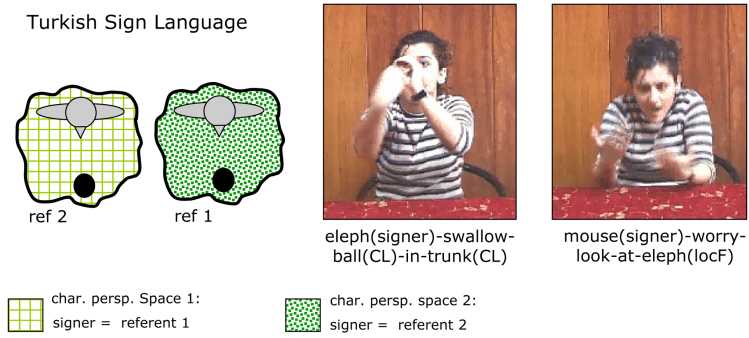


Figure 5.7: Use of space in subject reference switches: German signers used two distinct areas of sign space, whereas Turkish signers used the same area of sign space in character perspective for each referent.

5.4 Gesture and speech in motion description

In a crosslinguistic developmental study funded by the National Science Foundation (NSF), Özyürek in collaboration with Kita (U. Bristol), Allen (Boston U.), A. Brown, (MPI, Boston U.), Turanli (Bogazici U. Istanbul), and Ishizuka (UCLA) has been investigating differences in online spatial thinking patterns through the use of gestures in motion event descriptions across three different languages (English, Turkish and Japanese) both with adult and child speakers. Previous work has shown that adult patterns of these languages show differences in the syntactic packaging of manner and path elements. Thus while English speakers can express both manner and path in one verbal clause (e.g., *roll down*), Turkish speakers use two verbal clauses to do so (e.g., *yuvarlanarak iniyor*, 'descended while rolling').

Comparison of co-speech hand gesture has shown that while English adults use predominantly conflated gestures (manner and path expressed in one gesture), Turkish adults tend to express manner and path elements as separate gestures. These differences parallel preferred verbal descriptions of such events in each language. Previous work on this project (see Annual Report 2003) has shown that at around 3 and a half years of age (mean age 3:8), linguistic descriptions of motion events look different and language-specific in English and Turkish children's speech, but gestural depictions are not language specific at that age – they seem very similar to each other (i.e., both Turkish and English children used separate gestures for manner and path), suggesting universal tendencies in gesture development.

Further analysis has investigated 5 and 9 year old Turkish and English children's gestural development (N=20 in each age group and in each language). The results show that at age 5 the gesture patterns of Turkish and English children's

gestures are not differentiated from each other – the differences arise at the age of 9. However, English speaking children's gestures continue to develop towards language specific patterns (i.e., the conflation of manner and path) after 9 years. For Turkish children, even though there are no striking developmental patterns, a U-shaped curve is observed. 9-year-old Turkish children use more separated manner and path gestures than either Turkish adults or 3- and 5-year-olds.

These results suggest that children's gestural representations reveal different underlying representations of the semantic elements of events than those explicitly revealed in their speech. Furthermore, the language-specific tuning of representations may involve different patterns of development for different languages. Finally, the integration of representations in speech and gesture continues to develop after late childhood years, even though significant reorganization of representations occurs at around 9 years.

Özyürek, together with Hagoort and Willems from the F.C. Donders Centre for Cognitive Neuroimaging, started an NWO (Netherlands Organisation for Scientific Research) funded project that investigates in a series of ERP and fMRI studies whether and how the interpretation of language (specifically, semantic information about space) is influenced by information from gestures (specifically, those that represent certain aspects of spatial relations).

In the first year, fMRI data were gathered while subjects (n=12) viewed iconic gestures that depicted motion events in the context of speech in three conditions:

a) Control: language and gesture expressed similar content
   Ex. 1: "He slides on the roof and **[rolls down]**"
   (Gesture: ROLL DOWN)

b) Language mismatch: gestural information matched the previous context of the utterance (i.e., "he slides on the roof") but the verbal information mismatched
   Ex. 2: "He slides on the roof and **[walks across]**"
   (Gesture: ROLL DOWN)

c) Gesture mismatch: the verbal information matched the previous context of the utterance but the gestural content did not.
   Ex. 3: "He slides on the roof and **[rolls down]**"
   (Gesture: WALK ACROSS)

In response to increased integration load, both language and gesture mismatches recruited the left inferior frontal cortex (BA, 45). Parietal and temporal regions showed gesture and speech-specific responses (see Figure 5.8). This result shows that left inferior frontal cortex has a supramodal contribution to unification of semantic information.

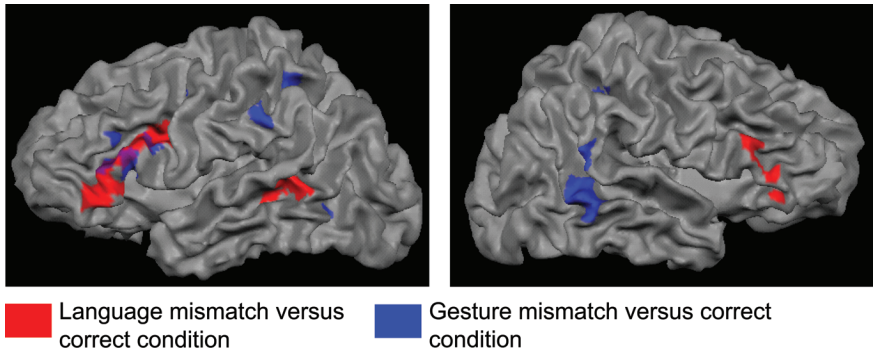


Figure 5.8: Regions activated by the language mismatch (red) and the gesture mismatch (blue) conditions contrasted with control condition.

5.5 Body part terms

Continuing their work on the linguistic categorization of the human body, (see Annual Report 2003) members of the space group have completed a volume on the body lexicon in 10 genetically, typologically and areally diverse languages (see Table 5.1). Previous research on body part terms has depended on secondary sources (e.g., dictionaries), and has lacked sufficient detail or clarity for a thorough understanding of these terms' semantics. The volume *Parts of the body: Crosslinguistic categorization* (Majid, Enfield and van Staden, eds., special issue of *Language Sciences*, in press) collects together original fieldwork-based descriptions based on standardized methodology, enabling more comprehensive comparison than has been possible previously. Based on these descriptions, it seems that there are fewer points of convergence across language communities in the concrete vocabulary of the body than previously thought.

RESEARCHER	LANGUAGE
Niclas Burenhult	Jahai
Nick Enfield	Lao
Alice R. Gaby	Kuuk Thaayorre
Stephen C. Levinson	Yélî Dnye
Asifa Majid	Punjabi
Sérgio Meira	Tiriyó
Jennie E. Pyers	American Sign Language
Angela Terrill	Lavukaleve
Miriam van Staden	Tidore
Claudia Wegener	Savosavo

Table 5.1: Descriptions of the body part lexicons for the above languages are published in *Parts of the body: Crosslinguistic categorization* Majid, Enfield and van Staden (in press).

5.6 Landscape terms and toponyms

Research continued in a subproject on the linguistic and conceptual categorization of landscape, with several project members conducting field work with communities whose livelihoods involve direct and extensive dealings with the natural environment. Two general and related issues are under investigation. First, how do languages differ or converge in the way they semantically categorize features of the physical environment as reflected in landform terms like 'mountain', 'hill', 'ridge', 'plateau', 'bluff', or 'river', 'creek', 'stream', 'pool'? Are there general principles dictating what tends to get lexicalized (e.g., perceptual salience, utilitarian considerations)? Second, how are places named? Are there universal sources for toponyms (e.g., descriptive, eponymous, etc.)? Do they have similar grammatical properties across languages?

5.6.1 Categorization of landscape

Burenhult continued his investigation of geographical ontology in Jahai (Mon-Khmer, Malay Peninsula), examining the pattern of borrowing of landscape terms from Malay (the neighboring Austronesian majority language). A point of focus was nominal lexicon relating to the flow of water. The indigenous system of categorization of the concept *t0m* 'water' involves metaphorical mapping from animate domains, especially the body. The body metaphor creates a systematic, partonymic template based on the relative position of features, which can be applied to any drainage system at any level of scale. Thus, for example, the 'water-head' forms the upper part of a drainage system, the 'water-bum' its lower end; the 'water-eye' denotes a source; the 'water-back' is the surface of a stream, the 'water-chest' is the streambed (see Annual Report 2002).

However, there are no indigenous nominal labels for water features like river-bend, rapid, waterfall and pool. These and a range of other features have borrowed Malay labels. The water entities denoted by such loans, although common and salient in the local environment, are neither necessary nor omnipresent features of a drainage system. Also, if they occur, their location within a drainage system is not predictable. For example, a waterfall can be located anywhere along the course of a river – as can bends, pools and rapids – and at any level of scale. So, in relation to the concept of *t0m* 'water', such features are difficult to fit into the indigenous metaphorical system. Or, more specifically, a conceptual system geared to providing a generally applicable template by subcategorizing a complex structure according to relative location of its features cannot accommodate features whose location, magnitude and presence in general are variable. This may help to explain the lack of indigenous labels for these features. What the borrowing patterns seem to suggest is that Malay concepts and their labels are imported to define and name features which

are *perceptually salient* but *conceptually suppressed* by the pre-existing indigenous system of categorization. In effect, Malay loans fill lexical gaps created by indigenous conceptualization.

Enfield investigated landscape terms in Lao (Southwestern Tai, Laos), exploring the idea that the conceptual content of these terms includes information about the affordances of landscape features for the activities of people. This follows from a neo-Gibsonian stance in which perception is seen as relational: how one perceives something is partly determined by how one sees oneself interacting with that thing. Such interactional or functional properties of things can enter into the conceptual structure of categories, not only through perception but also through use of language (i.e., hearing people talk about the category).

Included among the affordances relevant for landscape are aspects of livelihood, central to social and cultural activity. For example, the Lao term *vang2* denotes a deep still river pool, a section of river which not only has visually perceptible properties (lack of motion on water surface, certain width, length), but also interactional affordances such as the possibility of small boat transport (not necessarily possible for neighboring sections of river), of performing certain fishing techniques (and not others), and of finding certain fish species (and not others). Further, there are more explicitly culture-specific dimensions such as the standard idea that a *vang2* is spooky and will have a spirit owner (cf. Rossel coral boulders, below). There are two Lao terms for a water feature resembling a swamp or marsh – *bùng3* and *nòòng3*. Speakers' conception of how these terms differ mostly concern their conceived affordances. For example, one can wade through a *bùng3*, but a *nòòng3* is typically too deep for this; the two types of 'swamp' are thought of as sources of different kinds of plant matter and fish. In a third example, there is a general Lao term for 'forest' or uncultivated vegetated area – *paa1*. Several types of *paa1* are linguistically encoded in complex phrases, again corresponding to differences not only in visually perceptible properties, but in terms of the types of activity or access they afford people. Thus, *paa1 dong3* is thick forest or jungle, difficult to travel through, shadowed and cool due to an overhead canopy; *paa1 khook4* is open, spaced forest, on flat land, light and dry, and easily traversed by walking. The two differ in terms of available plant and animal pickings (thus, look for mushrooms in *paa1 khook4*, look for arboreal mammals in *paa1 dong3*). They also differ in terms of possible human interventions and available transformations. For example, since *paa1 khook4* is flat and well spaced it is prime land for transformation into rice paddy fields.

Landscape terminology is not only culture-specific because of the differential presence of certain types of environmental features in different geographical

areas, but also because of differences in how people interact with those features. This suggests that for a complete picture of landscape terminology and the categorization it encodes, an ethnographic approach is required.

5.6.2 Toponyms

Levinson investigated a rich set of toponyms in Yélî Dnye (Rossel Island, Papua New Guinea). In this language, just about every reef segment, hill, stream, path and area has a proper name. The sheer richness makes documentation daunting, so a one kilometer transect was taken from a village near the coast towards the hinterland or inner mountains, following existing paths, and places and areas pinned down with GPS measurements (see Figure 5.9 below). The transect crossed over a dozen named places. Eight of these were area names, of which two were superordinate and included smaller areas. In fact, area names nest at least three deep (see Figure 5.10).

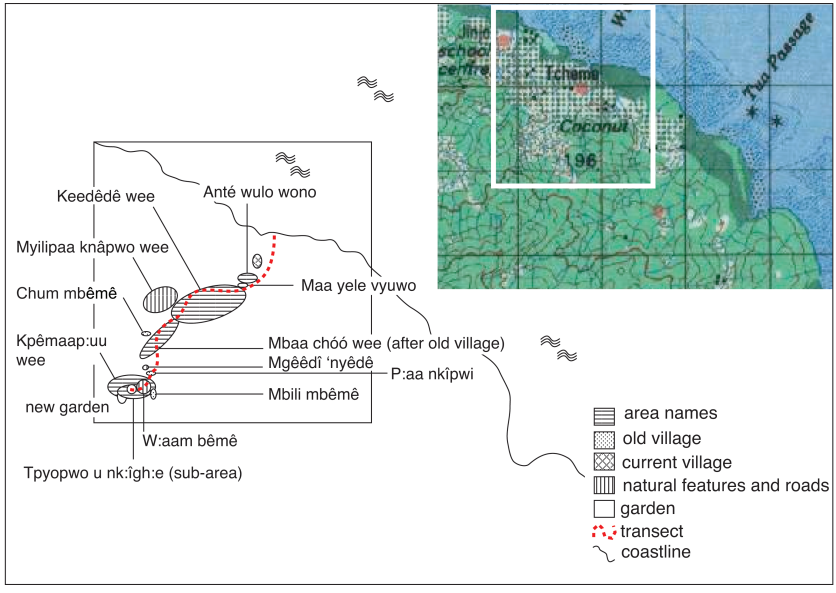


Figure 5.9: The 1-km transect on a map, with colour-coded features of areas

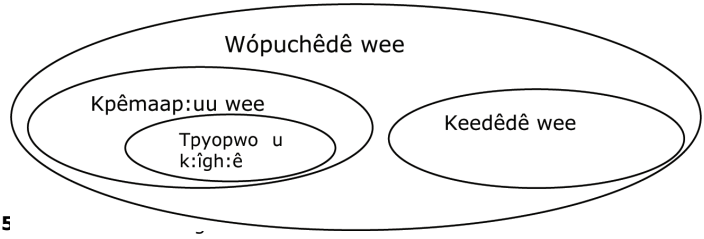


Figure 5

Names of areas are sometimes taken from rivers, extinct villages or trails. Sometimes the names are descriptive: e.g. *Mbaa chóó wee* 'district of Mbaa chóó (old village site)' designating an elongated segment of bush passing through the village site; while some area names are opaque: e.g., *Anté wulo wono*, with no recoverable decomposition. Initial investigation suggests that the main natural features underlying toponyms are rivers and hills, while man-made features like trails, old village sites and plantations also provide important focal points for named places.

In addition to toponyms on land, there are also names of sea features. Rossel Island is bounded by massive barrier reefs. Rivers, ancient or modern, are the source of the major reef openings. There are about 16 major and a number of further minor openings in the reef. As noted in the Annual Report 2002, the conception of rivers on Rossel reflects this ecology: there is no term for 'river' per se, rather three segments of one entity (larger than English *river*) are recognized:

(1) the fresh water segment (*mbwaa*),
(2) the salt-water or tidal segment (*pye*), and
(3) the fresh-water flow through the salt-water (*kpé*).

Each segment has a top (*nkwodo* 'branch, canopy') and a bottom (*kn:ââ* 'base'), indicating an underlying unity. Sometimes the three segments may also share a proper name, e.g., *Pe'ne mbwaa, Pe'ne pye, Pe'ne kpé*.

Since the rivers cut reef passages, the barrier reef comes in segments (*chaa*), each with its own proper name. Other natural features may also have a proper name (like the inwards curve or corner of the barrier reef at the passage opening – which are generically *ghee komo* – or a flat terrace of dead coral inside the reef). Large coral boulders also tend to have proper names, reflecting the gods associated with them. Unusual features, like a linear reef outside the main barrier reef, may also be associated with supernatural beings (on account of the thunderous surf they receive) and be named. The following figures show, superimposed on a photo of a particular reef section, first (Figure 5.11) the common nouns naming natural features and then (Figure 5.12) the proper names associated in this particular case.

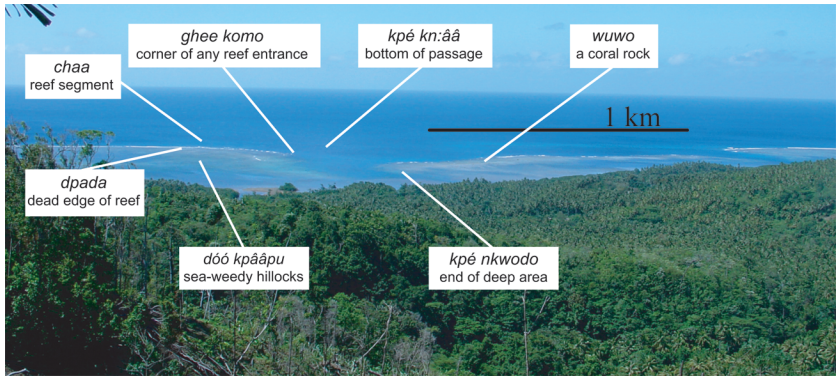


Figure 5.11: Common nouns denoting major reef features

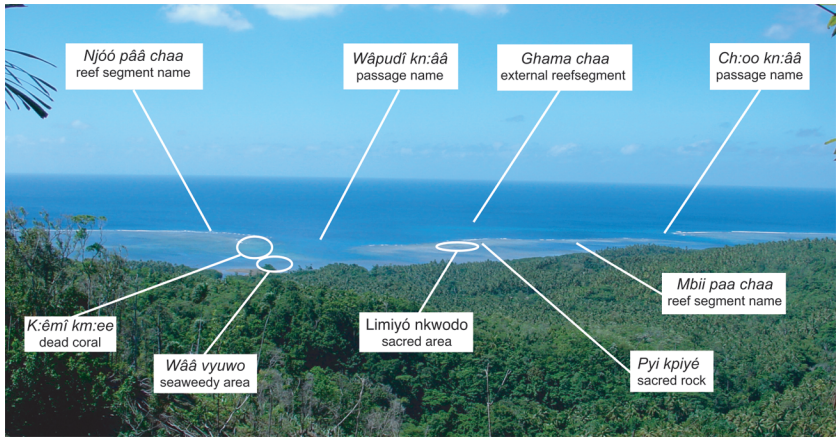


Figure 5.12: Proper nouns naming some major reef features

Senft documented toponyms for villages, gardens, wells, reef-channels, and points on Kaile'una, one of the Trobriand Islands (Papua New Guinea). The name for the island means 'reason for the villages'. These toponyms refer to events (gone by or typically expected), landmarks, states, things, people, activities, anecdotes, animals, plants, and stones. Table 5.2 summarizes these and presents illustrative examples.

SOURCE OF TOPONYM	WELLS AND REEF-CHANNELS	VILLAGES	GARDENS	POINTS
Events	*Esi'uli luleta* = 'he spatters his sister'	*Tauwema* = *tau ema* = 'the man (the founder of the village) came'	*Kavola* = *kivola* = 'find, object found'	*Kapwaku elupisi* = '(where) the cockatoos jump'
Landmarks	*Kabulukoya* = 'hill-like point' (at the reef-channel)	*Giwa* = *giu* ='spit'; a place close to the village where the water 'spits' through holes in the reef at high tide	*Boyoma* = ? name of a well in this garden	*Odukwe'utina* = *o kabububu* = 'at the point'
States	*Botovaya* = 'high waves' (in channel)	*Kaisiga* = *a esigi* ='oh it is rotten'		
Things		*Kaduwaga* = *ka waga* ='oh canoes'		*Obidaga* = *o mi daga* = 'at your ladder'
Villages	*Toymatela Vaseda* = guardian of Va-seda (channel)		*Lovebida* = ? extinct village	
Songs	*Pwase'uli* = Name of a song			
People	*Tuyabwau* name coined by the digger of the well *Moyabwau*			*Tokasikuli* = name of a man with many ulcers who lived there
Activities				*Ebwabusi* = 'they cut (trees for canoes)'
Anecdotes	*Bugei* = *bogiu* = 'the day after tomorrow' – the answer people gave when invited to bath in the cold sweet water grotto			*O kunukunu* = 'oh, hair!' – the exclamation a young man made when he first saw a girl's pubic hair
Animals				*Dukuboi* = *o boi* = 'at the herons'
Plants			*Gubale'i* = name of a flower	*Oganauwa* = 'at the *ganau*-trees'
Stones	*Dodumekasi* = stone close to reef-channel			

Table 5.2 Some Kilivila toponyms and their sources

Research continues in the domain of landscape, continuing crosslinguistic comparison of the system of categorization encoded in landscape terms, as well as (sometimes related, sometimes unrelated) strategies for naming places.

Chapter 6

Pioneers of Island Melanesia

Introduction

6.1 Deep time reconstruction

6.2 Language contact

6.3 Linguistic description

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Introduction

The Pioneers of Island Melanesia project is an international, interdisciplinary project funded under the European Science Foundation program "Origin of Man, Language and Languages" (OMLL). The linguistic part of the project is based in the Language and Cognition group at the MPI, with one outlying member in Sweden (Lindström, Stockholm U.). The other parts of the project are Biological Anthropology (Cambridge U., UK), Genetics (MPI Evolutionary Anthropology, Leipzig), and Archeology (Oxford U., UK). This report discusses only the activities of the linguistic part of the project.

6.1 Deep time reconstruction

One of the main aims of the Pioneers of Island Melanesia project has been the reconstruction of the history of the Papuan languages of Island Melanesia, and 2004 has seen some significant advances towards this goal. A method has been developed and refined which adapts computational phylogenetics as used with structural morphology in biological sciences for use with linguistic typological features. After development of the linguistic feature database in 2002–2003, the major focus of the project has been in application and testing of computational methods. Conceptually prior has been the application of the method to the Oceanic languages distributed over the same part of Island Melanesia. Oceanic languages (a subgroup of the Austronesian family) are the biggest group of languages spoken in Island Melanesia, and have a rich and reasonably well-understood history. The Oceanic languages studied belong to the Western Oceanic subgroup, and are classified into further subgroups by the comparative method. Once the output of the computational phylogenetic method has been tested against this known case, the results of applying the method to Papuan languages are interpretable.

For this analysis, the database questionnaire was filled out for 16 languages from the North New Guinea, Papuan Tip and the Meso-Melanesian subgroups of the Western Oceanic languages, as well as 14 ungrouped Papuan languages. The ~200 linguistic features encoded in the questionnaire are abstract structural features of language, nonspecific with respect to their formal expression, on the hypothesis that underlying features of languages may remain stable over deep time, even when lexical similarities have disappeared. If some of the Papuan languages are indeed genetically related to each other – and this is highly plausible from an archaeological perspective – then this abstract structural level is probably the only place where linguistic evidence of relatedness might feasibly be found.

A series of computational analyzes were carried out using the 'parsimony' method, with *a posteriori* weighting (Farris 1969) to proportionally reduce the effect of highly homoplasic features. The canonical comparative method tree of family relationships for the Western Oceanic languages is given in Figure 6.1. Figure 6.2a shows the result of a parsimony analysis carried out on the database of structural features.

There is a considerable degree of congruence between the topology of the canonical comparative method tree and the parsimony tree computed from typological features. Some superficial differences in the trees result from the obligatory binary splits in the parsimony tree: these can be reduced if branches in the parsimony tree are collapsed at the 80% bootstrap support level (Figure 6.2b). The computational phylogenetic tree differs from the comparative method tree in minor ways:

- It shows the wrong subgrouping within the North New Guinea Cluster (Kaulong and Takia should be a clade).
- North New Guinea is a clade within Papuan Tip, rather than a separate clade. Note however that this reflects uncertainties reported in the comparative method subgrouping. Lynch, Crowley and Ross (2002) report evidence that North New Guinea and Papuan Tip had a period of shared history after separation from the Meso-Melanesian Cluster.
- The Tungak and Nalik clade is not ancestral to the other languages in the Meso-Melanesian Cluster.

There is little lexical evidence that the Papuan languages of Island Melanesia are related, and no sets of regular phonological correspondences have been identified. Despite this, there are recurrent typological similarities (Dunn et al. 2000) and formal similarities in the pronominal systems (Ross 2004) which suggest that at least some of the languages have a common ancestor. Given that the similarities between the Papuan languages of Island Melanesia are precisely in the area of abstract grammatical features, computational phylogenetic methods on linguistic structure should retrieve a phylogenetic signal if there is one to be found. The null hypothesis is that there is no phylogenetic signal recoverable from the typological feature data; in this case we predict that topology of the parsimony tree should be random. The parsimony tree for the Papuan languages is shown in Figure 6.3. The topology of this tree is clearly not random, since most languages cluster most closely with the languages which are geographically nearest. This is in itself a historical signal, since recent contact has often been sporadic at best. Salient features of the tree are:

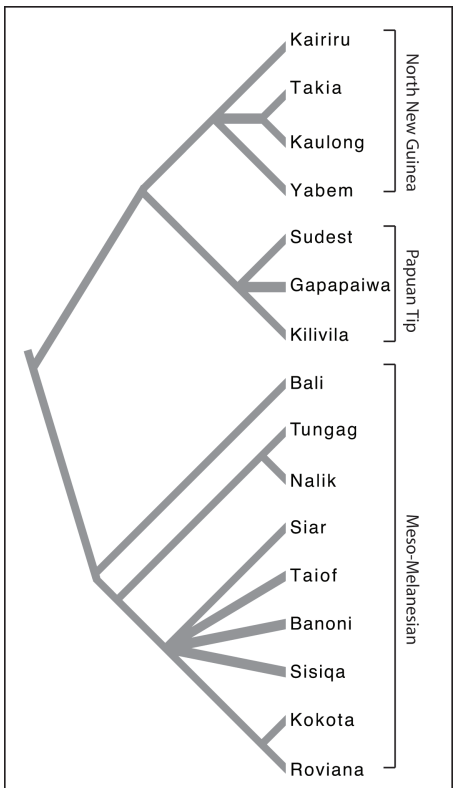


Figure 6.1: Canonical comparative method tree of some Western Oceanic languages

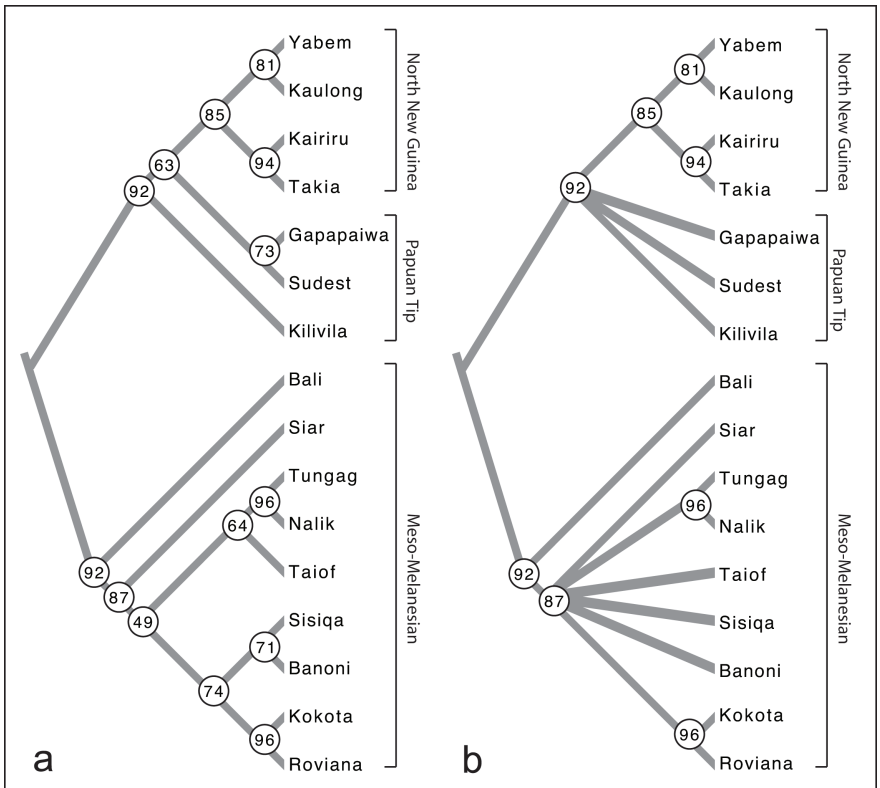


Figure 6.2a: Tree of Western Oceanic languages produced by computational phylogenetic method
Figure 6.2b: The same tree, with nodes collapsed where they have less than 80% bootstrap support

Bougainville and New Britain (or perhaps New Britain-New Ireland) languages form distinct clades).

- The Central Solomons languages are not clearly clustered with either of these groups; depending on how the tree is drawn, they could go either way.
- Touo and Savosavo are very closely clustered (bootstrap support 97%); they are more similar to each other than either is to geographically intermediate Lavukaleve.
- Yélî Dnye, the geographic outlier, clusters robustly with the Bougainville languages.

