MAX-PLANCK-INSTITUT FÜR PSYCHOLINGUISTIK

Annual Report Nr. 1
1980

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(1981)

TABLE OF CONTENTS

PREFACE

The Max-Planck-Institute for Psycholinguistics was established on
January 1, 1980, and it was officially opened on March 18 by Professor
R. Lüst, president of the Max-Planck-Society. The Institute evolved
from the Max-Planck-Projectgroup for Psycholinguistics which was formed
in Nijmegen in 1976. This annual report, covering the year 1980, is thus
the first to be published by the newly established Institute.

The Institute's research is concentrated in three major areas, namely,
the production, the acquisition, and the comprehension of language. In
each of these areas, the research centers around a small set of core
themes. The work on language production is particularly concerned with
the issue of how linguistic and non-linguistic context is taken into
account in the generation of speech; the acquisition studies are mainly
directed towards analyzing the mechanisms of acquisition: how does a
first- or second-language learner proceed from one stage of competence
to the next; and the comprehension studies have as a core theme the
question of how different sources of information are put to use in the
on-line interpretation of discourse. A fourth theme in the Institute's
research, orthogonal to those already mentioned, is also emerging, and
that is one concerned with disordered language, especially aphasia in
adults. This theme will not come to full development before 1982 when the
sponsorship of the Dutch Research council (ZWO) comes into effect, but pre-
paratory work is already in progress.

During 1980 the Institute was also involved with the "Special ZWO-
project on Descriptive Language", a cooperative effort of the Institute
for Perception Research, Eindhoven, and the Interfaculty Research Unit
for Speech and Language, Nijmegen University. Since this project is the
subject of a separate report, reference will be made only to those parts
of it that were carried out in our Institute.

Finally, during 1980 the Institute was involved in the preparation
of a project sponsored by the European Science Foundation, entitled
"The Ecology of Adult Language Acquisition". This project involves a
longitudinal study of the untutored acquisition of the host language
by foreign workers in different European countries. The preliminary
phase of the project began in the early part of 1981.

In listing our publications we have limited them to those that appeared
in print during 1980; we do not mention any further reports or manuscripts,
even if accepted for publication. It should be clear, however, that much
of the research described in this report has in the meantime reached, or
almost reached, the stage of publication.

Willem J.M. Levelt

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RESEARCH IN PROGRESS

1. LANGUAGE PRODUCTION

The study of language production has been a major focus of the re-
search here from the very beginning. A central theme, both for the
Projectgroup and for the Institute, has been the study of language
production in context; that is, to develop an understanding of the ways
in which different aspects of the production of utterances interact
with the task and discourse contexts in which the utterances are being
produced. These issues have been studied using a variety of investigative
techniques - ranging from reaction-time tasks to analyses of informal
natural discourse - and using a variety of different production contexts -
chiefly the description of spatial arrays of different types, but also,
for example, the telling of simple stories.

1.1 A first set of studies used reaction-time techniques and the de-
scription of simple spatial events in order to investigate the decompo-
sition of the production process into a series of successive stages.
Research by Levelt and Maassen examined the relationship between
linearisation and lexicalisation - that is, between the process of de-
ciding upon the order of mention of entities in an utterance and the
process of accessing the verbal labels of these entities in the mental
lexicon. The question in particular was whether decisions on order of
mention would be influenced by difficulties in lexical search. The
experimental task was to describe two simultaneously occurring visuo-
spatial events (e.g., a circle moving up, and a triangle moving down).
Given that the lexical search for one item (e.g., circle) was known to
be easier than for the other (e.g., triangle), would the easier item be
mentioned first? It was found that this was not the case, which supports
the general claim that linearisation decisions both precede and are
unaffected by linguistic decisions (lexical-syntactic). The effect of
search difficulty was to increase response latency when the more

difficult item was mentioned first; but it did not affect the order of mention. Research now in progress is looking at the relationship between linearisation and syntactic operations.

A related experimental situation was used by Jarvella and Deutsch to investigate possible asymmetries in the processing demands on speakers and listeners of the same basic linguistic material. In these experiments, speakers were asked to describe visual arrays, and listeners to verify descriptions of them. The descriptions took longer to initiate if the array was informationally redundant, and could best be described with a conjoined phrase at the beginning (e.g., "The left and right ones are red, and the middle one is blue"). But for the listener, on the other hand, the descriptions which took longer to verify were ones where the arrays were non-redundant and were described simply with a series (e.g., "The left one is red, the middle one is blue, and the right one is yellow"). Jarvella and Deutsch discuss these asymmetries in terms of the different demands of the speakers' and listeners' tasks, and relate them to a cooperative model of linguistic communication.

A continuing series of experiments by Flores d'Arcais, in collaboration with the University of Leiden, has also been studying language production in the context of the description of perceptual events. In particular, the research is addressed to the question of how the production of utterances describing simple events is affected by the ways in which these events are organised perceptually. One set of experiments examines the effects of the figural characteristics of the visual stimulus events on the syntactic form of the descriptive utterances. A second set of experiments investigates the ways in which the temporal order of the presentation of the elements of a complex event can affect the structure of the descriptive utterance. A final set attempts to separate experimentally two stages in the process of producing a sentence to describe an event; namely, a stage of perceptual coding followed by a stage of linguistic formulation. The research is intended to show which specific processing operations at the level of linguistic formulation are responsible for the differences found in the experiments.

1.2 A major research effort in language production has centred around the analysis of speakers' descriptions of complex spatial arrays. This focus on "spatial discourse" was primarily motivated by a general interest in the problem of linearisation - which is particularly salient in this task context. A spatial array is not itself intrinsically linearly ordered (unlike, for example, a sequence of events in time); but in order to describe it in speech, the speaker must find a linear path through the array. The properties of speakers' solutions to this linearisation problem are being studied in two related projects.

First, extensive continuing research by Levelt is based on about 4000 spontaneous descriptions of abstract spatial patterns (nodes and arcs forming a network). These descriptions had earlier been analysed with respect to the speakers' general linearisation strategies, leading to the development and validation of two ATN models of these strategies. The current analyses examined in detail the speakers' use of linguistic form - that is, word order and lexical choice - and concentrating on the use of modal, anaphoric, and deictic expressions.

The canonical word order was found to be clearly related to the linearisation principle of maintaining connectivity. Speakers tended to use the last mentioned goal as the source for the next spatial relation to be described (e.g., "...then you reach a yellow point. From the yellow point straight on to a green one"). Given the redundancy of the source phrase, this was in fact frequently omitted (e.g., "then straight on to green"). Speakers typically use anaphoric definite descriptions to relate new items to previously mentioned ones. The properties of the definite descriptions further depended on the adjacency relations between items. Demonstratives ("from that node") were exclusively used in connected transitions, where the immediately preceding goal is the source for the next spatial connection. Anaphoric references to items coming earlier in the sequence (relative to the moment of utterance) were usually more explicit, taking the form of complete adjective-noun NP's.

There was also frequent anaphoric use of directional terms (e.g., "go left to a blue node and to a yellow one"). These turned out to be always cases of deep (as opposed to surface) anaphora. Their correct interpretation depended on the new direction being the same as the previous one, not on the new direction term being the same as the previous one. Thus, in the example above, the network goes straight on from the blue to the yellow node, and does not turn left again at the blue node.

A different aspect of this project was an analysis of the almost 800 "repairs" produced by the speakers in the course of describing the networks. On the basis of this Levelt developed a three-part theory of repair. First, the speaker checks what he wants to say; second, he determines whether the intended utterance is contextually appropriate - that is, whether it is unambiguous given his assumptions about his shared knowledge with the listener of the situation and of the previous discourse. Third, the speaker monitors whether what he is producing is what was intended. These three forms of monitoring are distinguished by the different delays at which the repairs are initiated, relative to the point at which the trouble occurs, and by the type of "editing" terms used ("sorry", "eh", etc.).

A second major project, conducted by Ullmer-Ehrich, investigated the ways in which speakers break up large spatial descriptions into discrete segments, and how they organise the sequence and type of description within each segment. To do this, speakers were asked to describe miniature living-room arrangements, each consisting of four sub-arrangements of spatially distinct clusters of furniture. These sub-arrangements were treated as distinct discourse segments by the speakers, as evidenced, for example, by the use of non-anaphoric full referring expressions at the beginnings of segments, with ellipsis, subordinate clauses, and anaphora increasing in subsequent utterances within a segment.

Two distinct principles for segment linearisation were derived from the analyses; connective and disconnective strategies. In connective linearisation the speakers describe a continuous tour around the walls of the room, leaving the middle of the room to the end, or even omitting it altogether. In this type of description spatial terms (left, right, beside, etc.,) tend to be replaced by temporal terms, such as next or then. In disconnective linearisation, speakers break up the tour of the walls with descriptions of what is in the middle of the room. These speakers tend to use only highly specific spatial terms in describing the relationships of different articles of furniture to eachother.

Two further linearisation principles can be distinguished at the utterance level, within segments. In the sequential strategy, speakers start the description of a cluster of items of furniture with one object, then relate this to a second object, the second to a third,

and so on. In doing so they tend to use less specific spatial terms - beside rather than left and right for example. In the grouping strategy, speakers take one object as a reference point for the description of a cluster, and relate all other objects to this object. In doing so they tend to use more specific spatial terms.

These linearisation strategies at the segment and utterance levels interact further with the speaker's choice of perspective controlling the use of spatial deictics such as in front of, behind, left of, etc. At the segment level, describing the positions of the major clusters, speakers use a deictic perspective, where the speaker makes himself the reference point of the description. At the utterance level, speakers usually preferred an intrinsic perspective, where, for example, the intrinsic front of one of the described objects is made the reference point of the description. The use of the deictic perspective at the utterance level would apparently have led to ambiguities about the orientation of different objects.

1.3 A different approach to the problem of discourse and utterance segmentation in language production was followed in a project carried out by Jarvella. Speakers were asked to converse about a topic of their choice, and as they did so, were asked either to press a key or to utter a nonsense syllable, marking off what they felt to be distinct segments in their output. The analysis of the segments thus marked off revealed, first, that speech repairs are, together with what they repair, almost always enclosed within the segments marked off by speakers. Second, speakers frequently place markers around structures which resemble linguistic constituents, but which contain various kinds of dysfluencies, as evidence of constructive processes during speaking. Finally, the markers fill most of the major boundaries between clauses in the speech stream, although they may be elicited at finer levels of structure as well. The analysis of the data is still in progress, however, because of the complexity of the variables that seem to govern many of the speakers' decisions to place a segment marker.