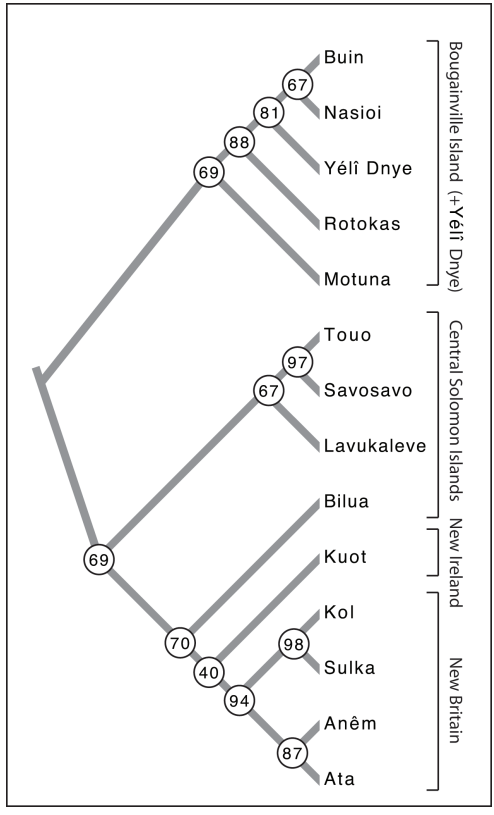


Figure 6.3: Tree of Island Melanesian Papuan languages produced by computational phylogenetic method.

While ancient contact and shared ancestry cannot be distinguished on this level, any contact induced convergence of languages must have occurred in the (probably pre-Austronesian) precursors to these languages, rather than in these languages as they are currently distributed. Where geographic proximity does not predict similarity between languages, we have structural evidence of ancient links predating the arrival of the Austronesian languages into Island Melanesia.

6.1.1 Culture and kinship in Island Melanesia

Culturally, Island Melanesia is a relatively homogenous region, when compared to the rest of the world. It is characterized by little social hierarchy, subsistence farming, and matrilineal kinship reckoning. Permissible social interaction is governed chiefly by kinship configurations. However, a closer look reveals quite substantive variation within those frames. A subproject run by Lindström investigates the patterning of this variation, the main objective being to determine whether there are any features that unite speakers of non-Austronesian languages, potentially revealing structures dating back to pre-Austronesian times.

It is generally assumed that pre-Austronesian inhabitants in the region were predominantly hunters and gatherers, a subsistence mode typically associated with patrilinearity, and that agriculture and matrilinearity are overlayered Austronesian features. Since traits such as kinship reckoning and subsistence modes show strong co-occurrence tendencies and bundle with other cultural features, any mismatches may point to earlier modes of social and cultural organization.

Two questionnaires were constructed and filled out by project linguists during the 2004 field season. Data is also being collected for other groups in the region from ethnographic accounts. Preliminary analysis of a subset of the data shows great inter-group variation even within smaller subareas of the region, and correspondence analysis and other multivariate statistics on the full dataset continue.

6.2 Language contact

6.2.1 Papuan and Oceanic languages in New Britain

Reesink continued to refine his analysis of the Sulka language as a mixture of Oceanic and Papuan traits, including a period of fieldwork in Papua New Guinea. Data were also collected on the Kol (Papuan) and Tomoip and Mengen (Oceanic) languages, and some preliminary orientation was carried out for further (large-scale) Papuan comparisons on languages of the Trans-Fly area in southwest Papua New Guinea.

The new data have indeed yielded evidence of early contact between Papuan and Oceanic languages of southern New Ireland, with a tentative conclusion that some features that are qualified as innovations in Western Oceanic languages may be in fact 'Papuanisms' acquired from the earlier occupants of the Bismarck archipelago. This hypothesis is being further investigated by comparison of formal resemblances in the large number of noun classes (possessive classifiers) in three other Papuan languages of New Britain: Kol, Ata and Anêm.

There are tantalizing similarities in a number of other Papuan languages, along the north coast of New Guinea, that clearly do not belong to the proposed Trans New Guinea family. Research continues to investigate wider connections of (some) East Papuan languages with Non-Trans New Guinea groupings on the mainland of New Guinea.

6.2.2 Semantic transference in Touo, Lavukaleve and Solomon Island Pijin

Substratum effects are well documented crosslinguistically in phonology, the lexicon, as well as – to a lesser extent – morphology and clause structure. Substratum effects on larger linguistic levels like discourse structure, information packaging, and the structuring of semantic domains are less well understood. One of the few studies in this area is Mithun (1992), which discusses substratum effects from the native languages of Central Pomo speakers on English. Mithun shows that substrate influence accounts for a number of distinctive aspects of the English discourse structure of these speakers, including zero anaphora for continuing topics, the linking of clauses, left dislocation and clefting of significant information. Dunn and Terrill have been investigating substrate effects on the structure of complex semantic domains in three languages of the Solomon Islands, focusing particularly on the domain of spatial expression. Solomon Island Pijin (SIP), an Extended Pidgin, shows a large range of variation based on the native language of individual speakers (Muysken and Smith 1995; Jourdan and Maebiru 2002), which makes it a good target for studies examining the mechanisms of semantic transference (in the terminology of Clyne 2003). Ross (2001) in his discussion of semantic transference ('metatypy' in his terms), claims that "reorganization of the language's semantic patterns and 'ways of saying things'" is the first type of change to happen in a situation of language contact, and only after this does syntactic restructuring occur (Ross 2001: 146).

Dunn and Terrill looked to see to what extent processes of semantic transference are pervasive in situations of language contact. They found that native speakers of two unrelated Papuan languages of the Solomon Islands use the semantic structures of their native language in their use of SIP when talking about spatial arrays.

In the areas of semantic structure tested, it was found that semantic transference is indeed the norm. However, one of the case studies added a level of complexity to the picture. The SIP spoken by speakers of Touo did not use Touo's default spatial reference system but a secondary system which is available in Touo for when the default, island-based system does not work (e.g., for when speakers are not on an island, or are lost). SIP as spoken by Touo

speakers shows semantic transference from the secondary rather than the default spatial reference system. Dunn and Terrill argue that this is because there are lexical restrictions (i.e., restrictions on the lexical encoding of relevant concepts) that limit the way that the semantic transference takes place.

A model being developed suggests that semantic transference is carried out through the balance of two competing forces: on the one hand, the desire for a straightforward translation of the substrate semantic structures onto the target language's semantic structures, and on the other, the 'naturalness' or ease of finding formal expression (lexical and morphosyntactic) for those semantic structures in the target language.

6.3 Linguistic description

6.3.1 Savosavo

Wegener continued her Ph.D. project with another five months of fieldwork on Savo Island working on Savosavo, one of the Papuan (non-Austronesian) languages of the Solomon Islands.

Wegener further investigated the noun class system of Savosavo, in particular the assignment of nouns to one of two classes. Nouns referring to humans and higher animate beings (in particular animals whose sex is readily discernible) are invariably assigned according to the sex of the referent (cf. Annual Report 2002: 80). Most of these nouns are 'double gender' nouns (Corbett 1991: 181), i.e., they can refer to referents of either sex (e.g., *mapa* 'person', *misu* 'dog', etc.) and can therefore be assigned to both classes. Only very few refer always to a male or female animate being (e.g., *tada* 'man', *adaki* 'woman', *kudo* 'hen', etc.) and are thus always masculine or feminine respectively.

With a few exceptions all nouns referring to inanimates or lower animate beings are by default masculine. In contrast to nouns referring to humans and higher animate beings, these nouns can be temporarily assigned to the feminine class. This does not happen very often (only in about 1.5% of the utterances in a corpus with 5360 utterances) and in most cases it is used to emphasize the smallness of the referent (compared to a 'typical' representative of its kind). In these cases the noun is also often modified by *nyari* 'small', *memere* 'little bit', *sodu* 'piece', etc. However, the assignment to the other class is also used to highlight the referent when it is of special importance to the discourse.

A few nouns seem to be feminine by default (at least for some speakers), although they refer to inanimates. Treating them as masculine is also grammatically correct. These nouns are *kughe* 'moon' (however, when used to refer to 'month' it is usually masculine), *sisi* 'flower', and the names of some coconut species, e.g., *niuniu* 'coconut sp. with very thin skin'.

6.3.2 Rotokas

Robinson continued his Ph.D. project, investigating the nature of reflexives and reciprocals in Rotokas, a Papuan (non-Austronesian) language spoken in Bougainville, Papua New Guinea.

Rotokas is head-marking with fairly elaborate verbal morphology that marks, among other things, subject agreement, aspect, and tense. The subject agreement is sensitive to person, number, and gender. There are two distinct classes of subject agreement, which loosely correspond to the distinction between intransitive and transitive verbs. Although the membership of verbs in one or the other class is difficult to predict from their semantics, the two forms of subject agreement systematically relate to different construction types. Class A is found on verbs with incorporated objects, reflexives, and reciprocals while Class B is found on causatives.

Robinson presented the reciprocals video stimuli from the 2003 Fieldwork Manual to a number of Rotokas speakers. It was found that there are at least 3 distinct construction types used to encode reciprocality in Rotokas, each involving the marker *ora*. Analysis of previously published materials and past fieldwork has found that *ora* is also used for emphatic or contrastive purposes, spontaneous events, and in lexicalized expressions (*ou* 'get' → *oraou* 'marry').

Construction 1. Marking on V

aireia-vu	riako-rirei	**ora**-rau-pa-ere-i-ei
PRO.3.DL.FEM-other	woman-FEM.DL	RR-hug-PROG-2/3.DL.F-EPEN-PRES

Two women are hugging each other.

Construction 2. Marking on N

ora-tautau-aro	tapatapa-pa-a-ei	viovoko-irara	vairei
RR-cheeks-POSS	hit.REDUP-PROG-a.3.PL-PRES	teenager- PL	2/3.DL.F

riako-rirei	ari	vaiterei	oira-toarei
woman-FEM.DL	yes/but	2.DE.M	man-MASC.DL

The teenage boys – two men and two women – are hitting each other's cheeks.

Construction 3. Marking on both V and N

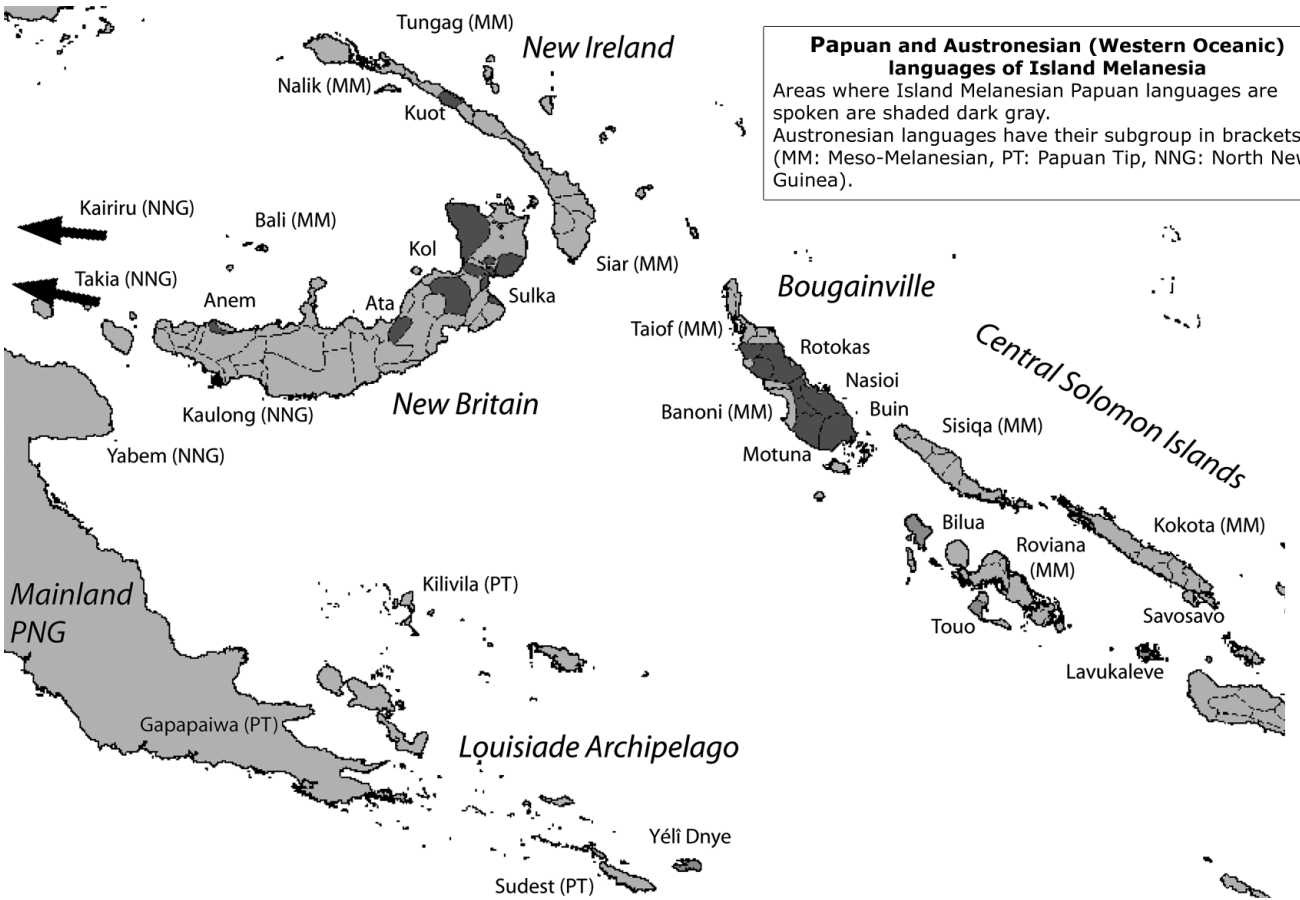
Rake	vaio	ora	Jon	**ora**-aatokoro-irao-si-ei	**ora**-vaiterei-re
Rake	DL	and	John	PR-turn.back-INTENS-2/3.DL.M-PRES	RR-2.DL.M-ALL

Rake and John turn their backs to each other.

All of the different reciprocal situation types depicted in the video stimuli – strong, melee, adjacent, pairwise, and chaining – can be described by at least one of these three constructions. The precise semantic and grammatical differences between the construction types are the subject of future fieldwork.

6.3.3 Yélî Dnye

Descriptive work continued on Yélî Dnye, the Papuan language of Rossel Island, Louiseades Archipelago, Papua New Guinea. Levinson has completed a full draft of a descriptive grammar of the language, and has explored a number of areas of grammatical and semantic interest in detail (see the description of reciprocals and 'put'/'take' verbs under "Event Representation", and landscape terms/ toponyms, body part terms under "Space"). In addition, work on the use of the language in conversation has thrown up interesting properties of person reference and close integration of gestural/facial signals in utterance production and reception (see Multimodal Interaction chapter). Meanwhile, P. Brown has begun the study of language acquisition and of the nature of early infant/caretaker interaction, as part of the Multimodal Interaction project.



Papuan and Austronesian (Western Oceanic) languages of Island Melanesia

Areas where Island Melanesian Papuan languages are spoken are shaded dark gray.
Austronesian languages have their subgroup in brackets (MM: Meso-Melanesian, PT: Papuan Tip, NNG: North New Guinea).

Chapter 7

Event Representation

Introduction

7.1 Crosslinguistic investigations of event encoding

7.2 Complex predicates

7.3 Participant marking and verb morphology

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Joint research with other projects:

Dynamics of Multilingual Processing
Pioneers of Island Melanesia
Space

Introduction

The Event Representation project explores universal and language-particular patterns in how speakers of different languages characteristically encode events – e.g., how they parse a stream of experience into simple or complex event units, assign participant roles to the events that have been singled out, mark these roles, and map participants onto syntactic clause structure. The project also investigates how children acquire event representation patterns in the language they are learning, including how they discover pervasive patterns in event construal, determine the meanings of event predicates, and master the morphological and syntactic treatment of event participants.

An important modus operandi of the Event Representation project is the development and use of structured elicitation tools to allow close comparisons of event descriptions collected across a wide range of field languages, and from speakers of different ages. In 2004, group work continued on three of these projects, "Cut and Break", "Kids' Cut and Break", "Reciprocals", and work was initiated on a new group project, "Put and Take", which compares the encoding of placement events across languages. Work also continued on the adaptation of multivariate techniques for uncovering and exploring the structure of large-scale crosslinguistic data sets like these. These projects are discussed in section 7.1. Additional Event Representation research in 2004 included both primary field work on the grammar and lexicon of various languages, and studies of language acquisition. Work on complex predicates and their acquisition is reported in 7.2, and investigations of participant marking and verb morphology in the structure and acquisition of various languages are outlined in 7.3.

7.1 Crosslinguistic investigations of event encoding

In the cognitivist climate of the last thirty years it has often been assumed that event categorization – at least for such seemingly basic human experiences as "giving", "putting", "hitting", "throwing", and the like – is more or less universal, due to correlations among features of events in the "real world" and probably also to biases in human perception and cognition. Within this framework, the task of verb learning has been portrayed as a process of matching words to event concepts that the child has already formulated on a nonlinguistic basis. Research of the Event Representation and Space projects over the last years has challenged this view, showing that languages differ strikingly in their structuring of conceptual domains such as topological relations, "coming and going", and frames of reference, and that children begin to approximate language-specific event categories very early. Research in this tradition was expanded in 2004 in the Event Representation project, with further work on existing projects and on the development of a new stimulus set, and with

increasing attention not only to dimensions of crosslinguistic variation but also to constraints on this variation.

7.1.1 "Cutting and breaking" in adult languages

The "Cut and Break" project is a large-scale comparative study which has used a standardized set of video-clips to investigate how speakers of 28 typologically, genetically, and areally diverse languages encode actions of cutting, breaking, and other kinds of separation. Previous Annual Reports reported agreement and variation in both the syntactic and semantic encoding of such events (2002: 191-121; 2003: 95-96). In 2004, Bowerman and Majid, in collaboration with Boster (U. Connecticut, Storrs) and van Staden (U. Amsterdam), used correspondence analysis to continue their analysis, across all the languages in the sample, of the semantic categorization of events in this domain. In this type of analysis, the degree to which speakers describe any two events in the same way is represented by the positioning of the events in a multidimensional similarity space: events positioned close together are often treated as members of the same event category, whereas events positioned further apart are usually or always distinguished.

The first and most important dimension identified in the data set distinguished between the "cutting and breaking" events proper and other separations such as "opening", "peeling", and "taking apart". These other separations are further distinguished in a regular way, e.g., the "peeling" events contrast with all the other separation events, and the various "opening" events are distinguished along a continuous dimension, with events involving the complete separation of object parts (e.g., opening a pot by taking the lid off) positioned at one end, events featuring a continuous "widening" in a single object (e.g., opening the mouth) at the other end, and events of opening a hinged object (e.g., a door, a book) falling in between. Within the focal set of "cutting and breaking" events, the main distinctions made across the 28-language sample can also be captured with a small number of dimensions: the first dimension distinguishes events on the basis of the agent's degree of control over the precise location of separation in an object, the second distinguishes "tearing" events from other events, and the third distinguishes, from among the set of events in which the agent's control is imprecise, between "snapping" events and "smashing" events.

The correspondence analyses not only show the most important dimensions along which languages distinguish events of "cutting and breaking" and other kinds of separation, but also provide a framework for comparing how particular languages fit with the overall statistical solution found. Individual researchers continued their work on how their language aligns with the general model, and what its distinctive characteristics are. They also explored whether the "cutting

and breaking" verbs of their language can be distinguished semantically and syntactically along lines discussed by Guerssel et al. (1985) and Levin (1993: 9-10). "Break" verbs are said to be "pure" state-change verbs that give no information about how the state-change comes about, and they can undergo causative-inchoative alternations (e.g., "John broke the stick/the stick broke") but not conative or antipassive alternations (e.g., *"John broke at the stick"). In contrast, "cut" verbs are said to include motion and contact meaning components that specify the means by which a state-change is brought about, and they undergo conative or antipassive alternations ("John cut at the bread") but not causative-inchoative alternations (*"The bread cut" [possible only under the "middle", but not inchoative reading]).

Narasimhan compared Hindi (Indo-Iranian) and Tamil (Dravidian). In some respects these two languages classify "cutting and breaking" events very similarly. The two verbs used most frequently in Hindi to describe the "cutting and breaking" events depicted in the project's stimulus set are *kaaT* 'cut' and *toD|* 'break'; Tamil has a corresponding pair of verbs, *veTTU* 'cut' and *oD|ai* 'break'. The extension of these verbs across the videotaped events is broadly similar in the two languages, but at a fine-grained level there are interesting differences in the placement of category boundaries, the available stock of less frequently used verbs, and the particular regions of semantic space where finer distinctions are made. Despite the similarity in their extensions, the high-frequency "cut" and "break" verbs of the two languages show different syntactic behaviors. In Tamil only the "break" verb undergoes the causative-inchoative alternation, but in Hindi both the "cut" and the "break" verbs do (the alternation involves morphologically related variants in both languages). One possible explanation for this difference is that the "cut" verbs of the two languages differ subtly in their meaning (e.g., the degree to which they specify the type of instrument). Alternatively, verb participation in the causative-inchoative alternation may, in crosslinguistic perspective, conform to an implicational scale: if a language has inchoative variants for its cutting verbs, then it will also have similar variants for its breaking verbs, but not necessarily the other way around.

Tzeltal was among the languages in the sample that generally uses simple, monomorphemic verbs for "cutting and breaking" events (Annual Report 2002: 121). Its lexicon for these events is also one of the largest, and there is no overarching "cut" or "break" verb. In continuing work on the semantics and morphosyntax of these verbs, P. Brown found a proliferation of micro-distinctions, especially to do with culturally specific farming, cooking, and housebuilding activities. The Tzeltal verbs make distinctions among object properties such as long and thin vs. round, hard (shatterable) vs. soft

(sliceable), and fibrous (cloth, rope, paper) vs. homogeneous (watermelon), as well as many more culture-specific object properties. Manner and instrument are relatively unimportant compared to object properties in the semantics of Tzeltal verb roots. These distinctions, if expressed at all, are often relegated to adjuncts (*ta kuchilu* 'with a knife') or derivational processes (*-tikla* 'do action repeatedly'). Almost all of the "cutting and breaking" roots of Tzeltal allow both the causative-inchoative alternation (expected for "break" but not "cut" verbs, according to Guerssel et al. 1995) and the antipassive alternation (expected for "cut" but not "break" verbs). Here are examples with the root-transitive 'break'-type verb *wuy* 'break brittle thing into pieces'; the root-transitive 'cut'-type verb *set'* 'cut across long/thin object with sharp tool' can also appear in all these constructions:

(1) a. Transitive, causative:

ya	*s-wuy-0*	*semento*	*ya*	*s-wuy-0*	*ta*	*martiyo*
INC	3ERG-break-3ABS	cement	INC	3ERG-break-3ABS	PREP	mallet

'He breaks (the) cement. He breaks it with a mallet.'

b. Intransitive, inchoative:

ya	*x-wuy-0*	*te*	*na-e*
INC	ASP-break-3ABS	ART	house-CL

'The house becomes broken/crumbled/knocked down.'

c. Intransitive, antipassive:

ya	*x-wuy-awan*	*muk'ul*	*makina*
INC	ASP-break-ANTIPASS	big	machine

'The big machine breaks (things).'

Thus, generalizations about the argument structure of Tzeltal verbs of "cutting and breaking" do not seem to hold at the root level, but (if at all) only for derived stems – from the abstract semantics of the transitivizing and intransitivizing derivations.

In Yélî Dnye, the Papuan isolate spoken on Rossel Island off Papua New Guinea investigated by Levinson, the "cutting and breaking" domain was covered by just three transitive verbs and their intransitive counterparts. These verbs are based on distinctions in the mode of severance – coherent severance with the grain vs. against the grain, on the one hand, and incoherent severance (regardless of grain) on the other. For example, the verb *chaa* groups together the "tearing" of two-dimensional flexible objects like cloth with the lengthwise "cutting" of carrots – these scenes share the property that the object is severed with the grain. This accords with a material culture based on fibres and the relatively recent introduction of steel cutting tools. Unlike English "cutting" and "breaking" verbs, the three Yélî Dnye verbs behave more or less uniformly from a syntactic point of view.

Enfield examined the semantic structure of Lao "cut and break" verbs. The semantically most general of these is *tèèk5* 'break'. While this verb is strictly intransitive and does not undergo any valence alternations, it plays an important role in many transitive expressions as a resultative complement, as illustrated in (2):

(2) *man2* *thup1* *còòk5* *tèèk5*
3sg smash cup break
'S/he smashed the cup (broken).'

As in Mandarin (see Chen in 7.2), transitive verbs like *thup1* 'smash' in Lao do not entail the outcome of their intended effects, but simply denote the carrying out of an action that could be expected to bring about a particular result. To use *thup1* 'smash' without the resultative complement *tèèk5* 'break' would imply that the action did not achieve the typical result (i.e., that s/he performed a smashing action on the cup, but there was no effect).

Lao has several transitive verbs of "cutting", none of which mean the same as English *cut*. The two most common verbs are *tat2* and *paat5*. *Tat2* differs from English *cut* in specifying that some part of the undergoer is separated completely from the whole, e.g., cutting hair or grass, or cutting fruit into pieces, but not merely making a cut in something. The other common "cut" verb, *paat5*, is more narrow than *cut* in specifying a particular kind of control over a bladed instrument: (a) the instrument is brought into contact with the undergoer prior to the cutting action, and (b) the force of the cutting action comes from the agent consistently pushing it through. These two criteria preclude events involving swinging the instrument through the air as part of the causing action. These data show that neither *cut* nor *break* are directly translatable into Lao.

Enfield also explored the semantic distinctions which, in the Lao system, lie behind an important opposition found in the larger crosslinguistic Cut and Break study: "snapping" versus "smashing". He suggests that this conceptual distinction can be decomposed into differences in the spatial and temporal relation between a causing action and its effect. Thus, the defining components of events denoted by the Lao verb *hak2* 'snap' are that (a) (unlike in cutting) the separation is not caused by something "going into" the undergoer, (b) the causing action involves applying force to the undergoer with direct contact extended over time, (c) the separation event is instantaneous, and (d) the precise moment of the separation is not known in advance. Events denoted by *thup1* 'smash' differ in at least two critical ways: (a) the application of force by direct contact with the undergoer is not extended over time (but the causing action is – swinging the instrument through the air), and (b) the precise moment of the effect, i.e., the moment of impact, can be anticipated in advance.

7.1.2 Learning how to encode events of "cutting and breaking".

How do children home in on the semantic categories of "cutting and breaking" required by their language? To explore this question, a "child-friendly" version of the Cut and Break stimulus set, "Kids' Cut and Break", was designed by Bowerman and Majid, together with Erkelens (U. Amsterdam) (Field Manual 2003: 96). Some illustrative stills from the video-clips "Kids' Cut and Break" in **Figure 7.1.**

Kids' Cut and Break was used to collect and systematically compare data from speakers of three genetically and areally disparate languages: Dutch (Erkelens), Tamil (Narasimhan), and Mandarin (J. Chen). Groups of 4-year-olds, 6-year-olds, and adults were tested in all three languages; for Mandarin, there were also 2- and 3-year-olds. Analyses by Bowerman, Chen, Majid, and Narasimhan showed that, just as in the adult Cut and Break study, the first two dimensions

along which speakers of these languages distinguished among the events capture the precision of the agent's control over the locus of separation and the contrast between "tearing" and other kinds of separation. The third dimension distinguished single-bladed cutting, as with a knife, potshard, or wire, and double-bladed cutting, as with scissors or clippers – a distinction that is rare in the larger Cut and Break project sample (found in only 3 of the 28 languages), but obligatory in 2 of the 3 languages of this study (Dutch and Mandarin). Child speakers of all three languages approximated the target categories of their language very early, and categorized the events more like adult speakers of their own language than like same-age speakers of the other two languages. But their word use was still not fully adult-like even at six years of age; apparently it takes a long time to work out the details of category boundaries in this domain.

P. Brown used Kids' Cut and Break to collect Tzeltal data from 4 adults and 10 children (aged 4-13). Preliminary analysis shows that the Tzeltal children used fewer verbs than the adults to describe the stimulus scenes (i.e., they divided the extensional space into fewer categories), and they overgeneralized some of the verbs, e.g., applying the verb *c'i'* 'tear' to separations of all objects made of cloth, while adults restrict it to gradual (incremental) tearing scenes.

7.1.3 Placement events

A new project, "Put and Take", coordinated by Bowerman, Gullberg, Majid, and Narasimhan and carried out in collaboration with the Dynamics of Multilingual Processing and Space projects, extends the systematic crosslinguistic exploration of event encoding to a new domain, that of placement events (putting things in places and removing them from places). This domain is often the subject of universalist claims. For example, Goldberg (1995) suggests that "causing something to move to a location" is among a set of event types that are basic to human experience, and that in English, *put* is the verb that best represents this meaning. Pinker (1989: 254) mentions *put* among a small set of verbs that he believes children acquire by simply mapping them to nonlinguistic event concepts. This project will examine the degree to which languages converge on the same or similar categories in the domain of "putting and taking".

Like the Cut and Break project, the Put and Take project provides a set of videotaped events for speakers of different languages to describe; this set was designed and created by Bowerman, Gullberg, Majid, and Narasimhan (MPI Field Manual 2004). The project takes as its starting point an event type that is widely assumed to be the prototype of a "putting" event: deliberately placing an object somewhere under manual control, e.g., a cup on a table or an apple in a

bowl. How broadly do languages construe such basic acts of placement? To what extent do they agree on whether and how to distinguish among placements of different kinds? The Put and Take event clips sample across often-recognized conditioning factors such as whether the goal is a surface or a container, what the orientation of the placed object is, and – for clothing items – the body part that is the goal. But they also sample distinctions that have not yet been systematically explored across languages, especially those to do with the nature of the causation; e.g., whether the agent manipulates the figure by hand or with another body part or a tool, whether the agent's control is maintained all the way to the goal or is terminated earlier, whether the placement is intentional or accidental, and whether the goal is animate or inanimate.