1.4 A fourth project on the production of connected discourse, involving Marslen-Wilson, Levy, and Tyler, focussed on the informational

conditions controlling the establishment and maintenance of discourse reference. A video-taped narration of a short story was analysed in detail, concentrating on the speaker's references to the main actors in the story. The outcome, first, was that essentially all of the devices analysed (both verbal and non-verbal referential devices) could be completely accounted for in terms of two intersecting factors: on the one hand the narrative function which a given device was serving, and, on the other, the local informational context. Given that the speaker needs, for example, to establish reference to an actor within an episode of the story, then the way he actually does this is strictly controlled by what the local context permits - that is, how specific a device needs to be (a name, a pronoun, a zero anaphor) for reference to be successfully established.

This general result was interpreted as reflecting the speaker's sensitivity to the listener's informational requirements. This interpretation was reinforced by the outcome of a further analysis of the types of processing information which the speaker must presuppose that the listener has available to successfully resolve a given anaphoric reference. It could be shown, for example, that the speaker's use of pronouns presupposed the use of pragmatic inference by the listener, in a manner predicted by experimental studies of comprehension. In general, the properties of the speaker's language production were found to be very precisely adapted to the properties of the comprehension system.

A related study is presently being conducted by Levy, examining in more detail the relationship between the thematic structure of a narrative and the mode of reference to major and minor characters. The analyses so far show that the establishment of major characters, as central in an episode, has distinctive verbal and non-verbal correlates. Gestures, for example, tend to co-occur with initial reference to a central character, but tend not to co-occur with subsequent references to that character within the same episode. Levy interprets these patterns as reflecting the segmentation of a narrative into distinct "focus spaces", which form an abstract deictic space within which reference is maintained in characteristic ways.

1.5 Approaching language production from a more linguistic perspective, Klein has continued his analysis of the fundamental properties of ellipsis in German. The use of an elliptical expression presupposes that the missing information can be recovered from the context, and Klein distinguishes here between thematically available information and contextually expectable information. In the former case, the contextually given information is already available at the point where the ellipsis occurs, while in the latter case the information only becomes available after the point of ellipsis. Klein defines these restrictions on ellipsis as the semantic conditions on ellipsis.

In addition he has developed a set of simple syntactic conditions on ellipsis; three major rules and two secondary rules. These can be seen as syntactic constraints on the realisation in a given string of the semantic conditions. However, these alone are not adequate. The appropriateness of various types of ellipsis is also critically dependent on the use of the correct intonation pattern (see 1.6). The significance of the results so far is the picture they provide, for an important aspect of language use, of the interaction between the structural organisation of speech and the availability of contextual knowledge of various types.

1.6 A different set of studies focus on what can be called the phonological aspects of language production, at both the segmental and suprasegmental levels. First, Klein is carrying out an extensive investigation of German intonation, using a special-purpose pitch-analysis system developed within the Institute. The starting point for this study was the issues raised in Klein's study of ellipsis, where he found intonational variables to be important. The study has since been broadened to cover intonation in general. The main results so far serve to discredit the major claims of previous empirical and theoretical research on German intonation. It is, for example, generally stated that Yes-No questions are characterised by a rising pitch-contour at the end of the utterance. This turns out to hold for only some of the cases analysed. A detailed analysis of a large number of questions and statements showed that the pitch-contours associated with each type of utterance are in fact highly variable.

This research is still in progress. However, three main factors

can be identified which seem to control the intonation pattern of an
utterance: the validity-value that a speaker associated with the
message being expressed, the factor of what is contextually already
given and of what is not, and, thirdly, the syntactic structure of the
utterance, in particular the position of the finite verb.

A second project - a dissertation completed in 1980 by Tropf -
examined phonological variation in natural second language acquisition.
Several interviews with adult Spanish guest-workers living in Germany
were phonetically transcribed, and compared with standard German equi-
valents. The major results were, first, that consonants and consonant
clusters at the beginning of a word are more stable, and vary less
than consonants at the end of a word. A second finding was an advan-
tage for front-articulated consonants in the acquisition of the German
consonant system (for example, front plosives /p, t/ are acquired
before back plosives /g, k/). Thirdly, the analyses indicate that the
syllable is the relevant linguistic unit underlying phonological pro-
cesses. In the course of acquisition the "same" sound is modified
differently depending on whether it is syllable-initial or syllable-
final. These differences correlated with syllable structure cannot
be captured at other levels of analysis.

1.7 A final research project, also primarily falling under the heading
of language production, was the dissertation research conducted by
Senft. This project analysed language variation among German workers
at different social levels, using the concept of linguistic variety-
space previously developed by Klein. This variety-space technique
successfully captured the phonological and syntactic properties of
both the similarities and the divergences in the language behaviour
of the sample of speakers. It was found, however, in language evalu-
ation tests that the linguistic variations captured in the grammar
did not by themselves completely account for the social evaluation of
the speakers' performance. The more general linguistic strategies
adopted by a speaker - for example, in organising the description of
a complex machine - were also found to be important determinants of
the social evaluation of language.

1.8 The Language Production group also benefited greatly from its
interactions with a number of visitors to the Institute, on visits
ranging between one and three months. During her stay at the Institute
Reinhart (Tel Aviv University) concentrated on two topics. First,
the relations between surface structure and semantic interpretation,
in particular on a theoretical re-organisation of linguistic research
on anaphora. The second area, discourse analysis, involved research
on topic, foreground and background, and the organisation of narrative.

Pinkal (University of Düsseldorf) worked during his visit on an
overview of different formal approaches to the semantics of vague
natural language expressions, with a special focus on the relationship
between vagueness and context-dependence. Williams (University of
Amherst) worked on several papers covering such topics as the struc-
ture of NP, compounding, and the relation between stress and anaphor.

2. LANGUAGE ACQUISITION

Language acquisition was the second major theme of the Projectgroup, and continues to be one of the four main areas in the present Institute. This emphasis on language acquisition is reflected in the wide range of projects being carried out, which have in common with the research on language production their concern with language in context. Various aspects of language acquisition are studied from the perspective of the manifold contexts for language use. These include the context provided by the physical environment which language may be used to talk about, the social interactive context provided by an adult or another child, and the linguistic context provided by what has been said in the preceding discourse.

2.1 A first set of studies examined the development of verbal and nonverbal means of reference to objects in the speaker's immediate physical environment. Several studies by Deutsch and Pechmann have investigated the use of pointing gestures as opposed to verbal means of reference, in test situations where pointing could be more or less effective as a referential device, and where verbal labels for the objects to be referred to were more or less easily available. The ages investigated ranged from two, five, six, and nine years, as well as adults.

The general finding is that while pointing is used at all ages, it is used increasingly selectively with increasing age. The younger children used pointing even when the objects were too far away, and physically too close together, for the gesture to be effective in distinguishing one object from another. In this situation adults tended not to use gestures. However, when pointing was an appropriate means of reference, then adults used it just as frequent as children. Similarly, adults use gestures as often as children when unfamiliar objects are introduced, with no readily

accessible verbal label.

The experiments also reveal considerable co-ordination between pointing gestures and the accompanying speech. First, the verbal means of reference tends to use less explicit linguistic descriptions when accompanied by a gesture. Second, the verbal and nonverbal behavior was highly correlated in time - for example, pointing almost always occurred at the moment in time at which the context discriminating features in the verbal utterance were being uttered.

In a related study Pechmann examined the specific role of acoustic stress, or accentuation, in the production of object descriptions at different ages. He has been looking in particular at the question of how far the assignment of stress in referential communication is determined by linguistic or non-linguistic factors. Children aged three to six, and adults, produced object descriptions consisting of a modifier and a noun, in situations where either the noun or the modifier carried the distinctive information necessary for the listener's identification of the object. In addition, the distinctive information coincided with given information, and non-distinctive information with new information - while in a second experiment this new/given connection was neutralised.

The results consistently show that what determines stress is the given/new structure of the description of the object relative to the preceding discourse, with syntactic factors also having an effect. In contrast, the distinctive/non-distinctive variable did not seem to correlate with stress - in other words, speakers did not stress a lexical item just because it provided critical discriminating information for the listener. These effects held equally across al age-groups, including adults.

2.2 A second range of studies centers around the role of social interaction in various aspects of language development. Deutsch and Pechmann have extended their studies of referential communication to include the role of interactive processes in the development of this type of linguistic performance. In a number of experiments, children aged three, six, and nine, as well as adults, were tested to establish how far they repaired their own ambiguous descriptions when directly asked for further specification. For every age group each case of

referential ambiguity was successfully resolved when feedback was given. Only the three year olds fell short of 100% performance, with a score of 87% successful repairs. The only age-related effect was the finding that the length of interaction required to elicit a successful repair diminished with increasing age. The younger the child, the less likely he was to produce a successful repair at the first attempt.

A further study of a form of referential communication in an interactive setting was conducted by Weissenborn. Following up on a longitudinal observational study of the development of spatial reference between the ages of 16-26 months, and a further experimental study of the ability to give route directions in children aged four to ten, Weissenborn is presently investigating route directions in seven to 14 year olds using a three-dimensional model of a small town. The two participants, who cannot see eachother, each have a model of the town in front of them. The direction giver has to specify for the other participant the route of a toy car through the town. This provides a rich source of data on the use of spatial knowledge and reference in an interactive situation. A first analysis of the data suggests that the spatial concepts left and right are motorically represented. The access to these conceptual representations, their application to spatial configurations as well as their verbalisation, seem to be mediated by the use of certain forms of spontaneous gestures. When these gestures are blocked, then processing difficulties result in the use of the terms left and right, and other verbal forms are substituted.

In an additional set of studies Käsermann continued her research within the framework of an interactive approach to language acquisition, looking in particular at how the child learns to select the appropriate variant of a given expression for a specific context. A first study examined the manner in which a child's selection of a syntactically incomplete (elliptical) expression as opposed to a syntactically complete expression was affected by various features of the preceding verbal context provided by an adult experimenter. While looking at a picture book, children were asked a set of WH-questions which systematically varied in the presence and type of embedding, in the determiner in the WH-expression, and in the word-order in the WH-expression.