This stimulus tool was taken to field sites in 2004 to collect data from 19 languages (see Table 7.1).

LANGUAGE	AFFILIATION	RESEARCHER
Dutch	Germanic	Asifa Majid & Melissa Bowerman
English	Germanic	Tanya Stivers
Hai‖om	Khoisan	Christian Rapold
Hindi	Indo-Iranian	Bhuvana Narasimhan
Hungarian	Finno-Ugric	Attila Andics
Jahai	Mon-Khmer	Niclas Burenhult
Kilivila	Austronesian	Gunter Senft
Kri	Mon-Khmer	Nick Enfield
Kuot	Papuan	Eva Lindström
Kuuk Thaayorre	Pama-Nyungan	Alice Gaby
Lao	Tai	Nick Enfield
Mandarin Chinese	Sino-Tibetan	Jidong Chen
Moroccan Arabic	Semitic	Nadi Nouaouri
Romansch	Italic	Silvana Derungs
Rotokas	Papuan	Stuart Robinson
Savosavo	Papuan	Claudia Wegener
Tamil	Dravidian	Bhuvana Narasimhan
Touo	Papuan	Michael Dunn
Yélî Dyne	Papuan	Penelope Brown & Stephen Levinson

Table 7.1: Put and Take project: language and affiliation, and researcher responsible for collecting the data.

The data are currently being prepared for comparative analysis, and further data collection is ongoing. Using this tool, project members hope to determine

what kinds of distinctions and grouping principles can be important for placement events, how much crosslinguistic variation there is, how the categorization of placement events is constrained, and – data permitting – whether there are uniform crosslinguistic patterns in how verb meaning is related to the syntactic treatment of the verb's arguments.

7.1.4 Reciprocals

Work continued on the crosslinguistic survey of reciprocal constructions (typically expressing actions done by agents to each other) that is being carried out in collaboration with Evans (U. Melbourne) (see Annual Report 2003: 97). A movie stimulus set was prepared (Evans, Levinson, Enfield, Gaby, & Majid, MPI Field Manual 2004) to provide a standard for comparing the extension of the reciprocal construction in different languages across differing scenarios. The clips manipulate parameters to do with number of participants, temporal organization, event type, and the "saturation" of relationships across the participant set (what proportion of the participants acted or were acted on). The stimulus has been run in about 20 languages. Initial results are discussed for three languages.

Levinson found that in the Papuan isolate Yélî Dnye, the reciprocity of an action is encoded with a special reciprocal pronoun *numo* (cf. English *each other*). The morphosyntax of patient reciprocals (comparable to English *They hit each other*) is complex, varying according to mood, tense, and aspect. All patient reciprocals are partially intransitivized, since the reciprocal pronoun is incorporated into the verb and the agent (or A) noun phrase is marked absolutive instead of the normal ergative. Reciprocal sentences with punctual aspect also have a frozen inflectional pattern, as if they always had a singular (or 1st person) subject and a singular object, even though semantically they have plural subjects and objects. The transitivity of reciprocal sentences also decreases across a cline moving from indicative to habitual mood, from punctual to continuous aspect, and from distal to proximal tenses, with true intransitive marking for e.g., present-tense continuous-aspect assertions like "they are all kissing each other". The logic of decreased transitivity for reciprocals would seem to be that (a) reciprocal objects are "less" than real objects because they do not introduce an additional participant, and (b) the more "here and now" or habitual the action is, the more it is like an intransitive property of the subject.

Languages differ in whether and how far they extend the reciprocal construction from prototypical situations (e.g., everyone acts on everyone else) to non-prototypical situations (e.g., "chains", as in "the students followed each other onto the stage"), and in their requirements on the relative timing of the reciprocal actions. The reciprocal constructions of both Yélî Dnye and English

allow a wide latitude of interpretations of "who acts on whom", but they differ with respect to timing: if A hits B, and then after a small delay B hits A, English speakers often use a reciprocal (*They hit each other*), whereas speakers of Yélî Dnye prefer a nonreciprocal construction like "The one hit the other, then the other hit him back". The sensitivity to the timing of reciprocal events reflects the degree to which multiple actions can be seen to constitute a single complex event – a subject at the heart of the Event Representation project (see Annual Report 2003).

Enfield began exploring the marking of reciprocity in Lao. All clips in the Reciprocals stimulus set elicited a description involving the particle *kan3*. This particle has a broad range of meanings, extending beyond reciprocity as defined by the various relations sketched by Evans (Annual Report 2003: 98). If an activity can be construed as something that both participants somehow take an equal part in, then *kan3* may be used. For example, here is a description of a scene in which one person hands an apple to another person (with no reciprocating action):

(3) *khacaw4* *cap2* *maak5-maj4* *haj5* *kan3*
3pl grab fruit give RCP
'They're giving each other fruit.'

This may be similar to cases like English *The policeman and the robber chased each other down the street*, but possibly steps yet further away from a "reciprocity" schema toward a notion of "co-participation".

Reciprocals were also investigated as part of two doctoral projects. Robinson's work on reciprocals in the Papuan (non-Austronesian) language Rotokas is reported in the Chapter 6, on Pioneers of Island Melanesia. In work on the Australian language Kuuk Thaayorre, spoken in Pormpuraaw, Cape York, Gaby investigated two derivational "reflexoid" suffixes. On first analysis, one appears to be used for "core reciprocal" events and the other for "core reflexive" events. A more detailed examination, however, reveals that the distinction is not so clear-cut: the "reciprocal" suffix, *-rr,* is found in some descriptions of inwardly-directed (semantically reflexive) events, while the "reflexive" suffix, *-e*, marks certain symmetric (semantically reciprocal) events. Gaby found that both morphemes are, in fact, highly polysemous, and span a number of semantic subtypes of varying degrees of semantic relatedness.

7.2 Complex predicates

J. Chen continued her dissertation research on children's acquisition of verb compounding in Mandarin (see also Annual Report 2003:93-94, and 7.1.2 above). One experiment examined children's interpretation of resultative verb compounds (RVCs), which are the most characteristic way to express changes of state or location in Mandarin. In an RVC, a verb expressing an action is combined with a verb expressing a (change of) location or state, as in *zhai-xia* 'do.picking.action-descend' (=pick, pick off/down, e.g., an apple). The combination V_1 + V_2 entails that the specified result has been achieved, but the action verb alone (V_1) entails only that the action is performed, not that any particular result comes about, e.g., an attempted picking might have been unsuccessful. Children of all age groups (mean ages 2;6, 3;6, 4;6, 6;1 years) generally understood that RVCs entail a state change, but below age 6 they differed significantly from adults in their interpretation of the semantics of the V_1 action verbs: for adults, sequences like *zhai* + *le* 'pick + perfective' entailed only the termination of the action (e.g., an attempt at picking), while for children they entailed the achievement of the result (the apple came off). This outcome contrasts strikingly with Wittek's finding (2002, see Annual Report 1996: 57) that learners of German often erroneously overlook the entailed state-change meaning in verbs like *pfücken* 'pick', thinking that the result is only optional. Children's neglect of entailed state-change has often been attributed to a general cognitive bias that favors attention to manner of action over state-change, but Chen's results suggest that learners' relative attention to manner vs. state-change is influenced by the way state-change is lexicalized in the language they are learning.

In further work, Chen extended her investigation of children's sensitivity to certain semantic constraints that block posture verbs, manner-of-motion verbs, and verbs of closing and cessation from appearing as V_2 in a resultative verb compound (e.g., **an-dun* 'press-squat' [press someone down into a squatting posture]; **la-guan* 'pull-closed'; **ti-gun* 'kick-roll'). In earlier work, Chen showed that children between 2½ and 6 years produce and accept such compounds (Annual Report 2003: 94). In her 2004 work with children up to age 13, Chen finds that learners begin to show some sensitivity to the constraints by about the age of 8.

O'Connor finished her dissertation on expressions of change in Lowland Chontal, a language of southern Mexico. A change event was defined as any event in which a participant moves to a new location, adopts a new posture or configuration, or transforms to a new state. The grammar of change in Chontal was shown to cross-cut the distinction between verb-framed languages and

satellite-framed languages in the motion event typology established by Talmy (1985, 1991, 2000), and subsequently extended by Slobin (1996, 1997, 2002) with the addition of "equipollently-framed" languages and a discussion of the discourse consequences of language type. O'Connor drew on the combined perspectives of discourse functionalism and semantic typology, incorporating data from narrative discourse, guided elicitation, and responses to stimulus tasks, to understand how a single language uses predicates of all three framing types. Three formal predicate types were identified and categorized according to the linguistic resource that encodes change, and each formal type was found to correspond to a different framing type:

- In simple predicates, the semantics of change are found in the verbal root; these represent *verb-framed* change:

VERB + inflection
change

(4) *lay-'wa* ***may****-pa* *el* *pana'*
my-child **go**-PFV.SG DET river
'My daughter went to the river.'

- In complex predicates of associated motion and change, the semantics of change are found in the subevent contributed by the morphology of associated motion or change (AM); these represent *satellite-framed* change:

VERB +AM + inflection
change

(5) *ga'a* *lakwe-grosero* *kwa* *naa* ***'ña-s****-pa*
that big-idiot say EVID **buy-ANDATIVE**-PFV.SG
'That big idiot says he went and bought them.'

- In complex predicates that combine an initial element (V_1) with an element of associated direction and topological relation (DTR), the semantics of change are contributed by both components of the compound stem. These predicates represent *equipollently-framed* change:

V_1–DTR + inflection
change-change

(6) ***sk'wi-'mi****-'ma* *ima'* *fa'a* *lo-ku'u*
stab-move.in-IPFV.SG 2S.AGT here your-belly
'You put it here (in the belt) on your belly.'

In Chontal, *verb framing* describes most change of state and spontaneous change of location predicates, and *equipollent framing* characterizes robust inventories of change of position and caused change of location predicates in

which the initial element of the compound stem serves adverbial, path-elaborating, and referent-tracking functions. In contrast, *satellite framing* predicates situate entire events as "here" or "not-here", and often occur together with predicates of more common framing types.

7.3 Participant marking and verb morphology

Narasimhan and de Hoop (Radboud U. Nijmegen) examined the morphological case alternations of subjects (A/S role arguments) and objects (O role arguments) in Hindi. In Hindi, case-marking on subjects and objects is split: in highly transitive clauses, ergative case is assigned to the subject of a perfective transitive verb, and accusative case to the specific or animate object; elsewhere, subjects and objects are unmarked ("nominative" case). Recent theorizing has attempted to account for split case-marking systems primarily in terms of the distinguishing or discriminating function of case-marking – its use in disambiguating the roles of two or more arguments in a clause (Aissen 2003, Van Valin 1992). Narasimhan and de Hoop argue that although the distinguishing function can adequately account for split *object* marking in Hindi (following Aissen 2003, de Swart 2003), it cannot satisfactorily deal with split *subject* marking in this language.

According to Narasimhan and de Hoop, ergative case in transitive clauses in Hindi fulfills an identifying rather than a disambiguating role: it is obligatory for the A arguments of verbs whose inherent semantics imply "strong" or prominent agents, such as *maar* 'hit' and *kaat* 'cut', but it is not used for the A argument of less agentive verbs like *mil* 'receive' and *pasand ho* 'liking be [=like]'. In intransitive clauses, there is a small set of verbs which allow either ergative case-marking or null-marking on the S (subject) argument. When ergative case is used, the argument is construed as prominent or strong. For instance, *mohan=ne chiikhaa* 'Mohan=erg shouted' implies that Mohan shouted deliberately, whereas in the absence of ergative case-marking Mohan's shout can be construed as either deliberate or involuntary. Since the calculation of argument "strength" varies across languages, depending on a number of factors such as animacy, specificity or referentiality, volitionality, and perfectivity (Hopper and Thompson 1980), these factors are best represented in terms of features or as semantic scales that play a role in some languages but not others. Narasimhan and de Hoop's study shows how the distinguishing and identifying functions of case, along with the notion of argument strength, can account for Hindi case-marking patterns in clauses with varying aspectual, nominal, and verb class properties.

In her doctoral research, O'Shannessy is studying children's bilingual development in Lajamanu, a remote Australian Aboriginal community in the Northern

Territory where children acquire two languages, Warlpiri and Light Warlpiri (LW). Previous studies of early bilingualism suggest that children typically distinguish between the languages they are learning in terms of their choice of forms for different social contexts or for different interlocutors. But these studies are mostly set in contexts in which the input is also fairly distinct along these lines, and the languages being acquired are clearly differentiated in their lexicon and grammar. Bilingual children's language differentiation has not been studied in a multilingual community such as Lajamanu, where there is considerable code-switching and code-mixing between the languages and the languages themselves share some grammatical and lexical features. O'Shannessy is examining production and comprehension data to discern the parameters along which the children distinguish between the languages, focusing on the roles played by ergative case-marking, word order, and verb morphology in each language.

Warlpiri is an Australian language with case-marking in an ergative-absolutive system, as in example (7). LW is a new mixed language, in which elements of Warlpiri, Kriol, and English are systematically combined, as in (8).

(7)	Warlpiri:	*jarntu-ng*	*ka-0-0*	*yarlki-rni*	*wirliya*
		dog-ERG	IMPF-3sg-3sg	lick-NPST	leg
		'The dog is licking the leg.'			
(8)	LW:	*jarntu*	*i-m*	*lick-im*	*wirliya*
		dog	3sg-NFUT	lick-TRANS	leg
		'The dog is licking the leg.'			

The two languages share Warlpiri nouns and nominal morphology, discourse elements, and interrogatives. Warlpiri has a Warlpiri verb and auxiliary system, and LW has Kriol verbs and verbal morphology, and an innovative auxiliary system. In both languages, core arguments can be omitted and word order is syntactically free, although SVO is favored for transitive clauses with two arguments. The two languages differ in the extent to which transitive subject noun phrases are ergative-marked, and there is also variation within Warlpiri speakers by age: the oldest Warlpiri speakers (aged 60+) use the ergative case marker on 100% of transitive subject noun phrases; this number drops to 80% in younger Warlpiri speakers, and 30% in speakers of LW.

Preliminary results show that children differentiate between the languages, at least at a metalinguistic level, by recognizing and naming each language, identifying speakers of each language, and giving examples of how people speak in each language. More detailed analyses of spontaneous speech and elicited production data focus on whether young children – like adults – differentiate between the languages in how frequently they mark transitive

subjects with ergative case, and in their use of different word order patterns. Comprehension experiments are in progress to compare children's understanding of the roles of ergative case-marking, word order, and number marking in the auxiliary systems of the two languages.

Gaby is undertaking research on the Australian language Kuuk Thaayorre, spoken in Pormpuraaw, Cape York. For her dissertation she will produce a grammar of Kuuk Thaayorre, plus documentary texts, wordlists, and ethnographic information. Gaby has also been investigating several topics in Kuuk Thaayorre semantics and morphosyntax more closely (see also 7.1.4 above). In one study she has analyzed the influence of pragmatics on the distribution of the Kuuk Thaayorre ergative morpheme, exploring in detail each of the conditions under which the ergative morpheme may be omitted from a transitive clause or included in an intransitive clause. She found that, rather than simply being assigned by the predicate or intra-clausal morphosyntax, the ergative morpheme is in the process of developing additional discourse functions, and may be employed to mark any "unexpected subject", whether in a transitive or intransitive clause. Conversely, when the subject of a transitive clause is "expected", ergative marking may be omitted. For a subject to be "expected", the addressee should reasonably be able to anticipate its reference, either through world knowledge, verbal semantics, or discourse context.

In his dissertation research on the grammar of the Papuan (non-Austronesian) language Rotokas (see Annual Report 2003: 80-81 and Chapter 6 of this report), Robinson examined verbal agreement. Rotokas verbs agree with their subjects in person, number, and gender. The subject agreement markers fall into two sets, A and B. Some verbs take Class A subject agreement by default (e.g., *uusi* 'sleep'), while others take Class B (e.g., *kotu* 'bite'). This is illustrated with the two distinct forms of agreement for the third person singular feminine in examples (9) and (10):

(9) *atuu* *koto-vira* *uusi-pa-**o**-i*
flying fox hang-ADV sleep-PROG-**A.3.SG.F**-PRES
'The flying fox is sleeping hanging.'

(10) *aakova* *aio-a* *kotu-pa-**e**-voi*
mother food-NEUT bite-PROG-**B. 3.SG.F**-PRES
'Mother is biting the food.'

Systematic alternations between verbs with these two classes of subject agreement are found in valency-changing derivations. Causatives, for example, are consistently associated with Class B, as can be seen in the contrast between the basic verb stem in (11) and its derived causative counterpart in (12):

(11) *kopii-**a**-epa* *voea* *rutu*
die-**A. 3.PL**-RP 3.PL.M very/truly
'Everyone died.'

(12) *rer* *kopii-pie-**i**-va*
3.SG.M die-CAUS-**B. 3.PL**-RP
'They killed him.'

It has been claimed that single-argument predicates tend to take Class A subject agreement and two-argument predicates Class B, with many exceptions (Firchow 1987). But Robinson's research reveals a more systematic pattern. Underived single-argument predicates may be associated with either Class A or Class B agreement, but two-argument predicates are uniquely associated with Class B. Furthermore, derived verbs are consistently inflected for a particular form of subject agreement: derived single-argument predicates (e.g., reflexives) take Class A and derived two-argument predicates (e.g., causatives) take Class B. Labile stems (e.g., *vatau* 'hide') take Class A when used intransitively but Class B when used transitively. The relationship between the two forms of subject agreement and grammatical relations, particularly the argument-adjunct distinction, is currently under investigation.

CHAPTER 8

THE COMPARATIVE STUDY OF L2 ACQUISITION

Introduction

8.1 Finiteness group

8.2 The early expression of semantic finiteness

8.3 The acquisition of morphosyntactic finiteness

8.4 Finiteness, negation, and other assertion-related particles

8.5 The acquisition of VP ellipsis

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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 coordinate the joint research of a group of European research institutions. The overall aim is the comparative analysis of untutored adult language acquisition from a cross-linguistic and longitudinal perspective. Its research is in many ways inspired by work done in the European Science Foundation's (ESF) project "Second Language Acquisition by Adult Immigrants" (Perdue 1993) and some other contemporary projects with a closely related setup. Researchers 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. An underlying assumption is that development in the direction of the morphosyntactic specifics of the target language takes place when the available linguistic means do not allow the learners to cope with specific discourse contexts.

In its present stage, the comparative dimension of the project focuses on three factors:

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

Some recent subprojects addressing these factors are, for example:

- the project *Construction du discours par des apprenants des langues, enfants et adultes* at U. Paris VIII studies the role of previous knowledge through a close comparison between the construction of discourse in first (L1) and second (L2) languages,

- the project *Deutsch als Zweitsprache - Altersfaktor* (DaZ-AF; see 8.3.4) investigates the age factor in a study of untutored L2 acquisition in children and adolescents, and

- the project *Advanced learner languages under a crosslinguistic perspective* (U. Heidelberg) studies the impact of the way in which information is encoded in different languages in very advanced adult second language learners.

Thematically, the entire project includes five major areas (with central coordination in Nijmegen):

THEME	RESPONSIBLE COORDINATOR
Aspect & temporal structure	Monique Lambert (U. Paris VIII)
Finiteness	Christine Dimroth (MPI)
Lexical development	Giuliano Bernini (U. Bergamo)
Scope particles	Sandra Benazzo (U. Lille 3)
The topic component	Marina Chini (U. Pavia)

This year's report focuses on the work of the Finiteness group, since it has incorporated the project "The Role of Finiteness" (see Annual Report 2003), which had been an independent Institute project till August 2004.

8.1 Finiteness group

The group focuses on the structure and the functioning of a verbal category that has recently found considerable attention in first as well as in second language acquisition – finiteness. The distinction between finite and nonfinite verb forms is familiar from the days of the Greek grammarians, but it has never found a proper definition. Traditionally, it 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 view, however, is unsatisfactory for at least two reasons. First, the distinction between finite and nonfinite forms is also made when there is hardly any morphological distinction on the verb. Thus, by far most English verb forms can be finite as well as nonfinite. Second, there is a number of syntactical, semantical and pragmatical phenomena that are clearly associated with the presence or absence of finiteness. These include, for example, basic word order rules, the licensing of grammatical subjects and of expletive elements, constraints of gapping and other forms of ellipsis, nonspecific readings of indefinite noun phrases in nonfinite constructions, the temporal interpretation of verbal elements, the role of temporal adverbials, and the interaction with the negation *not* and other "assertion-related" particles such as *only* or *too*. It appears, therefore, that finiteness is not a mere fact of verb morphology but a grammatical category in its own right that plays a core role in the organization of utterances. Research presented in the following subsections addresses some of its many facets.

8.2 The early expression of semantic finiteness

8.2.1 Early development in L1 Dutch: normally developing children vs. children with Selective Language Impairment (SLI)

Jolink continued longitudinal research on the acquisition of finiteness in Dutch. She studied six normally developing (ND) 2-year-olds as well as two 4-year-olds with Specific Language Impairment (SLI). Both spontaneous and elicited speech

data were collected biweekly for a period of one year.

The data show that for both the ND subjects and the SLI subjects the acquisition of finiteness proceeds in the stages proposed by Jordens (2002) and Dimroth et al. (2003):

1. Holistic Stage
2. Conceptual Ordering Stage
3. Finite Linking Stage

During the year in which the data were collected, the ND subjects moved from the first stage to the second stage; three of them moved on to the third stage. The SLI subjects were at the second stage at the beginning of the recording period; they started to use more utterances with a finite link over time. Contrary to the ND subjects, however, they continued to use nonfinite linking next to finite linking for an extended period of time.

Interestingly, the order of acquisition of nonthematic verbs and verb combinations used to mark the link between topic and predicate, was the same for all subjects:

1. copula
2. modal verbs
3. modal verbs with nonfinite lexical verbs
4. auxiliary verbs with nonfinite lexical verbs
5. copula with nonfinite lexical verbs (Note: this combination is ungrammatical in Dutch. It is used to express an ongoing event and could be considered an early aspect marker)
6. auxiliary verbs with past participles

These findings show that, although the SLI subjects started to acquire finiteness two years later than the ND subjects did, and although they continued to use lexical linking next to grammatical linking for a longer period, the order in which they acquired the various means to mark finiteness was the same as for the normally developing subjects.

8.2.2 Comparing L1 development: a crosslinguistic approach

In Dimroth et al. (2003) and Jordens & Dimroth (in press), a stage model for (first and second) language development of finiteness was proposed for Dutch and German. Adopting a semantic characterization of finiteness, whereby a finite utterance asserts that the state of affairs described in the utterance is valid for the spatio-temporal coordinates expressed in the utterance's topic, these authors trace the formal expression of the semantic characterization through a so-called "holistic stage", to a "conceptual ordering stage", before reaching a stage where the utterance shows syntactic finiteness.

Jordens, Matsuo and Perdue started a project to investigate the validity of the "conceptual ordering stage". In the studies above, it was claimed that the formal ordering of constituents is determined by principles of information structuring: utterances consist of three constituent positions, each with a particular information-structural function. Thus, the *topic* occurs in initial position. It functions as an anchoring element, i.e., it establishes external reference to the outside world or to the previous utterance. The *predicate* occurs in final position. It refers to a particular state of affairs that holds for the topic element. The relation between the predicate and the topic element is validated by a *linking element*. This linking element occurs between the topic and the predicate.

In Dutch and German L1, the order Topic – Link – Predicate corresponds to the predominant verb-second declarative surface ordering of the target languages. The present project investigates the robustness of this ordering by looking at two typologically different languages, French and Japanese, that are both known to behave differently than the Germanic languages of the previous studies. In French, it is the discourse context that can provoke surface orders that are different from the Germanic conceptual ordering, while in Japanese, it is a combination of syntax (SOV) and discourse context that provokes a systematic difference from Germanic conceptual ordering.

Both the French and the Japanese data come from the CHILDES database (MacWhinney 2000). The French data set consists of two files of Grégoire between 1;9.18 to 1;9.28. The Japanese data set consists of the twelve files of Jun from Ishii (1999) from the period between 1;11 and 2;2.

In the French child data it was found that a small number of (aspectual/modal) assertion markers occurred between the topic and the predicate, as in (1), and that in the simple case of assertion, the link might be left implicit.

(1) /jojo E kul/
(l')eau est coule
'The water pours.'

/e poZe /
est posé
'(The glass) has been placed.'

Although the modal links are more restricted than in Dutch or German, and the sentence negation evidence is slim, the situation is otherwise comparable.

The main elements that appear in the conceptual ordering stage such as topic, link and predicate remain constant between both the Japanese and the Dutch and German child language data that have been studied so far. However, the ordering is different. In the Japanese data of Jun, utterances are highly

influenced by the surface word order (SOV) and the characteristics of discourse structuring such as extraposition and topic drop. In the Japanese child data, no instance of a (topic) - link - predicate order was observed. According to the canonical surface word ordering in Japanese the link (for example: *ya, yoo, wa*) always appears after the predicate, as in (2).

(2) hikooki ya
plane indeed
'It's a plane.'

wanwan nai yoo
dog gone indeed
'The dog is gone.'

Finally, it was also found that the discourse context provokes the ordering as well. Double topic, as illustrated in (3), and sentence final topic, as illustrated in (4), were found in both French and Japanese child utterances.

(3) /pe~pe~ E dodo, pe~pe~/
Pinpin fait dodo Pinpin
'Pinpin is sleeping, Pinpin.'

(4) /kowai wa, are/
scary indeed, that
'It's scary, that one.'

8.3 The acquisition of morphosyntactic finiteness

8.3.1 The acquisition of morphosyntactic finiteness in L1 and L2 Dutch

In Jordens & Dimroth (in press), it is shown that in early Dutch learner varieties, utterances typically have a topic element in initial position, an illocutive marker in second position and a focus constituent in final position, e.g.:

(1) child L1 Dutch			adult L2 Dutch		
TOPIC	ILLOCUTIVE	FOCUS	TOPIC	ILLOCUTIVE	FOCUS
Peter	moet	zitte	muslim	kan	roken
Peter	must	sit	muslim	can	smoke
dit	nee	afdoen	dan	magniet	rijen
this	no	off-do	then	may-not	drive
mama	kanniet	kusje	mijn vader	niet	werken
mommy	cannot	kiss	my father	not	work

The *topic* element indicates what the utterance is about and anchors it in the context. *Illocutive markers* include several modal elements expressing a wish or refusal, a promise or an apology, a permission or prohibition, an obligation or option; they may occur in positive or negative form. Therefore, they function

simultaneously as affirmator or negator with scope over the predicate. Absence of a modal element may express assertion or denial. In utterances with normal intonation the *focus* constituent selects an alternative from a set of options. Information in focus is claimed to hold for the topic.

There01 are two options for transitive Agent predicates in terms of the information structuring categories TOPIC - ILLOCUTIVE - FOCUS. Either the agent or the object may have topic function. If the agent has topic function, then the object + lexical verb are in focus; if the object has topic function, then only the lexical verb is in focus. Both options are illustrated in (2).

(2) child L1 Dutch			adult L2 Dutch		
TOPIC	ILLOCUTIVE	FOCUS	TOPIC	ILLOCUTIVE	FOCUS
Jaja	mag	dop opdoen	Ik	moet	huis kopen
J	may	lid on-do	I	must	house buy
die	magwel	teke	die	magwel	kope
that	may-indeed	draw	that	may-indeed	buy

As pointed out, illocutive markers simultaneously function as affirmator or negator with scope over the predicate. Predicates are projections of V, i.e., they are either V or object + V. Thus, when the object has topic function, it is impossible for the agent to occur within the scope of an illocutive marker. This explains why, at the relevant stage, utterances as in *(3) never occur.

*(3) child L1 Dutch				adult L2 Dutch			
dop	mag(wel)	*Jaja*	opdoen	schoenen	kan(wel)	*ik*	uitdoen
lid	may-indeed	J	on-do	shoes	can-indeed	I	off-do
die	magniet	*Tita*	pakke	dan	hoefniet	*ik*	teruggeven
that	may-not	T	take	then	have-to-not	I	back-give

The acquisition of auxiliaries in child-L1 and adult-L2 learners leads to a restructuring. The illocutive markers are reanalyzed as elements of the syntactic category AUX. Lexical phrases, such as *kanniet* 'cannot', *magwel* 'may-indeed', *moet* 'has-to', *hoefniet* 'has-not-to' etc., are going to be functioning as functional elements, while the negator and particles such as *wel* 'indeed', *ook* 'too', *zelf* 'self' are used with scope over the predicate.

The acquisition of AUX leads to the possibility to express a semantic opposition between the <result state> of an action and its <prospectiveness> or <ongoingness>. Evidence comes from the distributional opposition in the use of *heb/heeft*, *ben/is* + pp, *doe/doet* + infinitive and *ga/gaat* + infinitive as in (4).