The first variable, presence and kind of embedding, as well as the

type of determiner (this vs. there), was found to govern the selection of "other" responses over predications. The variation in word-order governed the selection of syntactically complete or incomplete utterances. This latter result can be interpreted in terms of the child's knowledge prerequisites. Subsequent research, still incomplete, is examining the conditions governing the child's choice between another type of alternating form - namely, nouns as opposed to pronouns as forms of reference.

2.3 There has also been considerable research within the Institute upon various aspects of lexical development. Weissenborn, in collaboration with Dr. M. Kail of the Université René Descartes, Paris, has investigated cross-linguistically the acquisition of certain contrastive connectives - i.e. aber and sondern in German and mais in French. All of these expressions are translated into English as but. However, the aber/sondern distinction in German marks the difference between two uses of but. Sondern differs from aber in requiring an explicit negation in P, in the context "P but Q".

The correct use of the contrastive connectives requires an understanding of the presuppositions relevant to their use. The purpose of the experiment was to determine whether the more explicit marking of presuppositional requirements in German would facilitate the acquisition of the "but" connectives relative to French, where there is no lexical marking of the different uses of but. To evaluate this possibility, French and German children ages seven, eight, and nine years performed a completion task involving fragments such as "P but ..." and "... but Q", followed, in a second experimental session, by a judgement task in which they were asked to determine whether the final sentences of short narratives were acceptable or not.

The main result, for both linguistic groups, was that the youngest children tended to treat but as a simple co-ordinating conjunction, the intermediate age-group consider it as an operator of implication, while only the oldest group had begun to fully master the presuppositions underlying the correct use of the various forms of but. The second general result was that performance was better for all age-groups and both linguistic groups in the completion task than in the judgement task. This, it appears, is because in the completion task

the fact that P or Q is already given helps to restrict the set of presuppositions to be processed, while in the judgement task the restrictions must be entirely discovered by the child himself.

The third finding was that, as predicted, the presuppositions involved in the use of but/sondern are acquired earlier than those involved in the use of but/aber. However, contrary to initial assumptions, this held true for both linguistic groups, so that the lexical differentiation in German did not have the predicted facilitatory effect.

In a different series of studies, Deutsch has continued his research on the aspect of lexical development known as "nominal compounding". Even children as young as two or three years use the word-formation devices of the language in a highly productive and innovative manner. In a recent follow-up study, children's knowledge of compounding in Dutch was studied over the ages five to nine, and with a control group of adults. Dutch has two definite articles, differing in grammatical gender. In compound expressions in Dutch the grammatical gender of the expression is determined by the gender of the modified element of the compound, and not by the modifying element. This modifying/modified relationship is, further, coded in the language by word-order constraints, so that the modifying element must precede the modified element.

The acquisition of the child's ability to handle these restrictions was studied by asking them to decide which the appropriate articles were for N1N2 compunds in Dutch. The results show that it is only after about age eight that children consistently use the correct article - i.e., that associated with the second noun. This result is in contrast to the ability of much younger children to correctly paraphrase such compounds, reflecting an understanding of the modifying/modifier relationship in these compounds.

This disparity in paraphrasing ability as opposed to the rule for the use of the article suggests that there are two stages to the acquisition of nominal compounding. In the first stage, children learn the mapping between formal devices, such as word-order, and the general semantic distinction implied by a given word-order - that is, the modifying/modifier relationship. At a second stage, usually not before school age, children begin to learn the more formal implications of compounding, namely the relation between word-order and the assignment

of the correct article. In other words, children master the semantic consequences of a syntactic device before they master its purely syntactic consequences.

Deutsch also included in this study measurements of the response latencies subjects required to make their decision about the correct article. So far these data have only been analysed for the adult group. The results here show, first, that responses are significantly faster for lexicalised as opposed to non-lexicalised compounds, suggesting that the recognition of the second noun is speeded by the first noun in the lexicalised compounds. The second main result was the unexpected finding that responses to produce "het" were considerably faster than those to produce "de", despite the fact that het is less frequent in the language.

A third aspect of lexical development is being studied by Flores d'Arcais in a continuing series of experiments on the acquisition of the meaning of a class of function words, namely the connectives. Two aspects of the acquisition process are being studied. First, the progressive differentiation of the meaning of common connectives, and, second, the acquisition of the metalinguistic knowledge required to perform in different types of linguistic tasks. The tasks that are so far being used include judgements of appropriateness of a word in context, lexical decision tasks, and the sorting of words on the basis of meaning similarity.

2.4 The acquisition of language in context was also studied from the perspective of language comprehension processes. In a series of three experiments, involving some 360 children between the ages of five and 10 , Tyler, Marslen-Wilson, and Jeurissen (from Nijmegen University) investigated the on-line interpretation of utterances in their discourse contexts, focussing on the immediate processing of various types of anaphoric device. The general goal of these studies was to determine whether the processes involved in the mapping of an anaphor onto its antecedent change during development.