(4) child L1 Dutch						adult L2 Dutch					
ik	*heef*	óók	appel	gete		ik	*heb*	niet	geslapen		
I	have	too	apple	eaten		I	have	not	slept		
Jaja	*doet*	kitkat	opete			toen	ik	*was*	bij	hun	slapen
J	does	kitkat	up-eat			then	I	was	with	them	sleep
gaan	ze	almaal	ete,	zie?		een	toen	allebei	*gaan*	slaap	
go	they	all	eat,	see?		and	then	both	go	sleep	

At the relevant stage, AUX occurs next to the element with anchoring function, i.e., the topic. In this position AUX serves to express both aspectual and discourse-functional properties. Adverbs such as *niet*, *wel*, *ook*, *zelf* are used with scope over the focus constituent. As a consequence, elements of lexical verb-argument structure with no anchoring function can be expressed within the domain of AUX but outside, i.e., left of the domain of a possible scope adverb. This explains why with the acquisition of AUX learners are now able to produce utterances with the external argument (i.e., the subject) within the domain of (modal and nonmodal) AUX, as in:

(5) child L1 Dutch								adult L2 Dutch					
da	ben	*ikke*	ook	wees				izmir	heb	*ik*	niet	geweest	
there	am	I	too	been				izmir	have	I	not	been	
dat	heeft	*Jaja*	niet	van	papa	kege			heeft	*die*	*politie*	kapot	maak
that	has	J	not	from	daddy	got		[this]	has	that	police	kaput	made
die	heb	*ik*	wel	geplakt				waar	heb	*jij*	geweest?		
that	have	I	indeed	glued				where	have	you	been?		

(6) child L1 Dutch						adult L2 Dutch				
dan	moet	*Cynthia*	weer	make		dan	moet	*ik*	huis	zoeken
then	must	C	again	make		then	must	I	house	find
dà	mag	*papa*	wel	doen		waar	wil	*jij*	gaan?	
that	may	daddy	again	do		where	want	you	go?	
hier	moet	*poesje*	eve	kamme			kan	*jij*	kopen	
here	must	kitty	just	comb		[that]	can	you	buy	

Learners note that <ongoingness> is expressed not by a particular auxiliary verb such as *doe/doet* but simply by its absence. The lexical verb is, then, identified as the carrier of aspect, agreement and the discourse function of assertion and, as a consequence, it has to occur next to the topic, i.e., in verb-second position.

8.3.2 The acquisition of the V2 rule in L2 Dutch

Verhagen started to investigate the role of the nonmodal auxiliaries *hebben* and *zijn* in the acquisition of Dutch as a second language. Based on earlier work on the Dutch ESF data, it has been hypothesized that the first productions of *hebben* and/or *zijn* constitute a major step forward in learners' structuring of verbal elements within the sentence (see Jordens & Dimroth in press).

The longitudinal ESF data from three Moroccan and three Turkish learners of Dutch showed that learners start producing nonmodal auxiliaries relatively late compared to the production of other auxiliaries. However, once produced, these auxiliaries become abundant within a short period of time. Importantly, the explosive use of *hebben* and *zijn* co-occurs with the emergence of the following constructions:

- postverbal temporal adverbs

Ik vandaag lees	vs.	Ik lees vandaag
I today read		I read today

- postverbal negation (Dimroth, see 8.3.4)

Ik niet lees	vs.	Ik lees niet
I not read		I read not

- topicalized verb-second structures

Vandaag ik lees	vs.	Vandaag lees ik
Today I read		Today read I

The common characteristic of the above structures is that they have a finite verb in second position. Hence, it seems likely that the emergence of such structures is related to the emergence of *hebben* and/or *zijn*: the occurrence of a purely functional element, i.e., the nonmodal auxiliary, in second clausal position may make the learner restructure his/her sentences in such a way that finite verbs no longer occur in third or fourth position, but come to be placed in second clausal position.

Several experiments are planned in order to find out whether the production of *hebben* and *zijn* indeed enables, or even pushes, the learner toward placing the finite verb in second position. The main goal of these experiments is to test the corpus findings against more controlled data.

8.3.3 The role of lexically empty verbs in L1 Russian

Kirsch continued her research on the acquisition of finiteness in Russian L1 focusing on the role of lexically empty and full verbs. A longitudinal analysis of two Russian children showed a very rapid acquisition of finiteness. Lexically

empty elements like modal adverbs, auxiliarys and copulas aren't used before lexically full verbs appear in their inflected form.

These results suggest that typological differences in the auxiliary system of the target language play a crucial role in the acquisition of finiteness. Previous research (Dimroth & Jordens 2001) found that learners at some stage produce finite sentences without inflecting lexical verbs by using proto-modals and auxiliaries in combination with infinitives or the past participle (Jordens 2002). Which way to acquire the complex concept of finiteness do learners of a language choose when the auxiliary system isn't as productive as in the Germanic languages?

The observed Russian children began with nonfinite verbal categories such as imperative and infinitive verb forms. Both children also used the past tense form before the inflected present tense form. This observation could serve as evidence for a step-by-step acquisition of finiteness: as the Russian past tense form differs from other morphologically finite verb forms by not being marked for person, but for gender, the past tense form is more similar to nonfinite forms (such as modal adverbs) than to the verb forms of the present/future tense(s). Still, the past-tense verb form carries a distinct and regular marker - *L* -, allowing the children to refer to past-time contexts.

It seems that although the input situation provides children learning a language like Dutch with a stable and productive system consisting of an overt finiteness marker and an infinite predicate, this doesn't accelerate the acquisition of morphological finiteness: Russian children seem to use morphologically finite lexical verbs earlier than Dutch children.

8.3.4 Negation and finiteness in L2 acquisition at different ages

Dimroth compared the development of finiteness in adult, adolescent and child L2 learners of German to see if learners at different ages progressed similarly from the earliest stages onwards. In the literature it is generally assumed that age differences between adults and children are likely to affect a learner's rate and ultimate attainment, but not the acquisition process (e.g., orders of acquisition) as such (see Singleton & Ryan 2004:115 and Hyltenstam & Abrahamson 2003:566). In a study of finiteness and negation, Dimroth compared published results on the development of adult immigrants to longitudinal production data from two untutored Russian beginners age 8 and 13 (DaZ-AF corpus, see Annual Report 2002:148) and found different acquisition orders.

The developmental path of adult learners is well documented (see Parodi 2000, Becker 2004). Learners start out with negation in nonfinite utterances (Phase I). If such an utterance contains a verb, the negator is placed in immediately

preverbal position. In the next step (Phase II), nonthematic verbs play a special role: while lexical verbs remain nonfinite, semantically empty auxiliary verbs are used to spell out features of finiteness. These verbs are attested with postverbal negation from the earliest occurrences on. Only after the acquisition of nonthematic verbs do untutored adult L2 learners of German start to systematically use targetlike postfinite negation with lexical verbs (Phase III).

The results obtained for the adolescent learner (age 13) point to a similar order of acquisition. In phase (I) lexical verbs do not appear with the targetlike postverbal position of negation. The only exception is the verb *haben* ('have'), which is exclusively combined with the cohesive negator *kein* as in (1).

(1) wir hat kein sport [week 02]
we have no sports
'We didn't have sports.'

This combination seems to be unanalyzed, since *kein* appears with no other verb in Phase I, whereas *haben* is sometimes used incorrectly with postverbal *nicht*, once the syntax of negation has been analyzed (see example (3) in Phase III).

Phase II is defined through the acquisition of nonthematic verbs as carriers of finiteness and is reached by the adolescent learner after 16 weeks of contact with the target language:

(2) ich habe gesehen Mona Lisa [week 16]
I have seen Mona Lisa
'I saw Mona Lisa.'

Phase III, i.e., finite lexical verbs with postverbal negation, begins only after the acquisition of auxiliaries. Their integration entails abandonment of the transparent separation of finite and nonfinite forms in favor of the fusion of functional and lexical information and of a syntactic structure in which the scope of negation can no longer be directly mapped onto surface order.

(3) ich habe nicht angst [week 17]
I have no fear
'I'm not frightened.'

The development of the adolescent learner differs in some details (such as earlier acquisition of subject-verb agreement) from the adult learners studied by Parodi (2000) and Becker (2004). With respect to acquisition orders, however, we find no difference. Like the adult learners, the adolescent learner goes from no morphosyntactic marking of finiteness and preverbal negation (Phase I) to finiteness with auxiliaries (Phase II) and only then acquires finiteness with lexical verbs, which appear with postverbal negation (Phase III).

The child learner (age 8) seems to depart from the same initial structure in Phase I, which contains nonfinite lexical verbs used with preverbal negation:

(4) er nicht kauf steine [week 02]
he not buy stones
'He doesn't buy stones.'

After Phase I the child learner shows a different order of acquisition: Postverbal negation with lexical verbs constitutes Phase II in her data. Eighteen types/38 tokens are attested before auxiliary verbs come to be used as carriers of finiteness (week 11).

(5) heute ich geht nicht [week 05]
today I goes not
'I don't go today.'

(6) sie kauft nicht torte [week 07]
she buys not cake
'She doesn't buy a cake.'

The acquisition of morphosyntactic finiteness marking in lexical verbs by the child learner precedes the acquisition of auxiliaries by a couple of weeks. It looks as if, after a first stage in which pre- and postverbal negation co-occur, finiteness is acquired with lexical verbs, before the first auxiliaries appear. This acquisition order differs from the one attested in adult immigrants and the adolescent learner of the present case study.

8.4 Finiteness, negation, and other assertion-related particles

Finiteness and negation are closely connected, as illustrated by finite negation elements in Finnish, standard French negation *ne ... pas* or English *do*-support, which extracts finiteness from the verb in negative sentences. If finiteness is primarily a grammaticalized assertion marker, and if negation somehow reverts the assertion, such a relationship seems natural. Negation also has a direct relation to the topic–comment structure. The truth value reversal traditionally associated with negation only works if the topic is kept constant; the two sentences *someone was at the party* and *someone was not at the party* are not mutually exclusive, except *someone* refers to the same topic entity, and *John was at the party* and *John was not at the party* are only mutually exclusive, if the topic time, hidden in the finite form *was*, is tacitly kept constant. This also applies to other topic parameters, such as place or world. Thus, "topic consistency" in this sense is one ingredient of a satisfactory analysis of negation. A second fact, not accounted for by the firmly established truth reversal analysis, is the variable position of negation in many languages, paralleled by clear scope differences.

Klein developed an analysis of negation by particles such as *not, nicht, niet,* that brings negation into close relation with other assertion-related particles such as *also, only, again*, and similar ones. The basic idea is as follows. If a sentence HOC contains an assertion-related particle P, such that HOC = α P ω, then P marks a "secondary assertion", beyond the one made for HOC (and marked, e.g., by finiteness marking and intonation). This secondary assertion relates to another contextually relevant sentence, called HLIUD here. HLIUD is partly fixed by HOC; in particular, the position of P fixes the topic–comment structure of ALIUD in the following way: α DETERMINES THE TOPIC PART OF ALIUD – IT MUST BE A SITUATION IDENTIFIED BY α; ω DETERMINES THE COMMENT PART OF ALIUD – IT MUST BE A PROPERTY DIFFERENT FROM ω. Each assertion-related particle has a specific meaning contribution, which, in the case of a negative particle NEG, is as follows.

(1) If a speaker asserts α NEG ω, then it is marked that, to his or her mind:
(a) HOC is true (this is marked by the position of the finite element and by intonation);

(b) α ω is false. This is the HOC - NEG assertion;

(c) The topic situation identified by α has the comment "different from ω". This is the ALIUD assertion.

Thus, NEG combines an "exclusivity function" that reverts the truth value independent of the position of the negation (under topic consistency), and a "difference function" that says that the topic identified by α has a property different from ω, where ω is that part of the expression that is in the scope of NEG. In simple cases, as assumed here, it is the part that follows NEG. This analysis accounts for the difference between German sentences such as 2a,b:

(2) a. Gestern ist sie zum ersten Mal nicht gekommen
Yesterday has she for the first time not come

b. Gestern ist sie nicht zum ersten Mal gekommen
Yesterday has she not for the first time come

Both exclude that *Gestern ist sie zum ersten Mal gekommen* is true. Example 2a also requires that she was not there yesterday, whereas this is easily compatible with 2b. The reason is that in 2a, ω consists of the single word *gekommen*, thus, there must be a difference with respect to this single word. If ω is a longer stretch of descriptive expressions, as in 2b, then there can be a difference with respect to any of those; thus, it can be *zum ersten Mal* rather than *gekommen*.

Complications result from the fact that the relation between the position of NEG and ω can be less straightforward than assumed here. This, however, is not so

very much a problem of NEG and its functioning than of the entire syntactic structure of the language. In basic learner varieties, for example, we should expect a very transparent relation between NEG and ω.

8.5 The acquisition of VP ellipsis

Many types of ellipsis are closely connected to the availability of a finiteness marker. This is also reflected in acquisition. Matsuo continued to investigate how English and Japanese children interpret empty categories in verb phrase ellipsis (VPE) contexts as in (1):

(1) The penguin [sat on his chair] and the robot did Δ, too.

VPE in English contains a finite verb as *did* in (1) followed by an empty verb phrase. To obtain an adult-like interpretation of (1), English children have to do two things. First, they need to find a suitable antecedent for the empty verb phrase labeled with Δ; second, they need to find the antecedent of a pronoun (*his,* in this case). Finding the correct antecedent of the pronoun depends on the knowledge that English pronouns are ambiguous regarding referential and bound variable interpretations.

It is theoretically debated whether Japanese children have to do the same thing as English children in interpreting the Japanese equivalent of (1), or whether they need to engage in a different operation, such as recovering a noun that consists of a bundle of semantic features (Hoji 1998).

Matsuo ran several truth-value judgment tasks on 14 English and 17 Japanese children. The following four conditions and their equivalents in Japanese were tested:

(1) sloppy reading
Cookie monster ate his cookie and Mike did, too.
Scenario (S): Cookie monster$_1$ ate his$_1$ cookie; Mike$_2$ ate his$_2$ cookie.

(2) strict reading
The mother hid behind her tree and the girl did, too.
S: The mother$_1$ hid behind her$_1$ tree; the girl hid behind her mother's tree.

(3) color mismatch
The bear found a blue fish and the tiger did, too.
S: The bear found a blue fish; the tiger found a pink fish.

(4) object mismatch
The cow ate some asparagus and the elephant did, too.
S: The cow ate some asparagus; the elephant ate some carrots.

English children were expected to give yes-answers to (1) & (2) and Japanese children to give yes-answers to (1) – (3). Condition 4 should show clear differ-

ences between English and Japanese children's giving correct responses. Post-hoc comparisons indeed revealed a significant difference between the two languages under this condition ($F(3127)=6.809$, $p=0.0102$). The findings go against the claim by Otani & Whitman (1991), according to whom English and Japanese should treat VPE alike, and give support to Hoji (1998), who claims the contrary. It is hypothesized that Japanese children's difficulty stems from partial, rather than complete recovery of the relevant semantic features.

CHAPTER 9

THE DYNAMICS OF MULTILINGUAL PROCESSING

Introduction

9.1 The effects of exposure to an unknown L2+

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

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

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Introduction

The Multilingualism project, headed by Gullberg and Indefrey and sponsored by a grant from the Netherlands Organisation 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 Neuro-imaging. 2004 saw work launched in all three main areas of interest, and the start of two Ph.D. projects. In addition to the experimental work, the group has also created a vocabulary database of lexical items likely to be part of the repertoires of beginners, i.e., learners of low proficiency. The database is used for the creation of stimulus materials that are appropriate for language learners. The items for a specific language constitute an intersection of the most frequent words in corpora of (spoken and written) language, corpora of learner-directed speech, and word lists from teaching materials. The database currently covers Dutch, English, German, and Turkish.

9.1 The effects of exposure to an unknown L2

In this subproject, Dimroth, Gullberg, Roberts, and Kootstra focus on the earliest perception and processing of input in an unknown L2+. The aim is to uncover what phonological, semantic, and syntactic knowledge can be acquired after minimal exposure, and what the precise effect is of context information, item frequency, gestural deictic links between sound and context, and amount of exposure. Native Dutch listeners are exposed to seven minutes of controlled but naturalistic and therefore ecologically valid input in the form of a weather report in Mandarin Chinese, a typologically unrelated L2+ that is unknown to the participants. The weather report includes a set of nominal, verbal, and functional target words that are controlled for frequency. Half of these target words are 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.

One set of tests will examine how much and what segmental information (word boundary cues and phonotactic rules) learners can extract. A second set of tests investigates under what conditions lexical-semantic acquisition (sound to meaning mapping) takes place. The acquisition of nouns, verbs, and functional elements are examined separately. A lexical decision task is used to investigate the acquisition of noun meaning. Preliminary results indicate that mere exposure to the weather report does not suffice for noun acquisition to take

place. That is, the accuracy scores of subjects who were exposed to the weather report and a control group who received no Mandarin input at all were both at chance level. This is in contrast to subjects who listened to a word list before seeing the weather report. This group's performance was no longer at chance level, which suggests a real attempt to map sound to meaning. These findings suggest that learners who are provided with tools for segmentation, i.e., a list of pre-segmented items, do better with new material. This ability appears to be a prerequisite for sound to meaning mapping. Only when equipped with such knowledge can learners fully exploit the frequency of items and gestural links to the referential content.

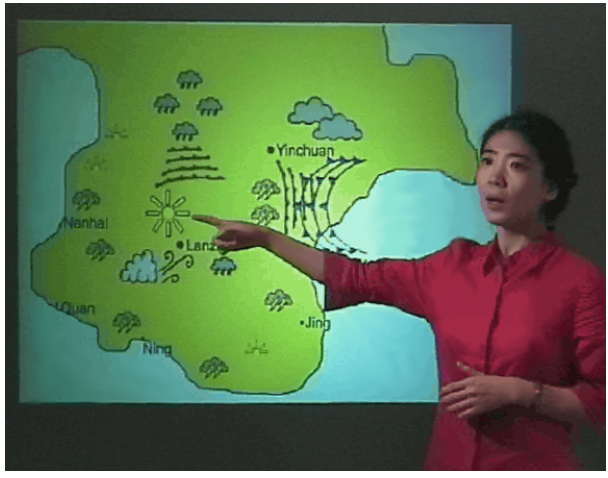

Figure 9.1: A Mandarin speaker, the weather chart, and a gesture linking sound to meaning.

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

9.2.1 Neural correlates of L2+ syntactic processing

Hemodynamic studies comparing L1 and L2 processing have shown different L2 brain activation patterns for proficient and less proficient L2 speakers, suggesting a cerebral reorganization during L2 acquisition. To investigate whether this general observation also holds for syntactic processing and to determine the time course of a possible reorganization, Indefrey and Hellwig designed a longitudinal fMRI experiment on Dutch L2 syntactic parsing. The experiment uses a paradigm in which participants are presented with animated scenes and judge whether corresponding auditory descriptions match the scenes (Indefrey et al. 2001, 2004). The descriptions are either sentences ("The blue circle is pushing the red square away") or lists of syntactically unrelated words

("circle, blue, square, red, push away"). A pilot study with Dutch native speakers has been completed. The results showed enhanced activation of Broca's area and the left middle temporal gyrus for the processing of sentences as compared to word lists. For a longitudinal fMRI study using this paradigm, a group of six native Mandarin speakers who started learning Dutch in February 2004 has been recruited. So far, data from scanning sessions at three, six, and nine months post learning onset have been analyzed at the group level. The behavioral data showed a moderate increase in task performance during scanning. In a standardized Dutch proficiency test, the participants scored in the low proficiency range after three months and the low to medium proficiency range after six and nine months. No detectable differences in hemodynamic activation between sentences and word lists were found after three months of learning. After six and nine months, enhanced hemodynamic activation for sentences as compared to word lists was observed in similar areas as for the native speakers. The finding suggests a functional reorganization at the neural level in the L2 learners of Dutch.

Davidson initiated a longitudinal study of the electrophysiological responses of the same Chinese learners of Dutch. This study examines the pattern of responses to grammatical and semantic violations (similar to the Dutch-English study described in 9.3.1) as learners acquire proficiency in understanding Dutch. Data collection and analysis will proceed during the next year.

9.2.2 Real-time processing of L2+ morphosyntactic features

In her Ph.D. research, Schneider focuses on syntactic processing and the transfer of first language (L1) mechanisms to the processing of the second language (L2) in intermediate learners. The research question is whether the syntactic processing of L2 sentences will be differentially affected depending on the possibility of applying L1 mechanisms. Turkish learners of Dutch were chosen as participants for two experiments due to the differences in word orders between these languages.

In order to establish the distribution of word orders in the two languages under investigation, both a Dutch and a Turkish corpus of newspaper articles addressing comparable readerships were analyzed in collaboration with Sahin for the relative order of the elements subject (S), object (O), and verb (V). The analysis revealed that for Dutch (1.000 sentences), the majority of clauses (both main and subordinate clauses collapsed) were written in the order SVO (48.7%). The other two most frequently appearing word orders were SOV (24.4%) and VSO (18.1%). For Turkish (838 sentences), the majority of clauses were SOV (94.3%), the so-called canonical word order. The remaining word

orders were OSV (5.5%) and OVS (0.2%). Based on this distribution, a behavioral reading time experiment and an fMRI experiment have been designed. The leading assumption is that word orders such as SVO and VSO will lead to processing difficulty. This should be mirrored in longer reading times and different brain activation patterns relative to SOV for Turkish learners of Dutch if they transfer their processing strategies from their L1 to their L2.

Oliver, under the supervision of Indefrey, completed the design and stimulus preparation for an experiment on L2 sentence comprehension in noise, using an auditory word-monitoring task. The target words are embedded in different types of contexts (normal prose, syntactic prose, random word order) and the stimuli will be presented with different levels of background noise. This experiment is designed to provide a measure for the automatization of auditory language processing in L2-speakers.

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 functional bilinguals at the syntactic level. Collecting both eye-movement data and acceptability judgements, Roberts, Gullberg, and Indefrey examined 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*, 'he', can only co-refer with the nonlocal referent [Hans]. In contrast, in the comparable Dutch construction (2) the subject pronoun *hij*, 'he', can co-refer with the local antecedent [Peter].

(1) Peter ve Hans ofiste oturuyorlar. Peter çalışırken, **o** sandeviç 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 is whether the bilinguals 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. Preliminary analyses suggest that, while the Turkish bilinguals did not differ from the Dutch natives in their off-line acceptability judgements, they differed in their on-line eye-movement patterns. Unlike the Dutch, the bilinguals' 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 was observed. This suggests that the functional bilinguals' 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.

A second line of study measures event-related potential (ERP) and oscillatory responses to grammatical and semantic violations in proficient Dutch speakers of English. Previous electrophysiological research on multilingual sentence processing (Weber-Fox & Neville 1997; Moreno & Kutas 2005) has shown delayed or variable ERP responses to grammatical or semantic violations for sentences presented in a second language. Davidson conducted a study of the electrophysiological responses to grammatical and semantic violations presented in English sentences to Dutch speakers who were proficient in English in order to assess whether a more robust measure of the responses to grammatical violations could be obtained using joint time-frequency analyses of the data. The grammatical violations were violations of number and phrase structure, while the semantic violations were traditional closure violations.

Analyses of the ERP responses indicated an N400 effect for semantic violations relative to their controls, as well as a P600 effect for the combined grammatical violation conditions. Analyses of event-related changes in spectral power for the grammatical violations showed a reduction in power at approximately 10-15 Hz following the violations relative to the controls (shown in blue in Figure 9.2), and a corresponding increase in power at approximately 3-5 Hz (shown in red in Figure 9.2).

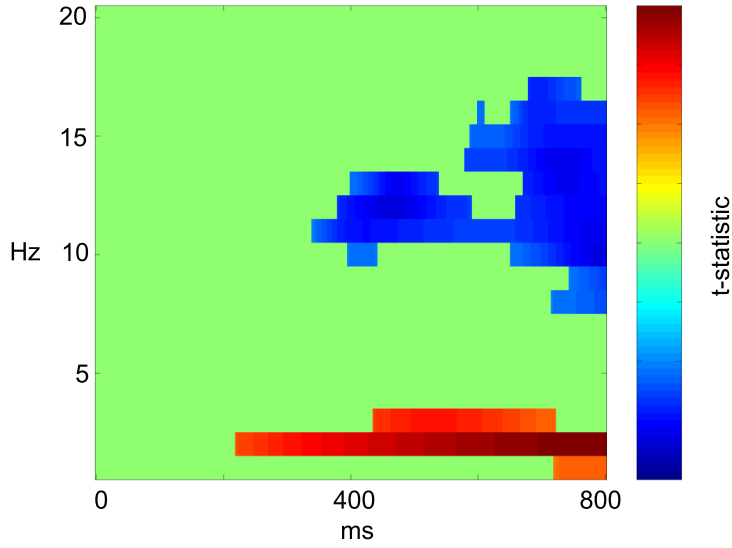

Figure 9.2: Event-related changes in spectral power measured at a right posterior sensor following grammatical violations (relative to controls) for bilingual Dutch-English readers. The x-axis represents time following the onset of the critical word within the sentence, the y-axis the frequency in Hz, and the z-axis the value of the t-statistic for significant increases (red) or decreases (blue) in power. The t-statistics were calculated using a clustering- and randomization-based algorithm.

The ERP results from this study are similar to previous studies of bilingual responses to grammatical and semantic violations. The event-related changes in spectral power are the first observation of this pattern in bilinguals, and may represent a more sensitive indicator of the neurophysiological basis for language comprehension.

9.3.2 Interactions in multilingual processing at the conceptual/ semantic interface

In her dissertation research, A. Brown investigates bi-directional relationships between the L1 and an L2 in the minds of L2 learners. The domain investigated is that of event construal in motion events, specifically Manner and Path expressions, where crosslinguistic differences exist. In addition to speech analyses, co-speech gestures are examined in order to provide insights on underlying structural, semantic and conceptual representations possibly masked by speech (cf. Annual Report 2003:115-116).

Production data have been collected from 16 monolingual speakers of Japanese, 13 monolingual speakers of American English, 15 advanced Japanese speakers of English living in Japan, and 13 advanced Japanese speakers of English living in the USA. Participants completed two tasks, both of which required them to

watch a series of animated stimuli and describe the events to a listener. The first task, employing the cartoon Canary Row, elicited rich narrative descriptions; the second, utilizing the series of Tomato Man animations, elicited focused descriptions of Manner and Path.

Initial analysis of narratives in the L1 has concentrated on the Canary Row Swing scene, in which Sylvester swings from one building to another in order to catch Tweety. During descriptions of this event, systematic variation in direction, handedness, and perspective, of participants' arc trajectory gestures was observed. Preliminary results reveal that the majority of arc trajectory gestures produced by Japanese monolinguals are sagittal, dual-handed gestures taking character perspective. In contrast, the majority of arc trajectory gestures produced by English monolinguals are lateral, single-handed gestures without character perspective. Most striking are the remarkably English-like arc trajectory gestures produced by many learners, even those in Japan without English language immersion, when performing narratives in their L1. This suggests an influence of the L2 on the L1. Accompanying speech will now be analyzed at lexical, syntactic and discourse levels to uncover factors motivating such inter- and intra-language differences in gesture. Analyses of further scene descriptions in the L1, as well as corresponding analyses in the L2, will be conducted in order to characterize the relationship between the two languages.

9.3.3 Complex interactions in multilingual processing: code-switching

Code-switching, or the rapid switching from one language to another mid-stream, offers a particular perspective on parallel processing of two languages as it indicates that two co-existing language systems are being processed simultaneously. To date, very few studies have examined the processing of code-switching beyond the single word level. Gullberg, Indefrey, and Muysken continued to examine code-switching data collected from Dutch-Papiamento bilinguals on several tasks (cf. Annual Report 2003:116). The baseline code-switching data consist of natural four-party conversations and data from a dyadic director-matcher task intended to elicit complex noun phrases. In this task a director describes the locations of a set of toys to a matcher who has to identify and locate toys following the director's descriptions. Dutch baseline data come from the same director-matcher task performed in Dutch only, and scores from a standardized Dutch proficiency test (Nt2 Staatsexamen). Two experimental tasks were used to induce code-switching: a picture naming task and a shadowing task with an appended acceptability judgement task. The experimental tasks were designed to investigate postulated structural constraints on code-switching. One such constraint concerns the effect of potential 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 Papiamento (NA). The director-matcher task was therefore designed to elicit natural noun phrases with color adjectives to provide a baseline for the experimental data.

The conversations and the code-switched director-matcher data have been fully transcribed and are currently being tagged for language and grammatical properties. The data will constitute the first adult Dutch-Papiamento corpus available. Both inter- and intra-sentential switching is observed in the baseline data. Switching within sentences consists mainly of between-constituent switches in the form of lexical insertions of Dutch nouns, verbs, discourse markers, and idioms into Papiamento grammatical structures (cf. Muysken et al. 1996).

The picture naming task was designed to investigate whether the subject-NP (the sentence-initial element) or the VP (an element projecting structure) of the clause best predicts the language chosen for naming an object-NP. The materials consisted of a text segment expressing the first part of a transitive sentence frame followed by a picture of a colored object to be named. The lead-in text segment was either monolingual in Dutch (Du) or Papiamento (Pa), or contained a language switch between the NP and the VP (NP_{Du} VP_{Pa} or NP_{Pa} VP_{Du}). To accommodate for the sensitivity of code-switching to the social setting, the task was organized as a party game where two subjects in a team competed against two other subjects in another team. The task was validated by comparing the data against the director-matcher data. All types of switches in the experimental task were also attested in the baseline data and as intended, the task induced (between-constituent) switches between the text segment and the picture naming. Among the within-constituent switches found, the dominant type in both data sets was determiner-noun-adjective, realized as PaDuPa (*e* fles *berde*, 'the bottle green'), thus conforming to Papiamento syntax. The analyses of the influence of the subject-NP vs. the VP on picture naming showed that both constituent type and language affected the language used for object-NPs. In the conditions where the lead-in text contained switches, VPs were more likely to be followed by an object-NP in the same language than were subject-NPs. This effect was stronger for Papiamento than for Dutch VPs, reflecting the overall dominance of Papiamento in the bilingual subjects.

Chapter 10

Sign Language Typology

Introduction

10.1 Documentation of sign languages

10.2 Crosslinguistic projects

10.3 Collaboration with other projects

10.4 Applied linguistics projects

10.5 Signed Lectures

Participants:

Ulrike Zeshan (coordinator)

Waldemar Schwager

Jun Hui Yang

Kang-Suk Byun

Hasan Dikyuva

Sibaji Panda

Collaboration with other projects:

Space

Event Representation

Introduction

The Sign Language Typology project was established in November 2003 with funding from the German Research Foundation (DFG) under a postdoctoral program of excellence (Emmy-Noether Programm) awarded to the head of the group (Zeshan). In 2004, the group consisted of participants from China (Yang), South Korea (Byun), Turkey (Dikyuva) and India (Panda), as well as a bilingual German-Russian signer (Schwager). The purpose of the project is to pioneer the study of typological variation across a broad range of geographically and genetically unrelated sign languages, to document undescribed sign languages around the world, and to provide social, political and educational impulses for deaf communities, particularly in developing countries. Consequently, all members of the research group are themselves deaf sign language users. The project is expected to run until October 2008.

10.1 Documentation of sign languages

10.1.1 Sign language corpus

For the sign language corpus, Yang, Byun and Schwager conducted fieldwork and collected more than 10 hours each of (mostly conversational) video data from signers in mainland China, South Korea and Russia. These data include a wide range of topics such as educational experiences, sign languages, interpreters, literacy development or story retelling, and were collected from deaf signers from a wide range of ages, regions and career backgrounds in various settings such as informal conversations, classrooms, group discussions, homes, and public parks. Less comprehensive sign language data from the Netherlands, India, Hong Kong, Turkey and Germany also contribute to the corpus, as well as data from the contact signing study (see 10.2.2). Metadata descriptions in the IMDI format document information about each video segment, and some of the video data are transcribed or annotated using the ELAN program. All sign language data have been integrated into the browsable corpus hosted by the Institute.

10.1.2 Documentation of individual sign languages

The Sign Language Typology project conducts in-depth studies on typologically interesting grammatical structures in individual sign languages. In 2004, Byun and Zeshan worked on the gender-marking system in South Korean Sign Language (SKSL), a system that only occurs in the Japanese Sign Language family (of which SKSL is a member) and uses handshape morphemes to mark natural gender. The basic distinction is between an extended thumb for male referents and an extended little finger for female referents, but a total of five different handshapes are used in a number of subsystems such as kinship

terms, transitive verbs, and sign names. Byun also began a study of sign language poetry in SKSL. He analyzed two signed renditions of the South Korean national anthem in sign language, as well as a "Korean Alphabet Story" based on the handshapes for the consonants of the written Korean alphabet. There is no tradition of sign language poetry in Korea, so these poems were the first ones to be created and analyzed.

Yang investigated the grammatical status of an interrogative morpheme and its relationship with numeral incorporation paradigms in Chinese Sign Language (CSL). Many interrogative signs in CSL derive from a base sign meaning 'how many', which uses an open hand with wiggling fingers. Three morphologically complex types of interrogative signs with finger wiggling were identified, consisting of up to four simultaneously expressed morphemes in complex signs, such as the sign for 'what-month-and-what-date'. Yang's second study investigated how written Chinese characters enter the CSL lexicon in the form of loans or partial borrowing based on the shape of written characters. Most primary users of CSL are bilingual to some extent and live in constant contact with written Chinese. The pathways of lexical borrowing in CSL are either via hand configurations that imitate the whole shape or part of Chinese characters, via tracing the strokes of Chinese characters in the air, or via a combination of both. Some grammatical features of CSL are added to the loan word or partially borrowed character in order to integrate the resulting sign into the visual-gestural channel of sign language.

Schwager's work focused on the morphological typology of Russian Sign Language (RSL). Considering that there are a number of fundamental theoretical problems with respect to the morphology of signed languages, he first identified an optimal classification system for morphological description. Within this framework, two main aims were pursued: firstly, basic morphological processes in RSL were documented. These visual-gestural processes are different from vocal-auditory processes both quantitatively and qualitatively. Secondly, an adequate linguistic system of classification was suggested to describe these processes: morphological marking has three levels of phonological representation (segmental, intrasegmental, and suprasegmental morphology). This was discussed with respect to some representative morphological phenomena in RSL. The results of this investigation show that RSL belongs to a particular mixed morphological type with featural inflection and (sometimes simultaneous) agglutination, a type that is unusual in spoken languages.

10.2 Crosslinguistic projects

10.2.1 Possession and existentials

Typological studies across sign languages aim at investigating particular grammatical domains and construction types using data from a wide range of geographically and genetically unrelated sign languages around the world (Zeshan 2004). Both data generated within the Sign Language Typology group and data contributed by collaborating coresearchers in other countries enter into the comparative analysis of sign language structures, which is then compared with what is known about spoken languages with respect to the target domain. Each study comprises data from around 30-40 sign languages.

In 2004, a new crosslinguistic project on possession and existentials was launched. The project investigates how attributive possession ('my house'), predicative possession ('I have a house.'), and existence ('There is a house.') are expressed across sign languages, and these findings are related to typological studies of possession in spoken languages (e.g., Heine 1997, Stassen 1995, Chappell & McGregor 1996). A pilot study compared some of the core target structures across the sign languages represented in the project group itself in order to get an initial idea of the range of linguistic diversity, which was found to be considerable. Subsequently, Zeshan and Schwager developed stimulus materials to elicit target constructions, and Zeshan developed an extensive questionnaire for participating coresearchers to work with. The stimulus materials consist of four different game activities to be run with pairs of signers and to be used in conjunction with the questionnaire. The materials consist of pictures, cards and charts and target individual subcategories of the domain of investigation. For instance, a family-relationship chart targets inalienable possession with kinship terms, a picture comparison task targets possessed items that are modified or quantified, and another game targets body-part possession (Figure 10.1). All project materials are used within the Sign Language Typology group and are also sent to coresearchers in other countries. Schwager and Byun elicited data using the stimulus materials in Germany and in South Korea. At the end of 2004, the coresearchers involved in the crosslinguistic project were based in 17 geographic locations around the world (Australia, Spain, Israel, Venezuela, Greece, Hong Kong, the UK, Catalonia, Austria, Jamaica, Japan, Belgium, Finland, the US, Québec, Croatia, and the Netherlands). New participants are still being added to the study, as well as data from the sign languages represented in the Sign Language Typology group itself in 2004 and 2005 (China, India, Turkey, South Korea, Brazil, Bali, Russia, and Germany).

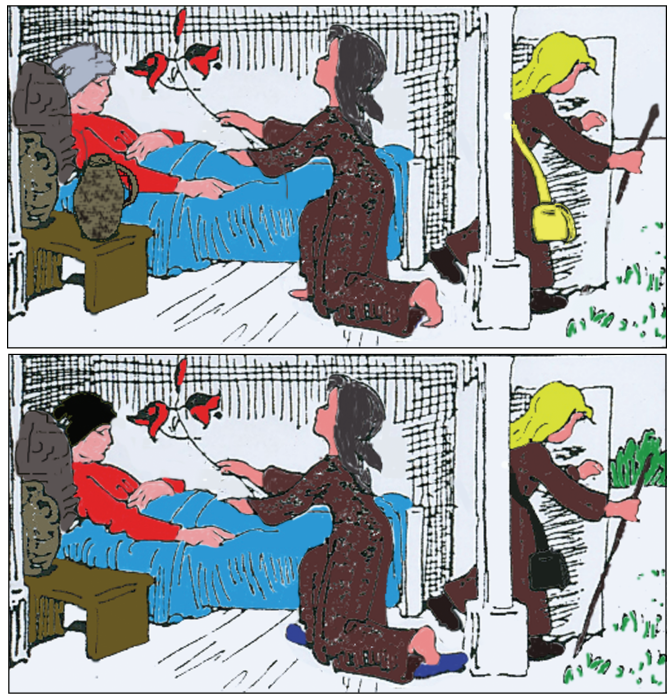

Figure 10.1: "Who has what?" - A pair of pictures from the picture comparison task

10.2.2 Contact signing

The Sign Language Typology project operates in a unique setting in that native deaf signers from various countries with different sign language backgrounds work closely together in a research situation for extended periods of time. Communication within the group keeps changing depending on the current composition of the group. The improvised inter-sign communication evolving in this setting is being documented and the data kept for later analysis. In addition, the emerging sign pidgin was taught to hearing Institute members in a three-month sign communication course in order to facilitate more interaction between the deaf project members and the hearing Institute staff.

Since January 2004, conversations between dyads of signers from different countries have been recorded (see Figure 10.2), always involving, as far as possible, the same time intervals:

a. The very first encounter
b. The second day of contact
c. After one week of contact
d. After one month of contact

These data are part of the browsable corpus hosted by the Institute. In a further step, the spontaneous conversations will be supplemented with an experimental setting where short clips from one sign language are presented to a signer of another sign language under a variety of conditions. This should provide some clues about inter-sign intelligibility under controlled conditions.

Figure 10.2: Contact signing study: A Turkish and a Korean deaf signer communicating in their second meeting

10.2.3 Sign Language Typology database

One of the aims of the Sign Language Typology project is to create a searchable multimedia database with typological data from sign languages around the world. The database will initially include typological information from the following target domains:

- color terms
- interrogatives
- kinship terms
- negatives
- numbers and numeral incorporation
- possession and existence
- signs related to sensory perception

In 2004, the project group began compiling example utterances, word fields and morphological paradigms matching these domains. Partial data sets were created for sign languages from Turkey, mainland China, Hong Kong, the Netherlands, and Russia. In addition to these typological data in a narrower sense, a further step will be to incorporate fully transcribed sample texts from each sign language represented in the database, as well as basic information about the languages and the language communities themselves.

10.3 Collaboration with other projects

10.3.1 Space Project

The Sign Language Typology group is associated with the Institute's Space project for investigating the use of space in sign languages. Of particular interest is the use of space in Kata Kolok, a village-based sign language in Bali, because some of the patterns found in Kata Kolok differ markedly from what is known about urban sign languages around the world. Fieldwork in Bali was conducted in November and December 2004, and the data will be analyzed by two new project members from Bali from January 2005 onwards. It remains to be seen whether and how the system of absolute spatial reference used in spoken Balinese correlates with the Kata Kolok Sign Language.

10.3.2 Reciprocals across languages

The use of space is also an important feature in the Reciprocals Across Languages project (Evans, U. Melbourne), a subproject of Event Representation, in which Zeshan is a co-investigator. Using stimulus films designed for this project, Zeshan conducted fieldwork with deaf signers in India in April 2004. The data are being analyzed by Zeshan and Panda within the general framework of the project, and the results will be compared to the findings from the various spoken languages represented in the project.

10.4 Applied linguistics projects

Members of the Sign Language Typology project and their partners are involved in the practical application of research results in sign language linguistics and such neighboring disciplines as special education for the deaf, particularly in developing countries. The cooperative projects in applied linguistics aim at knowledge transfer, the training of local personnel, in particular among the local deaf communities, the implementation of educational programs in the target countries, and changes in language policies, such as official recognition for sign languages.

10.4.1 India

Zeshan continued her association with the Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH) in Mumbai, India, where the Sign Language Cell has been developing sign language teaching materials and training modules. Hearing candidates can earn a diploma in Indian Sign Language interpreting, whereas deaf candidates receive training in Indian Sign Language teaching. In 2004, Zeshan and Panda developed and produced the third-level course in a series of video-based Indian Sign Language course materials, thereby completing the teaching materials for the nationally recognized sign language interpreter training program.

10.4.2 Turkey

Zeshan and Dikyuva developed and produced a beginner-level course in Turkish Sign Language (Türk Işaret Dili). This video-based course is the first sign language course available in Turkey. The course aims at mastering the most important grammatical structures and achieving basic communicative competence in Türk Işaret Dili. A first group of deaf signers was trained by Dikyuva in sign language teaching methodology at the Centre for Continuing Education at Boğaziçi U. in Istanbul. Sign language classes for hearing target groups are being taught at the Disability Centre of the Istanbul Municipality.

10.5 Signed Lectures

The Sign Language Typology project initiated the "Signed Lectures" series in 2004. In these lectures, a member of the group or an outside guest, usually a deaf researcher, gives a signed presentation on a topic in one of the subject areas of sign language research. Presentations are either in International Sign or in the presenter's own national sign language and are interpreted simultaneously into spoken English. In 2004, lectures were given by Yang, Byun, Schwager and Panda.

Chapter 11
Other Research

Introduction

11.1 Children's understanding of the basic temporal concepts

11.2 Endangered languages documentation

11.3 DoBeS ǂAkhoe Hai‖om project

11.4 Fieldwork and analyses of Mon-Khmer languages

11.5 Paradigmatic structures in morphological processing

11.6 Effects of pitch accent type on the interpretation of information status

11.7 Prosody and parsing ambiguous NP and S coordinations

11.8 Establishing coherence in discourse

11.9 The semantics of quantifiers in natural languages

11.1 Children's understanding of the basic temporal concepts

Schmiedtová and Gretsch continued examining children's understanding of the basic temporal concepts "sequentiality" and "simultaneity" and the relation between language and cognition (see Annual Report 2002). In addition to the data of 50 German children (age range 3;1 – 7;8) that were collected in 2002, a new data set from 27 monolingual German children (age range 3;7 – 6;2) was obtained in 2004. As in the previous study, the same elicited production task was used: six temporal relations were depicted by video clips showing two prototypical lamps turning on and off in different temporal orders. The variables' order and the color of the lamps were controlled.

Also similar to the previous testing trial, the main point of the experimental design was to separate a cognitive from a linguistic task. To examine children's nonverbal (cognitive skills), children were asked to act out the temporal relation they saw in the movie with the aid of the same set of lamps as used in the stimulus. These lamps were placed in front of them. Then the same children described the scene in their own words (linguistic abilities). For the new data set, the order in which these two tasks were performed was changed: children first retold the stimulus and acted it out afterwards.

As discussed in the Annual Report 2002, this experimental design allowed for detecting two atypical responses: (i) the exclusive match between language task and the stimulus (conceptual misalignment), and (ii) the exclusive match between the language task and the cognition task (internal coherence).

This means in the case of (i) children incorrectly acted out the temporal relation from the stimulus, but they described it correctly in the linguistic task. In the case of (ii), the acting out part corresponded to the children's verbal description but neither depicted the presented stimulus. Case type (i), conceptual misalignment, was found in 44 out of 77 children (both experimental trials together). Case type (ii), internal coherence, occurred in 68 out of 77 children (both experimental trials together). Both case types were found across all tested items. Additionally, both were found in the reverse testing orders: language task before acting-out.

These unexpected responses show that in case of conceptual misalignment a successful linguistic performance can be displayed despite the temporarily missing conceptual representation. In other words, language can be ahead of its conceptual counterpart. The case of internal coherence suggests that children are able to decouple the stimulus from the performance in both tasks. The course of the developmental curve provides additional information about these two responses: for case type (ii) the number of occurrences does not decline

with age, but remains the same across all three age groups. In contrast, the highest number of case type (i) occurrences can be seen in the middle group (3.10 - 5.2) and begins to decline in the oldest group (5.3 - 7.8). This suggests that internal coherence is employed by children as a strategy to deal with this type of task. Conceptual misalignment, on the other hand, occurs mainly when children's linguistic skills are on the increase. Thus, it can be said that conceptual alignments reflect to some degree developmental changes.

The existence of conceptual misalignments directly confronts the claim that cognitive skills are always necessary prerequisites for linguistic abilities. In other words, children can be saying something that is conceptually not yet completely facilitated. In line with this claim, Gretsch and Schmiedtová propose a speaking before/for thinking hypothesis as a complementary way of understanding the developmental interplay between cognition and language (see Slobin 1996).

11.2 Endangered languages documentation

In 2004, as in previous years, many staff, Ph.D. students, and visitors at the Institute began or continued primary field work contributing to the documentation and analysis of endangered languages. A number of these were part of the DoBeS Program (see 11.3).

RESEARCHER	LANGUAGE	COUNTRY	APPROXIMATE NO. OF SPEAKERS
Penelope Brown	Tzeltal Yélî Dnye Lacandon	 Papua New Guinea Mexico	200,000 4,000 300
Niclas Burenhult	Jahai Lanoh	Malaysia Malaysia	1,000 360
Connie Dickinson	Tsafiki	Ecuador	2,000
Michael Dunn	Touo	Solomon Islands	4,000
Nick Enfield	Kri Brou (Katang)	Laos Laos	250 20,000
Alice Gaby	Kuuk Thaayorre	Australia	300
Stephen Levinson	Yélî Dnye	Papua New Guinea	4,000
Loretta O'Connor	Lowland Chontal	Mexico	200
Ger Reesink	Sulka	Papua New Guinea	1,000
Stuart Robinson	Rotokas	Solomon Islands	4,500
Angela Terrill	Lavukaleve	Solomon Islands	4,000
Claudia Wegener	Savosavo	Solomon Islands	2,500
Thomas Widlok Gertie Hoymann Christian Rapold	ǂAkhoe Hai‖om	Namibia	10,000

11.3 DoBeS ǂAkhoe Hai‖om project

The language documentation team in the ǂAkhoe Hai‖om project led by Levinson as part of the DoBeS program (funded by the Volkswagen Foundation) has completed its first of three years of research. The team consists of Widlok, Rapold and Hoymann and its objective is the documentation of the language and culture that constitute the endangered social practices of a small group of southern African Khoisan speakers in northern Namibia.

The first year of the project comprised two field research periods and a systematic stocktaking of the existing linguistic material. Since community involvement in language documentation is a prime aim of all DoBeS projects, the liaison with the Hai‖om speech community has been central. At the same time about 70 hours of new digital video recordings have been added to the Hai‖om corpus (of approx. 50 hours) that already exists in the MPI media archive. The new material covers a wide range of speech situations including everyday speech situations involving a variety of speakers. This is particularly relevant for a documentation of the largely "egalitarian" pragmatics that characterize ǂAkhoe Hai‖om and that form a critical part of the threatened language resources of this speech community. The process of transcribing the material and of preparing the interlinearization has begun with local assistance. Characteristic for much of ǂAkhoe Hai‖om everyday speech as well as more formalized storytelling events and language in ritual is a complex interlocking mode. In the documentation and language analysis Rapold is carrying out specific lexical-semantic and syntactic research using the MPI toolkit, and Hoymann has started work on the syntactic aspects of the interrogatives and on the pragmatic aspects of question-answer sequences. Widlok is focusing his attention on names and kin terms in relation to the nonlinguistic milieu that influences the use of language.

11.4 Fieldwork and analyses of Mon-Khmer languages

Staff members Burenhult and Enfield conducted research on Mon-Khmer languages of mainland Southeast Asia, in collaboration with Gérard Diffloth and Samruan Wongjaroen (EFEO, Phnom Penh), who visited MPI Nijmegen during October and November. Enfield conducted preliminary grammatical analysis of Kri, a Vietic language of the Eastern branch of Mon-Khmer spoken along the Laos-Vietnam border in Central Laos. The language is endangered, with a total of about 250 speakers living in three villages (Mrka, Srô, and Paluunq) along the Nam Noy River. Enfield's July/August field trip to the area is the first ever documentation of Kri. Preliminary analysis of Kri phonology and morphology was done in collaboration with Diffloth. Enfield and Diffloth devised a preliminary notation and transcribed a Kri vocabulary of about 1300 entries, digitally

recorded in the field by Enfield. Kri presents unusual phonetic difficulties, including a contrast of postglottalization in syllable-final consonants, a syllabic register distinction between breathy and clear phonation, and very fine vowel height distinctions with as many as 18 contrasts in vowel quality. The phonetic problems were isolated one by one, and the transcriptions were checked by cross-comparison made easy using the ELAN annotation tool developed at MPI Nijmegen. Enfield and Diffloth also worked on transcription of vocabulary items from another previously unrecorded language, Katang, using field recordings made by Enfield in Laos in 2000 and 2001. It was possible to confirm that Katang is a variety of Bru, a Katuic language of the Eastern branch of Mon-Khmer, spoken in Laos, Thailand, and Vietnam.

Diffloth lent his expertise on historical and comparative Mon-Khmer linguistics to collaboration with both Enfield (on Kri and Katang) and Burenhult (on Jahai and Lanoh), consulting with a massive database of Mon-Khmer cognates. Diffloth and Burenhult found that the Northern Aslian subgroup departs typologically from Aslian in general in several significant ways, with possible implications concerning cultural affiliation among Aslian groups.

Diffloth also continued and developed his research on expressives, in collaboration with Enfield on Lao.

11.5 Paradigmatic structures in morphological processing

In collaboration with Tabak (Radboud U. Nijmegen), Baayen continued the investigation of the differences in semantic density between regular and irregular verbs and their consequences for lexical processing. Logistic regression analyses showed that whether a Dutch verb is regular or irregular can be predicted not only from its frequency, but also from its neighborhood density, inflectional entropy, morphological family size, number of meanings, its auxiliary, and its number of argument structures. All these variables were observed to be predictive for both response latencies and errors in a visual lexical decision study using a regression design with 286 Dutch verbs (143 regulars and 143 irregulars matched in the mean for lemma frequency). The greater number of synsets characterizing irregulars led to especially short response latencies for irregular past plurals. Moreover, a higher information complexity, as estimated by the inflectional entropy measure, led to shorter response latencies, and especially so for irregular verbs. This leads to the conclusion that the greater semantic density of irregular verbs affects lexical processing in a task that is known to be highly sensitive to word meaning.

In simple word naming, most semantic predictors, with the exception of the family size measure, were not predictive, as expected for a task that does not

require deep semantic processing. However, in cross-tense naming, where participants are asked to produce the past (or present) tense form when given the present (or past) tense form, inflectional entropy, number of argument structures, and auxiliary emerged as significant predictors. Interestingly, the lower the frequency of the form to be articulated was compared to the form shown on the screen, the longer the cross-tense naming latencies were.

This effect was equally strong for regular and irregular verbs, and appeared irrespective of whether participants were naming the past from the present or naming the present from the past. Apparently, cross-tense naming involves the resolution of competition between the two inflectional variants. This competition finds a natural explanation in exemplar-based models in which inflectional variants have their own lexical representations. However, in exemplar-based approaches, past tense forms need not be accessed (or derived) via the present tense stem, instead, they can be accessed directly. Possibly, cross-tense naming induces lexical competition as a task effect that does not arise in normal production of the past tense.

In collaboration with Boroditsky (Stanford U.), Baayen addressed the question of whether language-specific paradigmatic interconnectivity in the mental lexicon might affect nonlinguistic cognition. We asked participants to provide similarity ratings for pairs of objects presented pictorially side by side on a computer screen, and investigated the effects of native language (English or Dutch), language of instruction (English or Dutch), the morphological relatedness of the picture names in Dutch, and two measures of lexical connectivity on perceived picture similarity. The experiments revealed effects of the connectivity measures for the name of the left picture of the pair, as well as effects of morphological relatedness and of the language in which the experiment was performed. The higher similarity ratings for pictures described by words that are morphologically related provide further support for the subtle interactions of linguistic and nonlinguistic cognition.

Further evidence for such interactions was obtained by Baayen in collaboration with Hay (University of Canterbury, Christchurch). They observed the effect of nonlinguistic variables such as natural class and size on subjective frequency ratings and visual lexical decision latencies, as well as the effect of linguistic distributional variables for paradigmatic connectivity on nonlinguistic subjective estimates of object size and weight. In size and weight estimation, words with greater paradigmatic connectivity elicited reduced ratings, suggesting that spreading activation in the mental lexicon attracts resources that would otherwise have been available for weight or size estimation.

11.6 Effects of pitch accent type on the interpretation of informaton status

A. Chen undertook a project to investigate the prosodic signalling of information status. It is well established that in languages such as English, the placement of pitch accent (i.e. accentuation vs. deaccentuation) is of great importance in signalling/interpreting whether a given discourse entity conveys new information or given information. According to discourse-oriented theories of intonational meaning in British English such as Brazil (1975), Gussenhoven (1984) and Steedman (2000), given information can also be signalled by accentuation, just like new information. Crucial is the choice of pitch accent. That is, some pitch accents would seem to connote the notion of 'new' information, whereas other pitch accents the notion of 'given' information.

In collaboration with den Os (MPI) and de Ruiter (MPI), Chen examined the effect of pitch accent type on the interpretation of information status in British English, adopting the eye-tracking paradigm used in Dahan, Tanenhaus and Chambers (2002). Subjects followed instructions (e.g. *Put the candle/candy below the triangle; now put the candle above the square*) recorded in a human voice (Experiment 1) as well as a synthetic voice generated by the Festival TTS system (Experiment 2), and moved objects displayed on a computer screen. Subjects' eye fixations on pictured entities were monitored while they were performing the task. In each trial, two of the objects shared the same stressed syllable (e.g., *candle* vs. *candy*) or the stressed onset-peak cluster (e.g. *cake* vs. *cage*) such that the target noun (i.e. *candy, cage*) in the second part of the instruction is temporarily ambiguous during the first syllable and both the target noun and the competitor (i.e. *candle, cake*) are potential referents at that stage. The target word in the second part of the instruction were realised with two postulated 'new' pitch accents, H*L (Brazil 1975, Gussenhoven 1984, Steedman 2000), L*HL (Brazil 1975, Gussenhoven 1984), and two postulated 'given' pitch accents, H*LH (Brazil 1975, Gussenhoven 1984), L*H (Brazil 1975, arguably Steedman 2000) as well as without accent.

Initial results from the experiment using the human voice show that as predicted, when the target word in the second instruction was mentioned in the first instruction (e.g. *Put the cage below the triangle; now put the cage above the square*), there were more fixations to the competitor picture (i.e. *cake*) when said with the 'new' accent H*L than when said with the 'given' accent H*LH and deaccentuation. The opposite holds true when the target word in the second instruction was not mentioned in the first instruction (e.g. *Put the cake below the triangle; now put the cage above the square*), i.e. there were more fixations to the competitor picture when it was said with the 'given' accent H*LH

and deaccentuation than when said with the 'new' accent H*L. Unexpectedly, the 'given' accent L*H had the same effect as the 'new' accent H*L; the 'new' accent L*HL had the same effect as the 'given' accent H*LH. These findings show that type of pitch accent can and do affect listeners' interpretation of information status and that some pitch accents appear to have different functions than theories of intonational meaning predict.

11.7 Prosody and parsing ambiguous NP and S coordinations

Together with Kerkhofs and Schriefers (Radboud U. Nijmegen) Vonk continued research on the interaction of prosody and syntax. The materials consisted of sentences, locally syntactically ambiguous between an NP-coordination and an S-coordination reading, such as "The model kissed the designer and the photographer [at the party/opened a bottle of wine]". The detection of a syntactic break necessarily follows detection of a corresponding prosodic break (before "and"), making an investigation of the immediate interplay of syntactic and prosodic information impossible. We presented a solution to this problem by embedding sentences in a discourse context that induces the expectation of either the presence or the absence of a syntactic break right at a prosodic break (Annual Report 2003:131/2). Event-related potentials (ERPs) to acoustically identical sentences in these different contexts were compared. In principle, the recorded materials in that experiment allowed for a complete design with the three factors Prosodic Break (break vs. no break), Context (neutral vs. biasing), and Syntactic Disambiguation (towards S-coordination vs. towards NP-coordination). Because a complete design with these three factors would have made too long an experiment, half of the design was tested: The prosodic structure was kept constant within the actor Syntactic Disambiguation such that the syntactic disambiguation was always opposite to it. But it provided a complete design for investigating the effect of contextually induced expectations at the prosodic break. We found that the Closure Positive Shift, an ERP component known to occur after prosodic breaks, was significantly smaller when a prosodic break coincided with the expectation of a syntactic break than when a syntactic break was not expected at that point in the sentence. The other half of the design was tested in a follow-up experiment with a new group of participants. In this other half the prosodic structure was in line with the syntactic disambiguation. The results of this follow-up experiment confirmed the results reported earlier (Annual Report 2003). Together, the results establish that the brain matches prosodic information against syntactic information immediately.

11.8 Establishing coherence in discourse.

In collaboration with Commandeur, Cozijn and Noordman (Tilburg U.) Vonk investigated how processes to establish referential coherence (entities in one sentence refer to entities that are mentioned in a previous sentence) relate to processes to establish relational coherence (the meaning of one sentence is conceptually related to the meaning of a previous sentence). In a first experiment it was investigated how quickly information concerning the relation between sentences is available during comprehension and whether that information is used in identifying the referent of a pronoun. In a Visual World Paradigm experiment sentences such as "The snail failed to see the pig at the party because he was conceited and because he was unattentive that night" were presented over ear phones while a display of the two protagonists and a third entity (referring to "the party") were presented visually. The eye movements of the participants were recorded during the auditory presentation. The analysis of the eye fixation data indicated the successive effects of syntactic, semantic, and world knowledge information on looking at the entities in the course of time. As soon as the first pronoun is heard, a syntactic effect of parallel syntactic interpretation is observed: Participants look at the entity that corresponds to the first mentioned entity. Slightly after the first pronoun is heard, a semantic effect of the meaning of the verb in the first clause is observed: Participants fixate the entity that conforms to the "implicit causality" of the verb. These interpretations' are made in a predictive way, with the risk of a wrong pronoun resolution. As soon as the conceptual information in the third clause is heard that allows the intended referential assignment, eye fixations to the 'correct' antecedent dominate. This indicates that referential coherence is achieved as soon as the information concerning the relational coherence is available.