All three experiments used the "mispronunciation detection" task, in which the children listened to short spoken passages and pressed a response key whenever they heard a mispronounced word. The word that was mispronounced was always derived from a word whose predictability

dependend on successfully completing the anaphoric linkages between the sentence containing the word and the previous discourse context. Thus, for example, the word letter could be mispronounced as leffer following three different types of anaphoric linkage, as in the following example: "Mother saw the postman coming down the street. The postman/ The man/He brought a letter from Uncle Charles".

Over the three experiments the results show, first, that the major developmental change occurs in the mapping of anaphoric pronouns, while the ability to process anaphoric linkages based on definite noun phrases is already fully present by the age of five. Five year olds, unlike any of the older groups, found pronouns more difficult to interpret than the other anaphoric forms tested, and this difficulty seemed to be due to their inability to consistently take advantage of the lexical properties of the pronoun. That is, they did not seem to exploit the information carried by the pronoun about the number and gender of its antecedent. Instead, the presence of a pronoun in an utterance simply functioned as a signal that something or somebody that has already been mentioned will continue to be talked about, so that what the young child will choose as referent of the pronoun is the most salient entity in the preceding discourse - usually the "thematic subject". Subsequent research is investigating in more detail the kinds of variables that determine the child's choice of thematic subject.

A different type of comprehension study was carried out by Deutsch and Dr. J. Koster (from Nijmegen University), investigating the acquisition of "internal" anaphors, such as himself, as opposed to "external" anaphors such as him. In recent linguistic theory - in this case Chomskyian universal grammar - a very different status is assigned to these two types of anaphoric pronoun. The purpose of Deutsch and Koster's research was to investigate the developmental consequences of this distinction. To do this he used a sentence-picture matching task, in which six year old children were presented with pictures - for example, of one person washing another - paired with sentences contrasting the two types of anaphor - for example "Jan's vader wast zich ("Jan's father washes himself") versus "Jan's vader wast hem"("Jan's father washes him").

The results were quite clear. The children were well able to

interpret the reflexives correctly, matching the pictures with the appropriate sentence. But they had very great difficulties with the third person pronoun cases, with an error rate as high as 92%. They clearly consistently interpreted these pronouns as if they were reflexives, at least in these single sentence contexts. Since adults perform equally well on both types of anaphor, the results are good evidence for a developmental difference in the acquisition of the ability to interpret correctly external as opposed to internal anaphora.

2.5 A final aspect of first language acquisition was investigated by Klann-Delius, in her analyses of the linguistic aspects of game explanations given by five, eight, and 11 year olds, as well as adults. The purpose of the research was to determine which linguistic phenomena were involved in verbalisation strategies in natural explanations, in particular in the production of the explanation as a coherent text. The important variables seem to be the relation of word- and sentence-order, and the order of prepositions, together with the use of time-adverbials and person- and object-references. Less significant were such variables as verb time (consecutio temporum), aspect and "Aktionsart" of verbs, and types of pronouns and types of sentence-coordinators.

2.6 An important theme in the future development of the Institute will be second language acquisition, both in children and in adults, and some research in this area has already begun. One example is the dissertation completed by Tropf, described in section 1.6 above. A second dissertation study has been started by von Stutterheim, who is investigating second language acquisition among Turkish migrants in West Germany. The research is focussing, first, on the linguistic product - what the migrant actually learns - as a variety of German, and, second, on the learning process as a psycholinguistic phenomenon. Particular attention is being paid to the learners' use and awareness of temporal and modal forms, determining to what extent the learning of these forms in the target language depends on the properties of these forms in the learner's native language.

3. LANGUAGE COMPREHENSION

Language comprehension was not one of the original major themes of
the Projectgroup, but it has been selected as one of the central re-
search areas for the present Institute. Given the importance of this
area within psycholinguistics in general, some research on language
comprehension has nonetheless been carried out from the earlier days
of the group. As with the research in the two areas already covered,
there is particular interest in the comprehension of language in
context - chiefly the linguistic context provided by the previous
written or spoken discourse.

3.1 A central theme in the comprehension research has been the study
of the processes involved in the on-line interpretation of anaphora in
spoken discourses. Apart from the developmental studies mentioned
earlier (2.4), Marslen-Wilson and Tyler have continued their investi-
gations of the time-course of anaphor resolution processes. A first
set of experiments have been examining the temporal course of the pro-
cesses whereby an anaphoric pronoun makes contact with the appropriate
antecedent in the listener's mental representation of the preceding
discourse.

In these experiments subjects listen to spoken sentences containing
anaphoric pronouns, and make lexical descision responses to visual probes
flashed up at various points in time before and after the occurrence of the
anaphor in the speech stream. The assumption here is that probes semantically
related to the antecedent of the anaphor will be facilitated when that ante-
cedent is activated. The research is still incomplete, but the results so far
indicate that an anaphoric pronoun does not have the expected immediate se-
lective effect. There is no evidence for a differential facilitation of that
antecedent, from among those available in the context, which is indexed
by a given pronoun. Instead, the results consistently show facilitation
of probes related to both potential antecedents.