11.9 The semantics of quantifiers in natural languages

Seuren continued his enquiry into the logic of language and thinking, which started in 2001 (see Annual Report 2002). He has almost completed a book on the subject.

Chapter 12
Technical Group

Introduction

12.1 Externally funded projects

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Introduction

In 2004 the TG received a substantial amount of external funding to continue its increasing activity in archive creation, management and exploration and for achieving cross-discipline metadata interoperability. In addition to this the TG stimulated and participated in several new international activities.

Work in the TG is carried out in seven major groups: server systems, desktop systems, electronic labs, experiments, information and database systems, corpus management and corpus software development. The first five include the standard support for our researchers in carrying out their experiments, observational studies, and in analyzing their material. Corpus management has slowly developed into another major pillar, ever since we recognized that the MPI corpus was no longer simply a repository of final products, but had gradually become a reliable source of initial data. Consequently, request for improved corpus-management tools and corpus-exploitation tools had increased substantially.

The tools created by the TG are available on the Web at www.mpi.nl/tools and the corpora can be accessed via www.mpi.nl/corpora. All tools developed at the MPI are available for use free of charge and are distributed under the open-source license model.

12.1 Externally funded projects

The year 2004 saw the conclusion of a number of externally funded projects: development of the Corpus Exploitation Tool (COREX) for the Dutch Spoken Corpus project, the European Cultural Heritage Online (ECHO) and Integrated European Language Resources Area (INTERA) projects, as well as the first phase of the MPI's role within the Documentation of Endangered Languages (DoBeS) project. A few new projects began in 2004 or were scheduled for early 2005, among these being the collaboration with the Dutch Institute for Lexicology (INL) to develop a management framework for a dynamic corpus, and the European projects, Distributed Access Management for Language Resources (DAM-LR) and Linguistic Infrastructure for Interoperable Resources and Systems (LIRICS), a project in collaboration with the MPI for Evolutionary Anthropology for developing a Web-based corpus exploitation framework.

The delivery of the last version of the Dutch Spoken Corpus (CGN) marked the end of the COREX project. The COREX software was delivered on time as an exploitation shell allowing the user to work with the CGN CD-ROM. The CD-ROM version of CGN and the COREX tool are distributed by the European Language Resources Association (ELRA). The COREX tool was tested and remaining bugs were eliminated. In addition, a CGN version was transmitted to the new Text

Center, a foundation set up by the Dutch Institute for Lexicology (INL). Some assistance was provided in installing it on the servers and in creating demos. For the TG this marked the successful completion of its role in this large Dutch project. It was obvious that a project as large as this would inevitably develop its own dynamics, which would require redefining several of its initial goals. It is only due to the excellent communication with our major contact partners within the CGN project that allowed the final product to be fully operational just shortly after delivery.

The ECHO project also came to an end with two major TG contributions: (1) A prototype of the ELAN software that supports online collaboration of remote researchers working on an annotated media resource and (2) a framework for metadata interoperability. In addition to development a number of training courses were provided. Web-based collaboration is an interesting topic and for static Web content there are methods and frameworks readily available. Web-based collaboration falls into two categories: online and offline collaboration. In offline collaboration collaborators' comments to Web content must follow one another, whereas during online collaboration people may work simultaneously on a topic, i.e., all information must be synchronized with all participants. (This is the same principle used by Chat programs.) The task was to extend ELAN in such a way that collaborators could work at the same time on an annotated media documents, i.e., a streaming audio or video file that is associated with several layers of time-aligned textual data. A prototype was developed that would allow such work to be carried out and it was demonstrated to a number of users. Researchers could see immediately what the others were doing, in that all annotations were updated immediately on the screens of all participants. A media server delivered the media streams.

This ambitious metadata project required the integration of ten different metadata sets from five different humanities disciplines – linguistics, art history, history of science, ethnology, and philosophy. A complete ontology was constructed, partially automatic and partially manual, to solve the problems involved. A project-specific data-category registry was introduced to include all concepts used in the different metadata schemes, and mapping relations between them were defined wherever possible. Special mapping files were generated in addition to the two geographical thesauri and two content-description thesauri, Iconclass and the Art and Architecture Thesaurus (AAT). In addition, a mechanism was developed to allow the harvesting of all metadata records, porting them into validated XML files and allowing fast searching by use of prefabricated binary indexes. Ontological matching was used to extend the index, since ontological extension in real time would have led to unacceptable

latencies. Documents can be found under http://www.mpi.nl/ECHO and the search site is available at http://corpus1.mpi.nl/ds/dora. Both the ontology components and the source code are available on request.

The INTERA project had two major components: (1) A metadata infrastructure was to be created with a critical mass of searchable metadata descriptions and (2) parallel corpora were to be created for less spoken languages. The Institute was an active partner in the first task. For this the TG completed the ISLE Metadata Initiative (IMDI) metadata infrastructure. It encouraged several important data centers in Europe to create metadata descriptions making their resources visible via searching and browsing methods. At this time about 50 institutions worldwide are contributing actively to the visible language resource domain. When downloading the IMDI browser, this domain becomes visible, and soon the IMDI descriptions should also be searchable via Google. The TG expects increased institution participation, making their resources visible to the research community. Furthermore, a preliminary test was conducted to select a suitable Web-service tool for use even remotely once an interesting resource had been located. This work was done in close collaboration with the German Research Center for Artificial Intelligence (DFKI) in Saarbrücken. The work is described in detail at http://www.mpi.nl/intera.

The first phase of the Institute's contribution to the DoBeS program, concluded into 2004 and the TG began an evaluation of this phase. DoBeS now has 24 documentation teams operating at different sites around the world. Seven of these teams will finish their documentation work in 2005. The MPI's primary task was to establish a harmonized language-resource archive that was coherently catalogued, that used a widely accepted standard and that could be easily accessed via the Web. IMDI was developed for the catalogue system and DoBeS largely contributed to this standard. The standards chosen for the DoBeS archive are: UNICODE to represent characters, XML as the structure language for text documents, plain text or HTML for unstructured documents, MPEG2 as video backend format and JPEG or TIFF as image format. Creating the archive required efficient organization of digitization, data conversion, corpus structure creation and data integration. The result is a well-organized and accessible corpus. The responsible members of the teams are able to define access policies for resources in their respective subdivisions. Copies of the DoBeS archive now exist at seven different locations. In addition to this corpus-creation support, the TG assisted in the training of the team members, in the organization of the DoBeS summer school, in providing advice on equipment, and in its contribution to publicizing DoBeS ideas at numerous international conferences. It was the DoBeS program that cofunded the tools IMDI and ELAN as well as the

metadata-based access-rights management system. The year 2005 should see a switch to Web-based corpus ingest and exploitation tools. All in all the result of this four years of work has been successful, although there is still work to be done to improve the quality of interaction with documentation teams. A first step in this direction was taken with the establishment of the Language Archive Newsletter (LAN). Further details can be found at http://www.mpi.nl/DOBES.

In anticipation of the Digital Endangered Language and Musics Archive Network initiative (DELAMAN) and the Distributed Access Management for Language Resource archives project (DAM-LR) due to start in early 2005, the TG organized a very successful international workshop on the topic, bringing together experts from different areas of linguistics, language-resource archivists, "traditional" archivists and technologists from Grid-related activities. The workshop provided a clear indication of the requirements from the user and archivist side and the possibilities present technology can offer. All in all it provided an optimistic outlook for the coming DAM-LR project and reflected the clear interest on the part of our Australian and American colleagues in joining the project.

We should also mention active contribution to the International Organization for Standardization (ISO) technical subcommittee TC37/SC4 for language resource management. The IMDI semantics have become part of the ISO data category registry and the work on the Lexicon Markup Framework (LMF), a flexible standard for lexical modeling, has almost been completed. With LEXUS (see below) the MPI has developed the first tool for implementing this new standard.

12.2 Computer systems and networks

In 2004 the TG completely renewed the storage system. The capacity of the Tape Library was increased so that it can now handle up to 50 TB of data. The disk RAID system was replaced by a two-layer RAID system, one fast RAID system with 4 TB will house all metadata and textual data and will operate as a primary cache, another 14 TB RAID system with slower technology is planned to house a copy of the entire current corpus. This will help to bypass the old problem of users having to wait for data first to be staged from the tape library before being ready for access. At the same time the old Sun servers were replaced by two new Sun Fire V440 servers. The nucleus of the system is still the same SAM-FS storage management system that has operated until now without any critical errors. At the MPI we automatically create three copies. For the DoBeS archive two further copies are generated at the computer centers in Göttingen and Munich, each of them having their own redundancy strategy, i.e., creating at least two copies. Increasingly more of the MPI corpus (currently at about 11 TB) will be subject of the same exchange strategy. With the help of

the simple Rsync mechanism a copy will be generated automatically in Göttingen and using the Andrew File System (AFS) another copy will be sent to Munich. The MPG now provides an institutional guarantee of 50 years for archival material stored at one of the two computer centers. It requires that the data be well described. This condition is fulfilled by the MPI archive, as all of its objects are described by the IMDI metadata set.

The old NT servers were upgraded to Windows 2003 servers and Active Directory technology was introduced. In addition, the Institute has switched from McAfee to Sophos for anti-virus protection, and for the increasing problem of spam, it relies on the spam filter provided by the GWDG, which has proven to be an excellent service. Finally, the TG extensively tested the Mozilla packages Firebox and Thunderbird and intends to replace the antiquated Netscape mail client.

12.3 Information systems

One of the basic decisions in 2004 was to change completely the Web presentation of the MPI. A new design was worked out with the help of a Web designer and the decision was made to change over to an open-source Web-authoring tool. The combination of Zope as a Web-application server and Plone as a content management system was finally agreed upon. Currently, the entire design is in Zope/Plone and the transformation of the content is scheduled for early 2005. There are already many Web applications, most of them based on Perl CGI solutions, where a relational database management system is used to store the data. Since Zope is based on Python, it will be impossible to turn over all these existing applications in one step. An architecture in which the normal Apache Web server will redirect certain requests to the Zope server will be used. In any case, all scientific Web applications having to do with the language archive will be based on Java-Servlet solutions and kept separately.

During 2004 several important basic services were also updated. These include TGORG, the database containing all the MPI equipment, PROEFPERSONEN the database with all experimental information, and DIGIDB, the database with workflow data about the state of all archival objects. The work on the Web-based speech-error database was finished and additional Web applications were developed: a journal questionnaire, a logbook facility for experiment rooms, and a checkpoint facility for better guidance of Ph.D. students.

An increasing amount of time was spent on converting file formats. Special programs for converting Excel into Electronic Application Form (EAF) files, MS Word into EAF files, Transcriber into EAF files, Signstream into EAF files and merging different MS Word-based lexicon fragments to one Shoebox lexicon file

were developed. EAF is the XML-based ELAN Annotation Format that is used by the ELAN tool and is close to international standards. This conversion is mostly linked with character conversion problems and often the source formats are not formally described. All these problems together make conversion an expensive endeavor. We expect the amount of conversion required only to increase, as there is a vast range of tools applied and the degree of standardization remains low.

12.4 Archive management

The multimedia corpus at the Institute has developed very rapidly over the past four years: it now contains more than 35.000 sessions and Digital Master Files (DMF) covering about 11 Terabytes for one copy, i.e., in total, about 25 TB of storage space is occupied. Aside from the normal integration and checking, much semi-automatic screening was repeated to arrive at a coherent and proven archive. The TG developed programs to reduce structural and formal errors so that the remaining manual work can be kept to a minimum. Currently we are working to correct automatically as much as possible certain content errors in the metadata descriptions. Errors such as using A*frique* as opposed to *Africa* as a continent name continuously occur in the data of those researchers who prefer the use of tools such as Excel to create IMDI metadata descriptions instead of the IMDI editor. Fortunately this error can be identified automatically and corrected, and work of this type will continue for the new corpora ingested by the archive.

The MPI realizes that the central language archive will be crucial to Institute research in the future. Many other resources will form part of the normal scientific workflow for individual work in the future, but their maintenance and survival will be increasingly problematic, as researchers work with an increasing amount of objects. The language archive must become increasingly flexible in its usage, which at the same time will boost the demand on archive management and the risks of errors. A recent workshop at the MPI showed clearly that language archives are not archives in the classical sense, where the content is not subject to change, nor is it purely a digital library to access. The MPI and the DoBeS archives in particular must insure that the material will be preserved for a long time, while allowing at least the secondary data created by linguistic analysis to be subject to change. On the other hand an archive cannot be degraded to a pure workflow system, since this would jeopardize the consistency and quality of the archive. As a response to this, the Institute began development of the new Language Archive Management and Upload System (LAMUS) in collaboration with the Dutch Institute for Lexicology (INL). TheA first version was demonstrated in December (see below). This will allow us to work

in the direction of a more flexible archive while at the same time safeguarding its present content as well as reducing the load on the archive managers.

Increasingly researchers returning from the field find themselves with more recordings than they can process immediately and the Digital Master Files (DMF), the computer copies of recorded tapes, cannot be analyzed as quickly as desired. To cover these cases a special status was created for the DMFs: those not processed within 6 months are exported to AIT tapes kept offline.

The access-rights management tool developed in 2004 was another important step, since it allows archive management to delegate the rights to define access policies to responsible researchers. This was especially important for the DoBeS program one of its objectives is to make as many resources open to interested people as possible. Central archive management would not be able to handle the load expected in connection with such an objective. In another important step, the TG made available technology that allows users to browse the IMDI domain with normal Web browsers. It has also initiated work to make IMDI corpora searchable via Google, subject to certain obvious restrictions.

An effort was made to register again all CD-ROM based corpora ordered by Institute researchers, the library and TG members and to make them accessible via one well-defined portal in the Intranet. This work has been completed making a variety of corpora accessible to all MPI staff.

Despite all shortcomings, it can be said that the MPI has excellent technological means and staff expertise at its disposal to manage an archive of this size at a high level of quality.

12.5 Linguistic applications

It is in this area that the TG carries out most of its development work. Two long-range development projects, IMDI and ELAN, have almost concluded and will now enter a phase of maintenance and extension. The Access Rights Management system was finished and three new lines of development were begun: the Language Archive Management and Upload System (LAMUS); LEXUS, the Flexible LMF compliant lexicon tool; and the Web-based exploitation framework for annotated media files (ANNEX).

12.5.1 IMDI Infrastructure

The core IMDI infrastructure can be considered operational. It consists of (1) the most recent IMDI version 3.03, which is fully augmented by schemas for the element set and the controlled vocabularies, (2) the professional IMDI Editor with increased efficiency options, (3) the mature IMDI Browser with a structured

search component, (4) a gateway to OAI and OLAC that operates according to the OAI PMH protocol, (5) a component for converting IMDI XML files on the fly to HTML, allowing for browsing through the IMDI domain with normal Web browsers and (6) a full-text search component linked with the HTML browsing component. In addition, the complete IMDI element set has been integrated into the ISO Data Category Registry.

After having largely debugged these components, we can now speak of a second phase in which additional functionality will be added from time to time. In 2004 the TG started work on the creation of a component for supporting Google searching across IMDI metadata files. Personnel changes within the TG interrupted additional work on the TreeBuilder and TreeCopier that had initially been scheduled for 2004.

The registered IMDI domain now consists of more than 45,000 session bundles and contributions from about 50 institutions worldwide. The INTERA project developed an easy method for other institutions to create their own IMDI portals and a second IMDI portal is now running at the University of Lund. It should be stated that the IMDI infrastructure will continue to be maintained, as the entire MPI archive is based on IMDI technology. Since IMDI is an enterprise with many contributors in the years to come, the MPI team remains open for suggestions from all interested parties. An international advisory board will have the final say on all changes to the IMDI set.

12.5.2 Access rights management

During this past year the TG completed the first version of an access rights management system based on the IMDI metadata infrastructure. The responsible researcher may select a node in the IMDI tree and may either open or close access to certain resource types for a group of users. With a single command the researcher may both define a group and make all resources accessible to this group. This is the most efficient method of access rights management. The researcher may also couple this with an acceptance declaration, which must be signed by the users before they are allowed access. All commands issued are stored in a database and then regularly expanded into an .htaccess file governing access via the Web and into access control lists governing the access from the local area net. This system will be used until a completely new version based on GRID-type solutions is developed in the DAM-LR project.

12.5.3 ELAN multimedia tool

The core ELAN version came into its final shape in 2004, and its final release is scheduled for early 2005. ELAN has now become a robust and professional tool for the creation and exploitation of multimodal annotations of multimedia

recordings. A recent study by the Speech Processing Expertise Centre (SPEX) praised the precision of ELAN's timing control, a quality that is certainly very important for exacting multimodal studies. The master time can either be set to the video signal, which gives an accuracy at the video frame rate or to the speech signal, which gives an accuracy in microseconds, depending on the sample rate. Of course, the user has to know how exact the relation between the audio and video information is. Different MPEG Codecs can lead to differences. These, however, are constant and can be easily corrected. This is a problem inherent to the MPEG algorithms.

ELAN has a search function allowing searches for complex patterns within an opened annotation file. A more restricted functionality is also currently available for searching in several EAF files, the XML-based output format, in several directories. This multiple-file search tool will gradually be extended. Other major functions of the core ELAN version added in 2004 are (1) a professional printing option allowing the user to specify how complex annotations should appear on paper; (2) a 2D annotation option so that users can draw shapes over time and play them synchronized with a video and (3) a close synchronization with the speech analysis and synthesis program PRAAT, allowing the user to carry out acoustic analysis on the selected segment. The 2D shapes are stored as SVG files and available for analysis.

In the future ELAN will be selectively updated with new functions requested by user groups. Wayne State University has created an IntoELAN version by connecting ELAN with the GOLD ontology.

12.5.4 LAMUS – Language Archive Management and Upload System

One of the new projects started in 2004 was the LAMUS system, which will combine archive management and resource uploading functionality, all driven by Web-based interfaces. Of particular interest is the upload functionality, since it will allow users to upload new corpus structure elements, metadata descriptions and real resources via the Web. The basic idea is that a user can send a request to archive management for permission to carry out certain work within a specific period of time. When the request is granted, the user is giving a working space in which s/he can manipulate and control various types of files such as IMDI archive structure files, IMDI session descriptions, annotations, media files, lexica etc. When the preparatory work is finished, this user may decide whether to integrate the result into the archive. Only after extensive checks are carried out, is a decision made about accepting the new elements as part of the archive.

A first version was demonstrated in 2004, and we expect this system to be

ready in summer 2005. This will make researchers more independent and self-sufficient and will make the archive more open for changes. The big problem is whether this can insure a consistent archive. Manual archive management is imperative in the first phase. In the end such a mechanism is unavoidable. There must be something provided that is easy for the researchers to use themselves. There are simply too many researchers with too many resources and the requirements of these researchers to extend and modify their data. This would overburden any central archive management structure.

Of course, LAMUS will be coupled with access rights management system so that the researchers can immediately control access to their resources. In early 2005 we will start tests to check and improve our technology.

12.5.5 LEXUS lexicon tool

In 2004 we started work on a flexible lexicon framework that would work locally on notebooks as well as via the Web. This double function was seen as crucial since fieldworkers not only often work on the lexicon at remote sites, but also collaborate via the Web with their colleagues. After preliminary tests with the Sharable and Interactive Web Lexicon (SHAWEL), a prototypical tool to test Web-based collaboration issues and intensive discussions within the ISO TC37/SC4 about a flexible lexicon tool, the design of the LEXUS tool was finally decided upon. In ISO the Lexicon Markup Framework (LMF) standard was proposed as a flexible model for lexica of different structures and content. In this respect it was obvious that language engineers and field linguists had similar problems: there are almost no two lexicons that are identical with respect to structure and attributes, however, the need to carry out cross-lexicon operations becomes more and more evident. LMF is an attempt to define a flexible lexicon standard where lexical substructures and attributes can be combined in Lego building-block fashion. In addition, lexicon components can point to data category registries to serve linguistic encoding interoperability. LEXUS is a first implementation of this LMF standard.

Since Shoebox is a widely used tool and has excellent functionality, it was also obvious that LEXUS would have to have excellent filters for importing from and exporting to Shoebox format. The current LEXUS version allows the definition of arbitrary lexical structures; the reuse of attributes from the ISO, Shoebox-MDF and GOLD data categories; the addition, manipulation and visualization of lexical content; search on several lexica and the definition of a personal visualization (and printing) layout. Currently, the user interface is renewed on user request with the intention of making a first version publicly available in January 2005.

12.5.6 ANNEX annotation exploitation

It was mentioned above that the language resource archive would most likely assume an increasingly important role. If this proves to be the case, it would only make sense to work now on simple but nevertheless powerful Web-based exploitation frameworks. The first step is to develop a framework that allows access to annotated media files via normal browsers. The user would be able to select annotated media files created by ELAN, CLAN or Shoebox and define a workspace, within which s/he would be able to search the content and visualize the hits. The search of a randomly selected number of annotated resources creates problems of interoperability on the character-encoding, structural- and linguistic- encoding levels. The technical-encoding differences can be solved by selecting among a number of formats such as CHAT, SHOEBOX and ELAN. The linguistic-encoding differences require ontological knowledge, that is, the users must have acquired a knowledge of legacy resources to easily create mappings between different tiers and encoding values used on the selected tiers.

For the Web-based visualization we are making use of ideas implemented in ELAN, which include the reuse of existing codes. An initial flexible version of ANNEX was shown in December 2004, and in 2005 the first public version will be launched. With ANNEX we add a new possibility for accessing the resources in the language archive. Currently, it is possible to search metadata and then download or play the individual objects such as a video file with a media player or a SMIL object with a SMIL player such as RealVideo. When the exploitation framework has reached suitable quality we shall add Web-based manipulation options such as changing annotations. However, exact media annotation requires smooth media presentation, which cannot be guaranteed with the current state of network technology.

LEXUS and ANNEX are components of a comprehensive Web-based exploration framework and are based on the LAMUS infrastructure. In 2004 we made an effort to arrive at an integrated design and the look and feel of a graphic user interface that would make it simpler for users to select the language-archive oriented functions they wished to carry out. This work will also be finished in 2005.

12.6 Experimental facilities

The tried and true NESU software package was extended with the addition of minor functionality instigated by concrete experiment requests. In particular, the user interface was augmented so that looks like a normal video recorder and timing/event checks were added to provide more convenience to the user. Several versions of the new NESU light box were built to replace the older NESU boxes. Here we started a redesign to handle communication via the USB 2

connection, since modern notebooks no longer support the parallel port. NESU was also extended to control a notebook-based experiment with two monitors, in which the additional monitor is used for stimuli generation. An increasing problem for experiments with notebooks is the fact that new processors apply speedstep technology, which also manipulates the clocks. This creates problems for precise timing control and we have as yet found no solution for this problem. Frequently, Shuttle PCs are now used in experiments for audio input instead of DAT recorders.

The TG also updated the NESU experiment builder by adding the following features: facilitation of visual building of experiments, more interaction during code generation and better code control. In addition, the builder software was completely redesigned to better fit the increased requirements.

The new baby lab has created many problems on several levels: first of all, several users were using different setups while sharing some of the same equipment, which is often a source of problems. Second, it became apparent over the years that the design of the old NESU box was inappropriate and that it caused a falsification of the information at the start-up time in the baby lab. With the introduction of the new NESU light box the problems were solved.

In 2004 the TG also realized two novel setups: a new portable eye-tracking lab was installed and is running perfectly at a remote site, and an experiment was conducted in which a telephone was used for computer-controlled interaction with subjects.

12.7 Electronics and audio/video facilities

This year twenty-seven expeditions were prepared and tested. Due to a new organizational scheme more time was scheduled for the preparation of these trips. This allowed more time for testing and reduced the possible sources of error. In general the TG got very good feedback from the users, i.e., almost all equipment operated well. In the future the field trip preparation procedure should improve even more with the introduction of a Web-application for field trip planning. Researchers will have to enter their requests sufficiently early and any change in their planning will have to be documented using a simple Web form. At the end of the field trips a short note describing experiences should also be entered. This procedure would guarantee a better overview of all field trip activities and possible sources of error. There is still no ideal solution for the question of whether complete field setups should remain with the researcher or turned back over to the TG. For both solutions there are good arguments. The most important argument for returning the setups is that the TG is in the position to check all components and service them where necessary. However,

given the many field trips involved, this would create a significant work overload.

At the request of researchers a new AV-archive branch was opened. It was intended as a branch of the archive where any request to ingest or to borrow tapes would be documented in writing. As it turned out, researchers did not appreciate this procedure and preferred a return to a less bureaucratic procedure. Experience had shown that in twenty years almost no tape had ever disappeared despite a simple access procedure.

Some new setups were replaced and upgraded such as the multi-camera gesture lab, the major audio digitization stations and an eye-tracking system that had begun to be unreliable.

Once again new recorder types were tested with respect to their possible use in the field. In the video area DV camcorders with three CCD devices have become the first choice, since cameras with one CCD cannot offer sufficient resolution and MPEG2 cameras are still not of sufficient quality. From the many new audio devices on the market the Institute acquired a couple of USB-based audio amplifiers that allow the connection of high-quality microphones and direct storage of the recorded signal on notebooks. Sony released a new MiniDisc recorder that not only allows the user to make compressed recordings but also to make high quality linear PCM recordings as well. Although the files could be viewed as normal Wav files when connecting to the notebook, they could not be played, since Sony encrypts them according to some proprietary digital rights management algorithm. A number of new FlashCard recorders were tested, but revealed weaknesses that prevented the TG from recommending them for the field for the time being.

12.8 Other Activities of the Technical Group

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

12.9 Collaborations

COREX Project *Corpus Exploitation Tools* – NWO funded Corpus Spoken Dutch Project (www.lands.let.kun.nl/cgn/ehome.htm).

DoBeS Project *Dokumentation bedrohter Sprachen* – Tools and Infrastructure for the Documentation of Endangered Languages, funded by VolkswagenStiftung.

INTERA Project *Integrated European (Language) Resource Area* (EC funded) – German Research Center for Artificial Intelligence (DFKI) Saarbrücken, Laboratoire Lorrain de Recherche en Informatique et des Applications (LORIA) Nancy, European Language Resources Association (ELRA) Paris, Institute for Language and Speech Processing (ILSP) Athens, Istituto di Linguistica Computazionale (ILC CNR) Pisa.

ECHO-Project *European Cultural Heritage Omline* (EC funded) – MPI Berlin, Radboud U. Nijmgen, Bibliotheca Hertziana, Rome, l'École des hautes études en sciences sociales (EHESS), Indirizzo e Museo di Storia della Scienza (IMSS Firenze), U Berne, Radboud U Nijmegen, Ethnology Museum Leiden, U London and others (www.mpi.nl/echo).

LIRICS Project *Linguistic Infrastructure for Interoperable Resources and Systems* (EC funded) – Laboratoire Lorrain de Recherche en Informatique et ses 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 *Distributed Access Management for Language Resources* (EC funded) – U. Lund, SOAS London, Instituut voor Nederlandse Lexicologie (INL), Leiden.

Chapter 13
Other Activities

Overview

13.1 Honors/Awards

MIRJAM BROERSMA received the second-place award for Best Student Paper Competition at the 147th Meeting of the Acoustical Society of America 2004.

PETER HAGOORT was elected to the Royal Netherlands Academy of Arts and Sciences (KNAW).

VALESCA KOOIJMAN won the award for the best poster at the 3rd Dutch Endo-Neuro-Psycho Meeting in Doorwerth.

WILLEM LEVELT received the "Zilveren Penning" (Special Merits Medal) of the Radboud University Nijmegen.

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

LORETTA O'CONNOR (with Peter Kröfges, SUNY-Albany) was awarded a three-year grant from the Volkswagen Foundation for documentation of the language and cultural heritage of Lowland Chontal of Oaxaca, an endangered language of southern Mexico. The grant is hosted by University of Hamburg Center for Mesoamerican Studies. She was awarded, and declined, a two-year grant from the Hans Rausing Endangered Languages Project for a similar documentation project.

The Royal Netherlands Academy of Arts and Sciences (KNAW) awarded NIELS SCHILLER membership to "De Jonge Academie" [The Young Academy].

NIELS SCHILLER was appointed Professor of Psycholinguistics in the Department of Cognitive Neuroscience, Faculty of Psychology, Maastricht University.

13.2 Workshops organized

UNESCO workshop on Archiving Technologies

In collaboration with Lund University, Peter Wittenburg organized a UNESCO workshop on archiving technologies for cultural-heritage institutions. This workshop was held in Vilnius (Lithuania) for a whole week in March. Most of the national cultural-heritage institutions of Lithuania participated.

LREC workshop on XML-based richly annotated corpora

In collaboration with Bielefeld University and the Institute for Natural Language Processing Stuttgart (IMS), Peter Wittenburg organized the Language Resources and Evaluation (LREC) workshop in Lisbon in May on the use and benefits of Extensible Markup Language (XML) as the basis for richly structured and annotated corpora. Several contributions demonstrated its enormous potential.

DoBeS training workshop

Peter Wittenburg, Romuald Skiba and Paul Trilsbeek organized the Documentation of Endangered Languages (DoBeS) training workshop in Nijmegen in May. Members of the MPI Technical Group gave various presentations on technical matters related to the documentation and archiving of endangered languages.

Workshop on Feedback

Nick Enfield and Tanya Stivers organized a workshop on Feedback in Interaction (February 12-14). Presenters from MPI Nijmegen were Penelope Brown, Nick Enfield, Stephen Levinson, Jan Peter de Ruiter and Tanya Stivers. Other presenters were Anne Anderson (U. of Glasgow, Dept. of Psychology), Janet Bavelas (U. of Victoria, Dept. of Psychology), Herbert Clark (Stanford U., Dept. of Psychology), Yong Yae Park (Seoul National U., Dept. of English Language & Literature), Martin Pickering (U. of Edinburgh, Dept. of Psychology), Emanuel Schegloff (UCLA, Dept. of Sociology), and Ian Thornton (Max Planck Institute for Biological Cybernetics, Tübingen). The discussant was Paul Drew (U. of York).

Open Day Faculty of Psychology Maastricht

Niels Schiller organized the Open Day of the Faculty of Psychology at Maastricht University (Netherlands Psychonomic Society), 13-14 May.

Tutorials in Behavioral and Brain Sciences (TuBBS)

The Ph.D. students of the Institute organized the 2004 Tutorials in Behavioral and Brain Sciences (TuBBS). The topic of the Summer School, held June 28 – July 2 in Ehzerwold, was: "Multidisciplinary approaches to bilingualism." The Summer School included presentations by David Birdsong (U. of Texas), Annette de Groot (U. of Amsterdam), Marianne Gullberg (MPI Nijmegen), Annick de Houwer (U. of Antwerp), Peter Indefrey (F.C. Donders Centre/MPI Nijmegen), Pieter Muysken (Radboud U. Nijmegen) and Michael Paradis (McGill U. Montreal) and poster presentations by the participants (Ph.D. students from the MPI for Human Cognitive and Brain Sciences Leipzig, MPI for Human Cognitive and Brain Sciences, Department of Psychology, Munich, and the MPI for Psycholinguistics Nijmegen).

Symposium on Language Processing

Niels Schiller organized the Symposium on Language Processing at 3rd Endo-Neuro-Psycho (ENP) Meeting in Doorweerth, 1-4 June.

Workshop on First and Second Language Acquisition

Mirjam Ernestus, as a member of the board of the Nederlandse Vereniging voor Fonetische Wetenschappen, organized a workshop on first and second language acquisition at the MPI for Psycholinguistics Nijmegen, June 18.

Symposium on Roots of human sociality: culture, cognition, and human interaction

Nick Enfield and Stephen Levinson held a symposium "Roots of human sociality: culture, cognition, and human interaction", funded by the Wenner-Gren Foundation for Anthropological Research. The meeting was held in Duck, North Carolina, USA, October 2-9. Invited presenters were Janet Wilde Astington (U. Toronto), Robert Boyd (UCLA), Richard Byrne (U. St. Andrews), Herbert Clark (Stanford U.), Eve Danziger (U. Virginia, Charlottesville), Nick Enfield (MPI Nijmegen), Suzanne Gaskins (Northeastern Illinois U.), György Gergely (Hungarian Academy of Sciences, Budapest), Paul Kockelman (Barnard College, New York), Susan Goldin-Meadow (U. of Chicago), Charles Goodwin (UCLA), William Hanks (UCB), Edwin Hutchins (USCD), Elizabeth Keating (U. Texas at Austin), Stephen Levinson (MPI Nijmegen), Ulf Liszkowski (MPI for Evolutionary Anthropology, Leipzig), Jennie Pyers (UCB), Emanuel Schegloff (UCLA), Dan Sperber (CNRS-EHESS, Paris), and Michael Tomasello (MPI for Evolutionary Anthropology, Leipzig). Invited commentators were Maurice Bloch (London School of Economics), Alessandro Duranti (UCLA), Jane Hill (U. Arizona), and Catherine Snow (Harvard U.). Federico Rossano (MPI Nijmegen) attended as conference monitor. A volume of proceedings is being edited by Nick Enfield and Stephen Levinson.

Workshop A Nijmegen Gesture Centre Day of Gesture Talks

The Nijmegen Gesture Centre, under the coordination of Marianne Gullberg and Asli Özyürek, organized a workshop entitled A Nijmegen Gesture Centre Day of Gesture Talks (July 29). Presenters were Alan Cienki (Emory U. Atlanta), Cornelia Müller (FU Berlin), Jürgen Streeck (U. of Texas at Austin), and Katja Liebal (MPI for Evolutionary Anthropology, Leipzig).

DoBeS Summer School

Romuald Skiba was co-organizer of the International DoBeS Summer School in Frankfurt in September where about 50 participants were instructed in methods and tools in endangered languages documentation. From the TG the following persons contributed to the Summer School: Romuald Skiba, Paul Trilsbeek, Maarten Bisseling, Han Sloetjes, and Peter Wittenburg.

DoBeS workshop on Language Archive Exploration

In collaboration with the MPI for Evolutionary Anthropology Peter Wittenburg organized a workshop in Nijmegen in October on methods for exploring language archives for endangered languages via Web-based technologies.

Graduate Research Training Program on Cognitive Neurobiology
Gabriele Janzen organized a workshop for the Tübingen Graduate Research Training Program on Cognitive Neurobiology (October 5th).

Workshop on Access Management
Peter Wittenburg organized the International Workshop on Access Management for Language Archives in November in Nijmegen. The workshop took place within the framework of the DELAMAN initiative (See also Chapter 12.1). This workshop brought together linguists as potential users of distributed archives, archive managers from AILLA, PARADISEC, ELAR, LACITO, E-MELD, DoBeS and MPI, and technologists that are familiar with GRID and Digital Library technology. A framework was sketched for an access management solution for an emerging distributed archiving scenario. (www.mpi.nl/DELAMAN/ workshop).

39th Linguistics Colloquium
Peter Jordens organized the 39. Linguistisches Kolloquium (39th Linguistics Colloquium) at the Free University Amsterdam, August 25-27.

13.3 Nijmegen Gesture Centre (NGC)

The Nijmegen Gesture Centre (NGC), coordinated by Asli Özyürek and Marianne Gullberg was formed in 2003 to facilitate communication between gesture researchers within the Institute and to maintain visibility to the outside world. During 2004 gesture studies were undertaken in several Institute projects such as in the Multimodal Interaction project (Nick Enfield, Jan Peter de Ruiter, Stephen Levinson), the Dynamics of Multilingual Processing project (Gullberg, Amanda Brown) the Space project (Özyürek) and in the Neurocognition of Gesture project (Özyürek, Roel Willems, Peter Hagoort) conducted in coordination with the F.C. Donders Centre.
During the year, the NGC hosted a series of talks. Speakers were Scott Liddell (Gallaudet U. Washington), Formal Colloquium; Adam Schembri (U. Newcastle, AU); Jennifer Gerwing, (U. Victoria); Jack Sidnell (U. Toronto); Stephen Levinson (MPI Nijmegen); Hedda Lausberg (Charité - Universitätsmedizin Berlin); Asli Özyürek (MPI Nijmegen); and Susan Goldin-Meadow (U. of Chicago), Nijmegen Lectures 2004. The NGC also organised a workshop A Nijmegen Gesture Centre Day of Gesture Talks (see 13.2).
The members of the NGC also engaged in international gesture activities. Enfield and Özyürek serve as officers on the Executive Board of the International Society for Gesture Studies (ISGS): Enfield (Public Relations Manager), Özyürek (Secretary General). Gullberg is a member of the Editorial Board of the Society's journal, *Gesture* (published by John Benjamins).

13.4 Nijmegen Lectures

This year's Nijmegen Lectures were given by Susan Goldin-Meadow (U. of Chicago). The title of the series was "The many faces of gesture." The series included three morning lectures: "The resilience of language: How children use their hands to create language", "The gesture-speech system: how hand and mouth work together", and "Hearing gesture: how our hands help us think." The discussants of the afternoon seminars were Pieter Muysken (Radboud U. Nijmegen), Ulrike Zeshan (MPI Nijmegen), Geoffrey Beattie (U. Manchester), Jan Peter de Ruiter (MPI Nijmegen), John Lee (U. Edinburgh), and Harold Bekkering (Radboud U. Nijmegen). 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 Onno Crasborn, Marianne Gullberg, Asifa Majid, and Kerstin Mauth.

13.5 Formal Colloquia

The Formal Colloquium Series 2004 was organized by the Colloquium Committee (Nick Enfield and Ardi Roelofs).

January 20 — CARLOS GUSSENHOVEN, Radboud U. Nijmegen: Phonetics, Phonology and the Central Franconian Tone.

February 23 — SCOTT K. LIDDELL, Gallaudet U., Washington, DC: Directional Signs and Conceptual Mappings in American Sign Language.

March 16 — FREDERICK J. NEWMEYER, U. Washington, Seattle: Two approaches to functional explanation.

April 13 — CAREL J. TEN CATE, Leiden U.: Birdsong: providing a model for understanding language?

May 18 — ELLEN BARD, U. Edinburgh: Dialogue as a psychological experiment.

June 22 — ANTJE S. MEYER, U. Birmingham: Speech-to-gaze alignment in multiple object naming - Time to cascade?

October 19 — MIKE PAGE, U. Hertfordshire: Immediate serial recall, the Hebb effect, and the learning of phonological word-forms.

November 16 — INGO PLAG, U. Siegen: What constrains possible suffix combinations? The role of grammatical and processing restrictions in derivational morphology.

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).

In 2004 there was by exception only a single lecture in the series:

May 28 JIM HAXBY, Princeton U.: Spatial and tempora; distribution of face and object representations.

13.7 Presentations at conferences, congresses and workshops

Allen, S.E.M., Özyürek, A., Kita, S., Brown, A., Furman, R., & Ishizuka, T. "Universal and language-specific influences in syntactic packaging of information: A crosslinguistic developmental study." Annual Meeting of the Canadian Linguistic Association. Winnipeg, May.

Ameka, F. K. "Differential agreement marking in Likpe." 24th West African languages Congress, U. of Ibadan, Nigeria, August.

Ameka, F. K. "Whose document? Whose record?" [keynote lecture]. A World of many voices. U. of Frankfurt, September.

Ameka, F. K. "Information packaging constructions in Likpe." Workshop on Topic and Focus: Information structure and grammar in African languages, U. of Amsterdam, December.

Baayen, R. H. "Questioning the unquestionable: Semantics and (ir)regularity" [invited speaker]. International Conference on Linguistic Evidence: Empirical, Theoretical, and Computational Perspectives. Tübingen, January.

Baayen, R.H., & Boroditsky, L. "Effects of lexical structure on picture comparison." Conceptual Structure, Discourse, and Language (CSDL 2004). Edmonton, October.

Benazzo, S., & Dimroth, C. "The acquisition of additive particles in French and German. A comparative study of first and second language acquisition." European Second Language Association Conference on Formal and Functional Approaches to Second Language Acquisition (EUROSLA 14-2004). Donostia-San Sebastian, September.

Bien, H., Levelt, W.J.M., & Baayen, R.H. "Morphem-Frequenz Effekte versus Wort-Frequenz Effekte: Benennungslatenzen in der Produktion niederländischer Komposita." 46. Tagung experimentell arbeitender Psychologen (TeaP2004). U. Giessen, April.

Bien, H., Levelt, W.J.M., & Baayen, R.H. "The role of frequency information in compound production." Tutorials in Behavioral and Brain Sciences Summer School (TuBBS2004). Ehzerwold, June/July.

Bien, H., Baayen, R.H., Levelt, W.J.M. "The role of frequency information in compound production." 10th Conference on Architectures and Mechanisms of Language Processing (AMLaP-2004). Aix-en-Provence, September.

Bien, H., Baayen, R.H., Levelt, W.J.M. "Frequency effects in the production of Dutch noun-noun compounds." International Workshop on Language Production. U. Marseille, September.

Bohnemeyer, J., Eisenbeiß, S., & Narasimhan, B. "Manner and path in non-linguistic cognition." International Conference on Language, Culture and Mind. U. of Portsmouth, July.

Borgwaldt, S., & Hellwig, F.M. "Onset entropy matters: Crosslinguistic sound-spelling analyses and empirical validation." 31st Australasian Experimental Psychology Conference (EPC'04). Dunedin, April.

Bowerman, M. "Event categorization in language and cognition" [invited talk]. 30th Annual Meeting of the Berkeley Linguistics Society. Berkeley, February.

Bowerman, M., Majid, A., Erkelen, M., Narasimhan, B., & Chen, J. "Learning how to encode events of 'cutting and breaking': A crosslinguistic study of semantic development." Child Language Research Forum. Stanford U., April.

Bowerman, M. "Event categorization in language and cognition: The case of 'cutting and breaking'" [plenary lecture]. 4th International Forum on Language, Brain, and Cognition: Cognition, Brain, and Typology: Toward a Synthesis. Tohoku U., Sendai, September.

Bowerman, M. "Space under construction: Language-specific spatial categorization in first language acquisition" [invited talk]. Workshop on Language, Cognition and Typology. Tohoku U., Sendai, September.

Bowerman, M., & Majid, A. "Studying event cognition crosslinguistically." Symposium on Event Representations in Mind and Language. U. of Oregon, Eugene, September.

Brown, A., Allen, S.E.M., Özyürek, A., Kita, S., Ishizuka, T., & Furman, R. "What co-speech gestures reveal about L2 proficiency: A study of Japanese learners of English." European Second Language Association Conference on Formal and Functional Approaches to Second Language Acquisition (EUROSLA 14 - 2004). Donostia-San Sebastian, September.

Brown, A., & Gullberg, M. "Bilateral language effects in learner language systems: Evidence from speech and gesture." NWO Cognition Summer School: From stimulus to understanding in language and perception. Arnhem, October.

Brown, A., Özyürek, A., Allen, S.E.M., Kita, S., Ishizuka, T., & Furman, R. "Does event structure influence children's motion event expressions?" Boston U. Conference on Language Development (BUCLD-2004). Boston, November.

Brown, P., de Léon, L., Pfeiler, B., & Pye, C. A "Symposium declined at "Acquisition of agreement in Maya." 2003-2004 Annual Meeting of the Society for the Study of Indigenous Languages of the Americas (SSILA), held in conjunction with the 78th Annual Meeting of the Linguistic Society of America (LSA). Boston, January.

Brown, P. "Cultural shaping of emotional expression in interaction: Affective feedback in Tzeltal" [invited presentation]. Workshop on emotional meaning in social interaction: Toward an integration of the subjective and the social. Sloan Center on Everyday Lives of Families (CELF). UCLA, Los Angeles, January.

Brown, P., & Levinson, S.C. "Comparative feedback: Cultural shaping of response systems in interaction." Workshop on Feedback in Interaction. Max Planck Institute for Psycholinguistics, Nijmegen, February.

Brown, P. "Learning to express three-participant events in Tzeltal." Stanford Child Language Research Forum (CLRF). Stanford, April.

Broersma, M. "Syllable-final fricatives: Dutch and English listeners processing of voicing (oral)." 147th Meeting of the Acoustical Society of America (ASA). New York, May.

Broersma, M. "Dutch listeners' processing of word-final voicing in English (oral)." Dutch Society of Phonetics Workshop on First and Second Language Acquisition. Nijmegen, June.

Brugman, H. "A simple model for complex linguistic annotations." ZIF (Center for Interdisciplinary Research) Conference on Modelling Linguistic Information Resources. Bielefeld, January.

Brugman, H., Wittenburg, P., & Broeder, D." Towards collaborative annotation and commentary." Panel on collaborative commentary: Opening up spoken language databases. 4th International Conference on Language Resources and Evaluation (LREC2004). Lisbon, May.

Brugman, H., & Skiba, S. "Historical changes in linguistic annotation: From pieces of paper to computer files." DoBeS Conference. Frankfurt, September.

Burenhult, N. "Malay loanwords in Jahai: The case of the domains of body and landscape." 8th International Symposium on Malay and Indonesian Linguistics (ISMIL 8). Penang, July/August.

Burenhult, N. "Semantics of the Jahai landscape lexicon." Mon-Khmer workshop. 37th International Conference on Sino-Tibetan Languages and Linguistics (ICSTLL 37). Lund, September/October.

Byun, K.-S. "Gender marking in Korean Sign Language." Mini-Conference on Sign Language Research. Radboud U. Nijmegen, July.

Byun, K.-S., Emmerik, W., & Panda, S. "Sign language poetry and sign song" Max Planck Institute for Psycholinguistics, Nijmegen, December.

Chebotko, A., Deng, Y., Lu, S., Fotouhi, F., Brugman, H., Klassmann, A., Sloetjes, H., Russel, A., & Wittenburg, P. "On to ELAN: An ontology-based linguistic multimedia annotator. IEEE (Institute of Electrical and Electronics Engineers) 6th International Symposium on Multimedia Software Engineering. Florida International U., Miami, December.

Chen, A.J. "Language-specificity in the perception of paralinguistic intonational universals" [invited talk]. Workshop on Sign Language Prosody. Nijmegen, July.

Chen, A.J. "Ultimate attainment in perception of paralinguistic intonational meaning in second language acquisition." Intonational Conference on Tone and Intonation. Santorini, September.

Chen, A.J. "Obtaining perceptual judgments in research of intonational meaning." Workshop on Experimental Prosody Research" [invited lecture]. Leipzig, October.

Chen, T.-M., Dell, G. S., & Chen, J.-Y. "A crosslinguistic study of phonological units: Syllables emerge from the statistics of Mandarin Chinese, but not from the statistics of English." 26th Annual Conference of the Cognitive Science Society. Chicago, August.

Crasborn, O., van der Koij, E., Broeder, D., & Brugman, H. "Sharing sign language corpora online: Proposals for transcription and metadata categories." 4th International Conference on Language Resources and Evaluation (LREC2004). Lisbon, May.

Cutler, A. "Perceptual learning in speech." Workshop on Basic Mechanisms of Speech Perception. Konstanz, January.

Cutler, A. "De flexibiliteit van de luisteraar" [invited address]. Vereniging van Docenten Deens in Nederland (VDDN). Rotterdam, February.

Cutler, A. "The flexibility and inflexibility of speech perception" [invited address]. 4th Dutch Astrophysics Days. Nijmegen, April.

Cutler, A., & Otake, T. "Pseudo-homophony in non-native listening." 147th Meeting of the Acoustical Society of America (ASA). New York, May.

Cutler, A., Weber, A., & Otake, T. "From phoneme to lexicon in non-native listening." Workshop on Eerste- en tweede-taalverwerving, Nederlandse Vereniging voor Fonetische Wetenschappen. Nijmegen, June.

Cutler, A. "The flexibility of human speech recognition and the seeds of language change" [invited keynote address]. Association for Computational Linguistics. Barcelona, July.

Cutler, A. "How eye-tracking experiments produce sparkling results." Symposium on De zin van tekst. Nijmegen, October.

Cutler, A. "From speech to words in a second language." Workshop on Bilingualism and Second Language Acquisition. Brussels, October.

Cutler, A., Norris, D., & Sebastián-Gallés, N. "Is Spanish speech special?" Symposium in Honour of Juan Segui. Paris, November.

Cutler, A. "From phonological to lexical processing in second-language listening." Workshop on Language Processing in First and Second Language Learners. Colchester, December.

Davidson, D. "Statistical testing – mixed effect models." The Tool-kit of Cognitive Neuroscience In-Depth EEG/MEG Course 2004. F.C. Donders Centre, Nijmegen, March.

Dickinson, C. "Verbal gestures and the expression of path in Tsafiki." The Annual Meeting of the Society for the Study of the Indigenous Languages of the Americas, Special Session: The expression of path. Boston, January.

Dickinson, C. "La Documentación de la Idioma y Cultura de los Tsachilas. Segundo Encuentro de LASA sobre Estudios Ecuatorianos" [invited talk]. Facultad Latinoamericana de Ciencias Sociales Sede Ecuador (FLACSO), Quito, Ecuador, October.

Dickinson, C., & Zavala,R. "Nuevas herramientas tecnológicas para la documentación de lenguas naturales. Centro de Investigaciones y Estudios Superiores en Antropología Social" [invited instructor]. Workshop on Use of technology in the field given in conjunction with CIESAS. Mexico City, November.

Dimroth, C. "Finiteness in a learner varieties perspective." Panel discussion on linguistic theory and representation of variation in language acquisition. 39. Linguistisches Kolloquium. Amsterdam, August.

Dimroth, C. "German at different ages: Where do differences begin?" Attaining the ultimate – Expert Meeting on the Occasion of Theo Bongaerts' Retirement. Berg en Dal, September.

Dimroth, C. "The impact of information structure in the acquisition of German at different ages." Colloquium on Information Structure in Language Processing and Language Acquisition. Potsdam, October.

Eisner, F., & McQueen, J.M. "Talker-specific perceptual learning in response to idiosyncratic speech production." Workshop on Speech and Auditory Processing in Developmental Disorders: Evidence from Event-related Potentials. Oxford, September.

Enfield, N.J. "Languages as historical documents: The endangered archive in Laos." Workshop on Laos: Rethinking Identities in Contemporary Laos. Asia Research Institute, National U. of Singapore, January.

Enfield, N.J. "Laughter as feedback." A discussion with examples from Laos. Workshop on Feedback in Interaction. Max Planck Institute for Psycholinguistics, Nijmegen, February.

Enfield, N. J. "Linguistic typology and face-to-face interaction – Data from Lao." 14th Southeast Asian Linguistics Society Meeting. Bangkok, May.

Enfield, N.J. "It's all money in the bank - social consequences of common ground." Wenner-Gren Symposium on Roots of Human Sociality: Culture, Cognition, and Human Interaction. Duck (NC), October.

Enfield, N.J. "Virtual cognitive artifacts – diagrams and models in hand gesture." Preconference on Multimodality, National Communication Association Conference. Chicago, November.

Ernestus, M., & Mak, P. "Analogical effects in reading Dutch verb forms." Taalkunde in Nederland-dag 2004. Utrecht, February.

Ernestus, M., Lahey, M., Verhees F., & Baayen, R.H. "Lexical frequency and voice assimilation in complex words in Dutch." 147th Meeting Acoustical Society of America (ASA). New York, May.

Ernestus, M., Lahey, M., Verhees, F., & Baayen, R.H. "Lexical frequency and voice assimilation." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Ernestus, M. "Effecten van woordfrequentie op morfo-fonologische aan-passingen." Radboud U. Nijmegen, November.

Felser, C., & Roberts, L. "Plausibility and recovery from garden paths in second language sentence processing." 10th Conference on Architectures and Mechanisms of Language Processing (AMLaP-2004). Aix-en-Provence, September.

Gaby, A. "Levels of involvement: representing coparticipation in Thaayorre argument structure." Blackwood Workshop on Australian Aboriginal Languages. U. of Melbourne, March.

Gaby, A. "Out of sight and out of mind: distance and (in)accessibility in Thaayorre demonstrative 'fillers'." 2004 Annual Conference of the Australian Linguistics Society (ASL), Sydney, July.

Gaby, A., "The body familiar: categorizing kin relations in Thaayorre oral and manual registers." International Language and Cognition Conference, U. of New England, Coffs Harbour, September.

Gaby, A. "Distinguishing reciprocals from reflexives in Kuuk Thaayorre." Workshop on reciprocity and reflexivity – description, typology and theory. FU Berlin, Sonderforschungsbereich 447 'Kulturen des Performativen'. Berlin, October.

Gaby, A. "Pragmatically case-marked: the interaction between syntax and context in determining Thaayorre case-marking." Interventions, Interactions or Interrelation: School of Languages Postgraduate Conference 2004, U. of Melbourne, November.

Ganushchak, L., & Schiller, N.O. "Effects of time pressure on verbal self-monitoring." NWO Cognition Summer School: from Stimulus to Understanding in Language and Perception. Doorwerth, October.

Ganushchak, L., & Schiller, N.O. "Effects of time pressure on verbal self-

monitoring." Workshop on Neuroscience and Cognitive Control. Ghent, December.

Gullberg, M. "Gestures and multilingualism. Communicative and psycholinguistic perspectives." Tutorials in Behavioural and Brain Sciences Summer School (TuBBS-2004). Ehzerwold, June/July.

Gullberg, M. "Attaining the (antepen)ultimate" [discussant]. Attaining the Ultimate – Expert Meeting on the occasion of Theo Bongaerts' retirement. Berg en Dal, September.

Haun, D.B.M. "Exploring human cognition" [invited talk]. Wolfgang Köhler Primate Research Center. Leipzig, August.

Hellwig, F.M., & Borgwaldt, S. "Onset entropy counts: Crosslinguistic spelling-sound analyses." 27e Minisymposium Lezen. Radboud U. Nijmegen, April.

Hellwig, F.M., & Indefrey, P. "Neural responses to the production and comprehension of syntax in identical utterances." TABU-dag 2004, Centre for Language and Cognition Groningen (CLCG), June.

Hellwig, F.M., & Borgwaldt, S. "From onset to entropy. Word-initial ambiguity patterns: A crosslinguistic analysis." Tutorials in Behavioural and Brain Sciences Summer School (TuBBS-2004). Ehzerwold, June/July.

de Hoop, H., & Narasimhan, B. "Differential subject marking in Hindi." Workshop on Differential Subject Marking. Nijmegen, July.

Horemans, I., Jansma, B.M., & Schiller, N.O. "The gender congruency effect in French during naming investigated with event-related potentials." 11th Annual Meeting of the Cognitive Neuroscience Society (CNS). San Francisco, April.

Horemans, I., Jansma, B.M., & Schiller, N.O. "The selection of syntactic features in French speech production: an ERP study." 3rd Dutch Endo-Neuro-Psycho Meeting. Doorwerth, June.

Indefrey, P., & Cutler, A. "A meta-analysis on passive auditory language processing." 10th International Conference on Functional Mapping of the Human Brain. Budapest, June.

Indefrey, P. "Neural correlates of language processing components" [invited talk]. Neurex Meeting on cerebral processing of language and multiple languages. Basel, June.

Indefrey, P. "The neural architecture of syntactic parsing and encoding" [invited talk]. 28th International Congress of Psychology. Beijing, August.

Indefrey, P. "Neural correlates of syntactic encoding and parsing in native speakers and second language learners" [invited talk]. ESF Workshop on Language Processing in First and Second Language Learners. Colchester, December.

Janzen, G. "Neural representation of object location memory" [invited talk]. U. Saarbrücken, December.

Janzen, G. "Neural correlates of human spatial memory" [invited talk]. U. of Bristol, February.

Janzen, G., & van Turennout, M. "Automatic retrieval of object location: an fMRI study." 11th Annual Meeting of the Cognitive Neuroscience Society (CNS). San Francisco, April.

Joergens, S., Kleiser, R., Indefrey, P., & Seitz, R.J. "Syntactic speech lateralization in right- and left-handers by fMRI." 2nd Vogt-Brodmann Symposium. Research Center Jülich, April.

Johnson, E.K. "The development of word segmentation strategies during early infancy" [invited talk]. Centre National de la Recherche Scientifique (CNRS). Lyon, April.

Johnson, E.K., & Westrek, E. "Voice and language discrimination by Dutch-learning infants" [invited talk]. Dutch Phonetics Society Meeting. Nijmegen, June.

Johnson, E.K., Westrek, E., & Nazzi, T. "Voice and language discrimination by Dutch-learning infants." 45th Annual Meeting of the Psychonomic Society. Minneapolis, November.

Johnson, E.K. "Grammatical gender and early word recognition in Dutch." Boston University Conference on Language Development (BUCLD-2004). Boston, November.

Jolink, A. "Semantic and morphological finiteness in Dutch child language: An exploratory study of normal and impaired acquisition processes." Tutorials on Behavioral and Brain Sciences Summer School (TuBBS 2004). Ehzerwold, June/July.

Jordens, P. "Systematiek en dynamiek bij de verwerving van 'Finietheid'." Anéla 14e Juniorendag. VU Amsterdam, January.

Jordens, P. "Driving forces in the acquisition of Finiteness in Dutch." American Association for Applied Linguistics Annual Conference. Portland, May.

Jordens, P. "The acquisition of Finiteness in child-L1 and adult-L2 Dutch." 39. Linguistisches Kolloquium. VU Amsterdam, August.

Jordens, P. "Driving forces in the acquisition of Verb-second in Dutch." European Second Language Association Conference on Formal and Functional Approaches

to Second Language Acquisition (EUROSLA 14-2004). Donostia-San Sebastian, September.

Jordens, P. "Finiteness comes with age." Attaining the ultimate – Expert Meeting on the occasion of Theo Bongaerts' retirement. Berg en Dal, September.

Jordens, P. "Spontane taalverwerving: Tussen systematiek en dynamiek. De verwerving van variatie in woordvolgorde." NT2 Conferentie Paasheuvel, September/October.

Kempen, G., & Harbusch, K. "How flexible is constituent order in the midfield of German subordinate clauses? A corpus study revealing unexpected rigidity." International Conference on Linguistic Evidence. Tübingen, January.

Kempen, G., & Harbusch, K. "Generating natural word orders in a semi–free word order language: Treebank-based linearization preferences for German." Conference on Intelligent Text Processing and Computational Linguistics (CICLing2004). Seoul, February.

Kempen, G., & van Breugel, C. "A workbench for visual-interactive grammar instruction at the level of secondary education." Workshop Linguistik in der Schule, 26. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft. Mainz, February.