A second set of experiments by Tyler and Marslen-Wilson examined
the time-course of discourse integration processes using a somewhat
different paradigm. Subjects heard short story contexts - such as
"As Peter was walking back from the shop, he saw an old woman trip
and fall flat on her face. She seemed unable to get up again" - fol-
lowed by one of three continuation fragments, which were linked to the
preceding discourse either by a repeated name "Peter ran towards...",
by an anaphoric pronoun "He ran towards...", or by a zero anaphor
"Running towards". Immediately following the offset of the fragment
a visual probe is flashed up - for the above example, either him or
her, and the subject's task is to name this word as quickly as possible.
The assumption here is that subjects will be slower in naming a probe
if it is inappropriate with respect to the preceding context - as him
would be in the above case.

The results showed significantly faster naming latencies to the
appropriate probe in all three continuation conditions, and no diffe-
rence in the size of the effect for the three conditions. Thus the
pragmatic inferences which are necessary for successful discourse
linkage in the zero anaphor case do not slow down responses relative
to the other two cases, where inference is not necessary to make the
discourse link. This is contrary to widespread claims in the literature
- chiefly based on studies using written texts - that amphasize the
time-consuming nature of inference-based discourse links.

Research at the Institute by Vonk has also investigated text com-
prehension processes and the role of inference. An experiment was con-
ducted in which texts were read containing a sentence the understanding
of which required an inference to be made. If the reader makes the
inference when reading the sentence, the reading of such a sentence
should be speeded up in the cases where the information to be in-
ferred is explicitly presented earlier in the text. Similarly, the
recognition time for information that is inferred should not differ
from the recognition time for information that was explicitly stated
in the text. The first prediction but not the second was confirmed,
which suggests a difference in the coding of information depending on
whether or not it was explicitly stated in the text.

3.2 There has also been research at the Institute on more general
issues in sentence processing. In a series of three experiments,
Jarvella, Wubben-Damen, and Deutsch have studied the interrelation of
syntactic and semantic information storage and processing in the
left-to-right analysis of sentences. The work focussed in particular
on the effects of sequential dependencies defined with respect to
prior sentence context. At various points in a visually presented
sequence, subjects made forced choice decisions about what should
come next. In this task, semantic and syntactic constraints set up by
the context appear to have additive effects in facilitating correct
judgements. Moreover, a semantically biassing context seems capable of
simplifying decisions of an almost purely grammatical nature (e.g.,
gender, number, and tense agreement). The execution of grammatical
commitments made in a linguistic sequence appears to be made more
complex when material intervenes between the two agreeing parts and
makes them discontinuous, although this effect can be attenuated and
even completely offset semantically.

Flores d'Arcais has also continued his research on the strategies
a listener uses in constructing an internal structure out of the in-
coming signal, based on the assumption that the listener constructs
such a structure by using not only his knowledge of the rules of the
language, but also of a series of heuristics which allow a rapid and
efficient on-line use of incoming stimulus information. One recent
experiment has examined eye-fixations during the verification of
comparative sentences, to test various hypotheses about the processing
of such sentences. A second study consisted of two experiments on the
verification of complex sentences, while a third study investigated
the use of given and new information in the comprehension of temporal
sentences.

3.3 An important aspect of language comprehension is the process of
word recognition. This has been the subject of two series of experi-
ments by Marslen-Wilson, both investigating various predictions made
by the "cohort" model of spoken word recognition. This model claims
that spoken word-recognition is mediated by the parallel activation,
at the beginning of a word, of all the words in the language that
begin with the same sound sequence, and that the word in question can

be recognised as soon as it becomes uniquely distinguishable - starting
from word-onset - from all the other words with which it shares its
initial segments.

The first experiment used a phoneme monitoring task, followed by
a gating task, to test the model's claims about recognition point. It
was found that response latencies to detect phoneme targets were highly
correlated with the relationship between the location of the target in
the word and the recognition point, as operationally defined in the
gating task. Thus detection latencies tended to be slower when the
target preceded the recognition point, but were greatly speeded up as
the target came later and later in the word. Thus, for example, reac-
tion-times to detect the /t/ at the end of the Dutch word advocaat
were less than 200 msec, since the /t/ comes well after the recognition
point - which for this word is during the "o". These results indicate
that the concept of recognition point does indeed apply to the recog-
nition of spoken words.

A second experiment, still in progress, is testing a different as-
pect of the cohort model; namely, its claim that many different word
candidates are activated early in the word. To do this, sets of word-
pairs were generated that only separated relatively late in the word
- for example, the pair kapitein and kapitaal. Each subject heard one
member of each word-pair, and associated with the word was a visual
probe, that was related to either one member or the other of the pair.
The prediction of the cohort model is that probes related to both
members of a pair will be activated, irrespective of what the word
will eventually become, so long as the probe is flashed up at a point
in the word before the point at which it uniquely separates. For the
example pair above, this should apply to probes placed on the /t/ or
earlier. At present, different techniques for measuring the hypothe-
sized activation processes are being evaluated. These include the
Stroop colour interference paradigm, a simple naming latency task,
and a cross-modal lexical decision task.

3.4 A different aspect of the role of words in language comprehension
was studied by Colombo, during a six month visit from the University
of Padua. The goal of the project was to study the concepts of poly-
semy and homonymy as applied to Dutch prepositions. The question was

asked of how the different meanings of these prepositions were related, and whether processing evidence could be found for a unique general conceptual structure underlying all the different senses of a given word.