Kempen, G. "Human Grammatical Coding: Evidence for shared structure-formation resources in sentence comprehension and production" [invited talk]. Human Communication Research Centre, School of Informatics, U. of Edinburgh, March.

Kempen, G. "Human Grammatical Coding: Shared structure formation resources for grammatical encoding and decoding" [invited talk]. 17th Annual CUNY Conference on Human Sentence Processing. U. of Maryland, College Park, March.

Kempen, G. "Human Grammatical Coding: Evidence for shared structure-formation resources in sentence comprehension and production" [invited talk]. Workshop on Cognition, Languages and Language Impairments. Swietokrzyska Academy. Piotrkow Trybunalski, April.

Kempen, G. "Zinsontleding voor twee hersenhelften." Studiedag Didaktiek voor het Nederlands. Utrecht, May.

Kempen, G. "Symmetrical clausal coordination as grammaticalized self-repair." TABU-dag 2004, Centre for Language and Cognition Groningen (CLCG), June.

Kempen, G., & van Breugel, C. "Interactive visualization of syntactic structure assembly for grammar-intensive first- and second-language instruction." [with computer demonstration]. STIL/ICALL Symposium on NLP and Speech Technologies in Advanced Language Learning Systems. Venice, June.

Kempen, G., & van Breugel, C. "Interactive visualization of syntactic structure assembly for grammar-intensive first- and second-language instruction." 15th Meeting of Computational Linguistics in the Netherlands (CLIN2004). Leiden, December.

Kemps-Snijders, M. & Wittenburg, P. "LEXUS Lexicon Tool." ISO TC37/SC4 Working Group Meetings. Pisa, November.

Kirsch, K. "The usage of delat' in Russian L1." Tutorials on Behavioral and Brain Sciences Summer School (TuBBS 2004). Ehzerwold, June/July.

Kirsch, K. "Vstavnoe upotreblenie glagola delat' v russkoj detskoj rechi?" Child Language Conference. St. Petersburg, July.

Kirsch, K. "Delat' insertions in Russian L1?" Child Language Seminar. Bristol, July.

Kooijman, V., Hagoort, P., & Cutler, A. "Word segmentation from continuous speech: An ERP study with 10-month-old infants." 11th Annual Meeting of the Cognitive Neuroscience Society (CNS). San Francisco, April.

Kooijman, V., Hagoort, P., & Cutler, A. "Word segmentation from continuous speech: An ERP study with 10-month-old infants." 3rd Dutch Endo-Neuro-Psycho Meeting. Doorwerth, June.

Kooijman, V., Hagoort, P., & Cutler, A. "Word segmentation from continuous speech: An ERP study with 10-month-old infants." Workshop on Eerste- en Tweede-Taalverwerving. Nederlandse Vereniging voor Fonetische Wetenschappen. Nijmegen, June.

Koppenhagen, H., & Schiller, N.O. "Solving conflict in lexical access: An event-related potentials study." Workshop on Neuroscience and Cognitive Control. Ghent, December.

Kuzla, C., & Cho, T. "Prosodic and phonotactic influences on fricative voicing assimilation in German." 9th Conference on Laboratory Phonology (LabPhon). Urbana-Champaign, June.

Kuzla, C., & Mitterer, H." Segmental and prosodic context effects on fricative categorization in German." NWO Cognition Summer School. From Stimulus to Understanding. Doorwerth, October.

Levelt, W.J.M. "The speaker dissected." Delivered lecture on the occasion of receiving an honorary doctorate of the University of Padua, December.

Levinson, S.C., & Brown, P. "Comparative feedback: Cultural shaping of response systems in interaction." Workshop on Feedback in Interaction. Max Planck Institute for Psycholinguistics, Nijmegen, February.

Levinson, S.C. "Living with Manny's dangerous idea." CLIC Symposium on Theories and Models of Language, Interaction, and Culture. Los Angeles, February.

Levinson, S.C. "Diversity in human spatial cognition: where prehistory, culture, language and biology meet. Influential Thinkers Series, Department of Anthropology, UCLA. March.

Levinson, S. C. "On the human 'interactional engine'." Wenner-Gren Symposium on Roots of Human Sociality: Culture, Cognition, and Human Interaction. Duck (NC), October.

Levinson, S.C. "Adult homesigners in Papua Guinea." Workshop on Homesign to Sign. Max Planck Institute for Psycholinguistics, Nijmegen, December.

Majid, A. "Crosslinguistic categorization" [invited talk]. Psycholinguistics Research Group, U. of York, February.

Majid, A. "Crosslinguistic categorization of events" [invited talk]. Language Group, U. of Glasgow, April.

Majid, A., van Staden, M., & Enfield, N. "The image schema and crosslinguistic differences in body-part terms." Workshop on Empirical Methods in Cognitive Linguistics: Image Schemas and Linguistic Relativity. U. of Portsmouth, July.

Majid**,** A., van Staden, M., Boster, J.S., & Bowerman, M. "Event categorization: A crosslinguistic perspective." 26th Annual Meeting of the Cognitive Science Society. Chicago, August.

Majid, A. "Investigating perception with an eye on language" [invited talk]. Workshop on Language, Cognition and Typology. Tohoku U., Sendai, September.

Majid, A. "The human body in cognition, brain and typology" [invited talk]. 4th International Forum on Language, Brain, and Cognition: Cognition, Brain, and Typology: Toward a Synthesis. Tohoku U., Sendai, September.

Majid, A., & Bowerman, M. "Studying event cognition crosslinguistically" [invited talk]. Workshop on Event Representations in Mind and Language. U. of Oregon, September.

Matsuo, A., & Eisenbeiß, S. "External and Internal Possession - a comparative study of German and Japanese child language." 37th Annual Meeting of the British Association of Applied Linguistics (BAAL). King's College London, September.

Matsuo, A., & Duffield, N. "Sentence matching and the competence paradox: How to outperform native speakers." European Science Foundation Workshop on Language Processing in First and Second Language Learners. U. of Essex, December.

McQueen, J.M. "The plasticity of speech perception." Workshop on Speech perception and comprehension. Toulouse, October.

Mosel, U., & Wittenburg, P. "The DoBeS program and its contribution to documentation and revitalization, Dialogue on language diversity, sustainability and peace. Universal Forum of Cultures. Barcelona, May.

Narasimhan, B. "Split-ergativity in early child Hindi." Linguistic Society of America Winter Meeting. Boston, January.

Narasimhan, B. "Agency and case-marking in early child Hindi." South Asian Languages Analysis Roundtable. State U. of New York, Stony Brook, November.

Narasimhan, B., & Gullberg, M. "Lexical choice in encoding spatial perspectives in Tamil child language." South Asian Languages Analysis Conference (SALA 24). New York, November.

Neumair, B., Soddemann, T., Verharen, E., & Wittenburg, P. "Technology for access management – broad view. International Access Management Workshop. Nijmegen, November.

Nickel, J., Kleiser, R., Joergens, S., Neeb, H., Stoecker, T., Shah, N.J., Indefrey, P., & Seitz, R.J. "Secondary, fully compensatory bilateral representation of speech in a right-handed female with a left fronto-temporal tumor." 10th International Conference on Functional Mapping of the Human Brain. Budapest, June.

Noordman, L.G.M., Vonk, W., Koppen, M., & Frank, S.L. "Modeling pronoun resolution." 28th International Congress of Psychology. Beijing, August.

O'Connor, L. "Elaboration of path in Lowland Chontal." Annual SSILA/LSA Meeting, special session on the Expression of Path in Languages of the Americas. Boston, January.

Oliver, G., Indefrey, P., & Mitterer, H. "L2 sentence comprehension in noise." Tutorials on Behavioral and Brain Sciences Summer School (TuBBS 2004). Ehzerwold, June/July.

Olsthoorn, N., & Kempen, G. "Does syntactic priming speed up linearization?" 10th Conference on Architectures and Mechanisms of Language Processing (AMLaP-2004). Aix-en-Provence, September.

O'Shannessy, C., McConvell, P., & Meakins, F. "Gurindji Kriol and Light Warlpiri." The International Working Symposium: Language contact, hybrids and new varieties: Emergent possessive constructions. Monash U., Melbourne, September.

O'Shannessy, C., & Meakins, F. "Shifting functions of ergative case-marking in Light Warlpiri and Gurindji Kriol." 2004 Annual Conference of the Australian Linguistics Society (ASL), Sydney, July.

Özyürek A., & lkbasaran, D. "The use of space in transfer verbs in Turkish Sign Language: Implications for typological variation." Crosslinguistic perspectives in Sign Language research. 26. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft. Mainz, February.

Özyürek, A. "How do linguistic representations influence gestural representations and when? A developmental study of English and Turkish speakers' speech and gesture patterns" [invited talk]. Workshop on Gestural Communication in Nonhuman and Human Primates. Max Planck Institute for Evolutionary Anthropology, Leizpig, March.

Özyürek, A. "Number quantification and space in Turkish and German Sign Languages" [invited talk]. Mini-Conference on Sign Language Research. Linguistics Department, Radboud U. Nijmegen, July.

Özyürek, A., & Turanli, R. "How to express casual motion events in Turkish and English." 12th International Conference on Turkish Linguistics. (ICTL 2004). Izmir, September.

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "Perception influences production and vice versa: Evidence for connecting links between the two modalities." 10th Conference on Architectures and Mechanisms of Language Processing (AMLaP-2004). Aix-en-Provence, September.

Özdemir, R., Roelofs, A., & Levelt, W. J. M. "Perception influences production and vice versa: Evidence for connecting links between the two modalities." International Workshop on Language Production. Marseille, September.

Perniss, P., & Özyürek, A. (2004). "How many pots on the window sill? Number and Quantification in German (DGS) and Turkish (TID) Sign Language." 26. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft. Mainz, February.

Perniss, P., & Özyürek, A. "Expressing spatial relationships in German Sign Language (DGS) and Turkish Sign Language (TID)." Theoretical Issues in Sign Language Research (TISLR8). Barcelona, September/October.

Pluymaekers, M., Ernestus, M., & Baayen, R.H. "Lexical frequency and prefix reduction." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Rey, A., & Schiller, N.O. "A case of letter/word dissociation." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Roberts, L., Marinis, T., Felser, C., & Clahsen, H. "Antecedent priming at gap positions in children's sentence processing." 17th Annual CUNY Sentence Processing Conference. Washington, March.

Roberts, L., Indefrey, P., & Gullberg, M. "Pronoun resolution in the L2: An eye-tracking study with Turkish-Dutch bilinguals." 10th Conference on Architectures and Mechanisms of Language Processing (AMLaP-2004). Aix-en-Provence, September.

Roberts, L. "The on-line processing of co-reference relations by Turkish advanced L2 learners of Dutch: An eye-tracking study." European Second Language Association Conference on Formal and Functional Approaches to Second Language Acquisition (EUROSLA 14-2004). Donostia-San Sebastian, September.

Roberts, L., Marinis, T., Felser, C., & Clahsen, H. "Gaps in children's sentence processing: Evidence from cross-modal priming." Boston University Conference on Language Development (BUCLD-2004). Boston, November.

Roberts, L. "Resolving pronouns on-line in the second language: Evidence from eye-tracking with Turkish-Dutch bilinguals." European Science Foundation Standing Committee for the Humanities (ESF SCH) Workshop on Language Processing in First and Second Language Learners. U. of Essex. Colchester, December.

Roelofs, A., van Turennout, M., & Coles, M. "Anterior cingulate involvement in Stroop task is independent of a congruity effect in response latencies." 11th Annual Meeting of the Cognitive Neuroscience Society (CNS). San Francisco, April.

Roelofs, A. "Anterior cingulate involvement in a Stroop task is independent of response conflict." Lectures on Cognitive Neuroscience: Open Day of the F.C. Donders Centre 2004. Nijmegen, June.

Roelofs, A. "The seduced speaker: Modeling of cognitive control" [keynote lecture]. 3rd International Conference on Natural Language Generation (INLG04). Brockenhurst, New Forest, July.

Roelofs, A. "Control of spoken word production by dyslexic and non-dyslexic readers." Conference of the Dutch Society for Neuropsychology. Doorwerth, September.

Roelofs, A. "The language user as Ben-Hur: Modeling the hemodynamics of control." Brain Science Event (Koninklijke Nederlandse Akademie van Wetenschappen/Royal Society of Edinburgh). Amsterdam, October.

Roelofs, A. "Anterior cingulate cortex executes control rather than detects conflict." Seminar on the Neuroscience of Cognitive Control. Ghent U., December.

de Ruiter, J. P. "The history of feedback." Workshop on Feedback in Interaction. Max Planck Institute for Psycholinguistics, Nijmegen, February.

de Ruiter, J. P. "On the primacy of language in multimodal communication." LREC Workshop on Multimodal Corpora, Lisbon, May.

Schiller, N.O., & Pieterse, J. "Self-monitoring of metrical stress during speech production estimated from event related potentials." 11th Annual Meeting of the Cognitive Neuroscience Society (CNS). San Francisco, April.

Schiller, N.O., & Pieterse, J. "Self-monitoring of metrical stress during speech production estimated from event related potentials." 3rd Dutch Endo-Neuro-Psycho Meeting. Doorwerth, June.

Schiller, N.O. "Masked segmental priming of picture naming." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Schiller, N.O., & Costa, A. "The role of the syllable in speech production: Evidence from masked priming." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Schiller, N.O. "The selection of gender-marked suffixes during the production of German and Dutch indefinite noun phrases." 4th International Conference on the Mental Lexicon. Windsor, June/July.

Schiller, N.O. "The nature of the self-monitoring system and the nature of the code being monitored in language production." International Workshop on

Language Production. Marseille, September.

Schmiedtová, B. "The role of grammatical aspect in event encoding: A comparison of Czech and Russian." Event Representations in Mind and Language Research Symposium. U. of Oregon, September.

Schneider, S., & Indefrey, P. "The neural correlates of syntactic processing in multilingual speakers." Tutorials in Behavioural and Brain Sciences Summer School (TuBBS-2004). Ehzerwold, June/July.

Schwager, W. "Sign Language Contact." Mini-Conference on Sign Language Research. Radboud U. Nijmegen, July.

Schwager, W. "Segmental, intrasegmental and suprasegmental morphology in Russian Sign Language" [presentation]. Max Planck Institute for Psycholinguistics, Nijmegen, September.

Schwager, W. "What is a morpheme? – Intrasegmental alterations in Russian Sign Language." ESF Exploratory Workshop on Modality Effects on the Theory of Grammar: A Crosslinguistic View from Signed Languages of Europe. Barcelona, November.

Seidl, A., Johnson, E.K., Brentari, D., & Redman, A. "Segmentation of clauses in English, Dutch and American Sign Language." Boston University Conference on Language Development (BUCLD-2004). Boston, November.

Senft, G. "Classifiers in Kilivila: Introducing referents and keeping track of them" [invited paper]. Réseau Thématique Européen: Langage et Cognition. Atelier 1 Diversité des Langues et Cognition. Toulouse, January.

Senft, G. "Bronislaw Malinowski and Linguistic Pragmatics" [invited plenary lecture]. 2nd Lódz Symposium on New Developments in Linguistic Pragmatics. Lódz, May.

Senft, G. "Genres in Kilivila." 6th International Conference on Oceanic Linguistics (COOL6), Emalus Campus, U. South Pacific, Port Vila, Vanuatu, July.

Seuren, P. "German plurals in Umlaut-er" Annual Conference of the Societas Linguistica Europaea. Kristiansand, July.

Shatzman, K.B. "Segmenting ambiguous phrases using phoneme duration." Tutorials in Behavioural and Brain Sciences Summer School (TuBBS-2004). Ehzerwold, June/July.

Shatzman, K. B. "Segmenting ambiguous phrases using phoneme duration."8th International Conference on Spoken Language Processing (ICSLP 2004). Jeju, October.

Shi, R., Werker, J., Cutler, A., & Cruickshank, M. "Facilitation effects of function words for word segmentation in infants." International Conference on Infant Studies. Chicago, May.

Shi, R., Werker, J., & Cutler, A. "Phonetic representation of frequent function words in 8-month-old infants." 147th Meeting of the, Acoustical Society of America (ASA). New York, May.

Stivers, T. "How selected next speakers' feedback shapes the contributions of non-selected recipients: A preference for progressivity in interaction." Workshop on Feedback in Interaction. MPI. for Psycholinguistics, Nijmegen, February.

Stivers, T. "The interactional process of reaching a treatment decision in acute medical encounters." 99th Annual Meeting of the American Sociological Association (ASA). San Francisco, August.

Stivers, T. "Non-antibiotic treatment recommendations: Delivery formats and implications for parent resistance." European Association of Healthcare Communication Conference. Bruges, September.

Stivers, T. "An initial look at vocal and kinesic response tokens." National Communication Association Pre-conference. Chicago, November.

Stivers, T. "Re-assertion as confirmation: One way speakers claim epistemic authority" [invited talk]. National Communication Association. Chicago, November.

Stivers, T. "Non-antibiotic treatment recommendations: Delivery formats and implications for parent resistance" [invited talk]. U. of Wisconsin, Madison, November.

Szöllösi, V., Mosel, U., & Wittenburg, P. "DoBeS Program - tools, methods, content." DoBeS Conference. Frankfurt, September.

Vonk, W., Noordman, L.G.M., Koppen, M., & Frank, S.L. "Modeling knowledge-based inferences in story comprehension." Invited Symposium on Language Processes: Text and Discourse Comprehension, 28th International Congress of Psychology. Beijing, August.

Wagner, A., Ernestus, M. "Language-specific relevance of formant transitions for fricative identification." 147th Meeting of the Acoustical Society of America (ASA). New York, May.

Wegener, C. "Aspects of noun classification in Savosavo." 6th International Conference on Oceanic Linguistics. U. of the South Pacific, Port Vila, July.

Widlok, T. "Ethnography in the DoBeS documentation." DoBeS Training Workshop. Nijmegen, May.

Widlok, T. "From act to agency in the anthropology of sub-Saharan hunter-gatherers" [invited talk]. Centre for African Studies, U. of Leiden, May.

Widlok, T. "Eliciting the terms of address in landscape talk." Landscape Special Interest Group, Max Planck Institute for Psycholinguistics, Nijmegen, June.

Widlok, T. "Research on endangered Khoisan languages in Namibia" [invited talk]. Desert Research Foundation. Gobabeb, August.

Widlok, T. "Implications of ethnographic techniques for anthropological and linguistic theory." Conference on A World of Many Voices. Frankfurt a.M., September.

Widlok, T. "Bringing ethnography home? Some benefits of having ethnography venture into neighbouring disciplines." 8th Biennial Conference of the European Association of Social Anthropologists. Vienna, September.

Widlok, T. "The relational resourcefulness of the body. Birth and trance in a southern African hunter-gatherer context." International Workshop on Body Resources. Kyoto, September.

Widlok, T. "Peril and perspicacity: prospects for the cross-disciplinary documentation work of anthropologists and linguists." Workshop on Multidisciplinary Approaches to Language Documentation, Endangered Languages Academic Program, School of Oriental and African Studies. London, December.

Wittenburg, P., & Uszkoreit, H. "GRID applications for linguistics and language technology." Global GRID Conference. Hawai, June.

Wittenburg, P., Broeder, D., van der Veer, K., & Piepenbrock, R. "Databases for linguistic purposes." E-Meld Conference. Detroit, July.

Wittenburg, P., & Uszkoreit, H. "Erwartungen der Linguistik Community an GRID Infrastrukturen." BMBF GRID/e Science Expert Meeting. Bonn, July.

Wittenburg, P., Broeder, D., & Buitelaer, P. "Towards metadata interoperability - from a data driven perspective." 42nd Annual Meeting of the Association for Computational Linguistics. Barcelona, July.

Wittenburg, P. "Language documentation - for whom and how?" International IASA/IAML Conference. Oslo, August.

Wittenburg, P., Bibiko, H.-J., Russel, A., & Kemps-Snijders, M. "Frameworks for language archive exploitation." DoBeS Archive Exploration Workshop. Nijmegen, October.

Wittenburg, P. "Goals for access management in DELAMAN and DAM-LR." International Access Management Workshop. Nijmegen, November.

Wittenburg, P., Skiba, R., & Trilsbeek, P. "Architectures of the DoBeS and MPI language archives." International Access Management Workshop. Nijmegen, November.

Yang, J.H. "The linguistic status of finger wiggling in Chinese Sign Language interrogatives." Theoretical Issues in Sign Language Research (TISLR8). Barcelona, September/October.

Yang, J.H. "Deaf teachers and Chinese Sign Language." 1st Chinese Sign Language Interpreting and Teaching Seminar. Shaoxing, July/August.

Yang, J. H. "Interrogative finger wiggling and numerical paradigms in Chinese Sign Language." Max Planck Institute for Psycholinguistics, Nijmegen, April.

Yang, J. H. "From character to sign: Processes of lexical borrowing in Chinese Sign Language." Max Planck Institute for Psycholinguistics, Nijmegen, November.

Zeshan, U. "Manual-dominant and non-manual-dominant systems of negation in sign languages." Workshop on Prosody and Sign Languages, Radboud U. Nijmegen, July.

Zeshan, U. "Sign Language typology: Possessive constructions in sign languages." Theoretical Issues in Sign Language Research (TISLR 8). Barcelona, October.

Zeshan, U. "Interrogative constructions in sign languages" [invited talk]. Workshop on Questions. Max Planck Institute for Evolutionary Anthropology. Leipzig, October.

Zeshan, U. "Negative and interrogative marking in Turkish Sign Language and Indian Sign Language – Manual dominant, non-manual dominant, balanced and mixed systems." European Science Foundation Exploratory Workshop on Modality Effects on the Theory of Grammar: A Crosslinguistic View from Signed Languages of Europe. Barcelona, November.

13.8 Colloquia presented

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

AMEKA "Beyond names as ethno-historical records: on the uselessness of names in African address systems." Institute of Ethnology, U. of Mainz.

BAAYEN "Semantic density and (ir)regularity." U. Paris
"Semantic density and (ir)regularity." U. Siegen
"Semantic density and (ir)regularity." U. Christchurch
"Semantic density and (ir)regularity." U. Edinburgh
"Semantic density and (ir)regularity." U. Turku
"Semantic density and (ir)regularity." U. Tartu

BOWERMAN "Event categorization in adult and child language: The case of cutting and breaking." Stanford U.

"Event categorization in language and cognition: The case of cutting and breaking." Medical Research Council Cognition and Brain Sciences Unit, Cambridge, UK.

CHO "Phonetic signatures of prosodic structure and featural enhancement." Institute of Phonetics, U. of Cologne.

"Phonetic signatures of prosodic structure and their psychological reality reflected in spoken word recognition." Department of Psychology, Korea U., Seoul.

CUTLER "Aanpassing in de spraakwaarneming (en de rol daarvan in taalverandering)." The Royal Netherlands Academy of Arts and Sciences (KNAW), Amsterdam.

"The interplay of phoneme and word recognition in second versus first language." U. Potsdam.

"The flexibility of the native listener." MPI for Human Cognitive and Brain Sciences, Leipzig.

"From speech to lexicon in non-native listening." Korea U., Seoul.

"What determines recalibration of a phoneme category?" U. Munich.

ENFIELD "On linear segmentation and combinatorics in co-speech gesture." Committee on Human Development, U. Chicago.

GULLBERG "Why gestures are relevant to issues of multilingual language use. Communicative and psycholinguistic perspectives." U. Mannheim.

INDEFREY "Neurophysiological constraints on models of language production." International Graduate School of Neuroscience, Bochum.

"Variabilität in Erwerb und Repräsentation einer niedrigfrequenten regulären Flexion." U. Potsdam.

MCQUEEN "The use of phonetic detail in spoken-word recognition." U. Edinburgh.

"The plasticity of speech perception." Ghent U.

ÖZYÜREK "What do co speech gestures reveal about differences in spatial thinking patterns of English and Turkish speakers during speaking?" Linguistics Department, Radboud U. Nijmegen.

SCHILLER "Sprachproduktion in Millisekunden: Neurolinguistische Ansätze bei der Produktion von Wörtern." [Speech production in milliseconds: neurolinguistic approaches in the production of words]. Fakultät für Linguistik und Literaturwissenschaft, U. Bielefeld.

"Neurolinguistische Ansätze in der Sprachwissenschaft: Einzel-wortproduktion in Millisekunden." [Neurolinguistic approaches in linguistics: Single word production in milliseconds]. Geistes-wissenschaftliche Sektion, U. Konstanz.

"What's in a name? Op zoek naar de klank van woorden in de hersenen." [What's in a name? In search of the sound of words in the brain]. Inaugural speech, Faculty of Psychology, Maastricht U.

"Self-monitoring in language production." Faculteit der Sociale Wetenschappen, Leiden U.

"Phonological encoding in speech production: The state of the art." Scuola Normale Superiore, Laboratorio di Linguistica, Pisa.

SENFT "Genres in Kilivila, the language of the Trobriand Islanders." MAPS seminar, invited lecture at the Melanesian and Pacific Studies Centre, U. Papua New Guinea, Port Moresby.

SKIBA "Anlage und Auswertung von Datenkorpora." FU Berlin.

SCHMIEDTOVÁ "Úvod do metodologie psycholingvistiky" [Introduction to the methodology of psycholinguistics]. Charles U. Prague

ROELOFS "De verleide spreker." [The seduced speaker]. Studium Generale series on cognitive science, Leiden U.

"The seduced speaker." Department of Experimental Psychology, Ghent U.

"What determines the direction of our thoughts and actions?" Radboud U. Nijmegen.

WITTENBURG "Sprachenvielfalt - ein Opfer der Globalisierung?" Johann-Heinrich-Voß Gymnasium, Eutin.

13.9 Teaching:

Members of the Institute taught at the following institutions:

BOWERMAN "Form-meaning mapping in first language acquisition: A crosslinguistic perspective." Radboud U. Nijmegen.

"Semantic development in first language acquisition." VU Amsterdam.

CUTLER: LOT Winter School Amsterdam – Spoken Language Comprehension.

"De ontdekking van gesproken taal" 27e en 28e Kinderartsenweek Nijmegen 2004.

"De ontdekking van gesproken taal." Studiedag Jeugdgezond-heids-zorg, Den Haag.

DAVIDSON Tutorial Tool-kit of Cognitive Neuroscience 2004. Radboud U. Nijmegen.

ENFIELD Seminar: "Semantics and Pragmatics in a Crosslinguistic Perspective." Radboud U. Nijmegen.

DE RUITER "Language and interaction." Radboud U. Nijmegen.

GULLBERG "Language and gesture." Hauptseminar/course Wintersemester, U. Mannheim.

INDEFREY: LOT Winter School Amsterdam - Neurolinguistics.

"The ins and outs of PET" Toolkit course lecture, F.C. Donders Centre, Nijmegen.

"Neural correlates of first and second language processing." Tutorials in Behavioural and Brain Sciences (TuBBS) lecture, Ehzerwold.

"Hemodynamic methods in cognitive neuroscience." and "Brain activations in language production and comprehension." Hersenen en gedrag course lectures, Radboud U. Nijmegen.

KEMPEN "Psycholinguistic experimentation" Department of Psychology, Leiden U.

KLEIN "Prinzipien des Zweitspracherwerbs." Institut für Deutsch als Fremdsprachenphilologie, U. of Heidelberg.

"Die Argument-Zeit- Struktur von Verben." Institut für Deutsch als Fremdsprachenphilologie, U. of Heidelberg.

LEVINSON Seminar: "Semantics and Pragmatics in a Crosslinguistic Perspective." Radboud U. Nijmegen.

MATSUO "Theory and Language Acquisition" Department of Linguistics, U. of Sheffield.

MCQUEEN "The mental lexicon: Auditory Word Recognition." Masters' program Cognitive Neuroscience, Radboud U. Nijmegen.

NARASIMHAM "Introduction to Hindi Component of course on Reflections on Learning an Exotic Language." Radboud U. Nijmegen.

"Fundamental issues in first language acquisition." [guest lecture] Indian Institute of Technology, Madras.

"Do children have adult syntactic competence?" [guest lecture]. MPI Ph.D group: Max Planck Institute for Psycholinguistics Nijmegen.

"Acquisition of Syntax" [Block Seminar]. Masters' program in Language Acquisition. Radboud U. Nijmegen.

Construction Grammar: "Regularity and Idiomaticity in Natural Language." Max Planck Institute for Psycholinguistics, Nijmegen.

SCHILLER "The mental lexicon." Radboud U. Nijmegen.

"Neurocognition of language" Maastricht U.

SCHMIEDTOVÁ: "Methodology in psycholinguistic research." Charles U. Prague.

"Introduction to Psycholinguistics." U. Hradec Králové.

Seminar: "Fremde Sprachen – fremde Konzepte?" U. Bremen

SENFT Seminar: "Space games." U. of Cologne.

Seminar: "Semantics and Pragmatics in a Crosslinguistic Perspective." Radboud U. Nijmegen.

Seminar: "The Trobriand Islanders of Papua New Guinea." Session in Ad Borsboom's introductory seminar on anthropological

research in Oceania, Radboud U. Nijmegen.

SPRENGER: "Introduction to Psycholinguistics." Radboud U. Nijmegen.

VONK "Introduction to Psycholinguistics." Radboud U. Nijmegen.

"Text processing." Radboud U. Nijmegen.

ZESHAN "Gebarentaal" [Sign Language]. Course in the linguistics program, Radboud U. Nijmegen.

Chapter 14
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