The research completed so far has used judgements of similarity applied to sentences containing one of 10 Dutch prepositions. In a first task subjects judged how close the meaning of the preposition in each sentence was to the general concept of the preposition. In a second experiment, subjects were asked to sort the sentences according to the similarity in the meaning of preposition in each sentence. A cluster analysis was performed on these groupings, and a new sentence was then constructed with a meaning corresponding to each of the main clusters so obtained. In a third experiment, these new sentences were then evaluated for their similarity to the sentences used in the preceding tasks.

The results were interpreted in terms of questions about the presence of one or more core conceptual structure underlying a preposition, and the interaction of these clusters with the use of a preposition in a given context. The first experiment showed that the senses judged closest to the concept of the preposition are generally the spatial ones. When there are two main different meanings for a preposition, in some cases only one meaning is perceived as central, while in other cases both meanings compete to be judged as most similar to the basic concept. The clusters derived from the second task exhibit similar properties, with single meaning prepositions showing a clustering around the core meaning, while for prepositions with two meanings, either two well separated clusters are obtained, or else the two meanings may be related to eachother by decreasing degrees of similarity. Further research is investigating the implications of these differences in underlying conceptual organisation for the accessing of one meaning or another in a processing task.

3.5 There were a number of short-term visitors to the Insititue whose work was most closely associated with the interests of the Comprehension group. Two of these - Garrod (University of Glasgow) and Swinney (Tufts University) - chiefly cooperated with Tyler and Marslen-Wilson on the development of joint projects in spoken word-recognition and on the on-line determination of referential significance in spoken and written texts.

During a short visit from the Institut für Anglistik, Graz, Karpf was able to carry out a study of the perception of ambiguous sentences in a second language, using for her study native Dutch speakers and English sentences containing syntactic and lexical ambiguities.

As part of a longer-term visit to the Institute, ter Meulen continued her research on the relationship between structural models of language-processing and the logical models of formal semantics. The development of formal models of partial interpretation allows the definition of a new concept of a truth, which relates the truth-functional interpretation to situational knowledge and to previous stages of the partial interpretation. In such partial models events can be naturally defined as sets of changes between situations. Present research is examining the different contributions that the aspectual properties of tensed sentences make towards the discourse interpretation, as explained by the structure of the information on which the truth-functional model depends.

4. LANGUAGE DISORDERS

From the beginning of 1982, the field of language disorders will become a fourth main research area within the Institute, reflecting the commencement of a multi-year grant from ZWO (Dutch Science Foundation) to support four researchers in this area. Some research has, however, already begun at the Institute, focussing on adult aphasias.

4.1 Research by Friederici has examined syntactic and semantic processes in production and comprehension by aphasics, with special emphasis on the availability of prepositions. These recent experiments follow up earlier research, on English-speaking populations, on differences in production and comprehension tasks in the ability of aphasics to handle prepositions.

This research raised questions about the role of semantic and syntactic information in the use of prepositions, and these questions can be directly addressed in a language like German, where the same lexical item (preposition) can have very different semantic and syntactic roles, depending on its function in a given structure. If agrammatism is assumed to be based on a general inability to assign syntactic structure, then one would predict that agrammatic speakers should have greater difficulty in producing closed class forms that mainly bear syntactic rather than semantic information. Further, given the earlier research, the prediction can be made that the factor of functional role will affect production performance but not comprehension performance in off-line tasks.

These issues were examined in German-speaking Broca's (agrammatic) and Wernicke's aphasics. The role of prepositions was varied in production and in comprehension tasks. Overall performance was better in the comprehension task - making an acceptability judgement - than in the production task. In the judgement task, Wernicke's aphasics more accurately determined the acceptability of prepositions when in their syntactic role rather than their semantic role, while the Broca's showed no such difference. In the production task, Wernicke's were more likely to produce prepositions when they were in a primarily syntactic role. But Broca's failed to produce such syntactically functioning prepositions despite their abiltiy to produce the same items when they were semantically based. These results can be interpreted in terms of the suggestion that Broca's aphasics have difficulties in using their syntactic knowledge source. However, the dissociation between the processing of prepositions depending on whether they are filling syntactic or semantic roles, means that the general open/closed class distinction needs to be qualified by statements about the functional properties of closed class items.

4.2 Jarvella also continued research on aspects of adult aphasia, in collaboration with research institutions in New York. In one study, the analysis continued of aphasic patients' performance of direct speech acts under experimental conditions. The findings suggest that non-fluent subjects appear to perform both production and comprehension tasks in a manner which is sensitive to the conventional use of grammatical forms to convey requests and make statements. Fluent subjects, on the other hand, appear to produce language and comprehend it without making these connections as clearly. Secondly, non-fluent subjects were better at identifying the intended function of spoken sentences when these were fully meaningful from their intonations, while fluent subjects were better at doing this when the sentences were meaningless.

Final analysis and write-up was also begun of a large-scale study of question-answering and sentence comprehension in aphasia. Fluent and non-fluent aphasics were found to differ most with the respect to the use of a strategy to recover information conveyed as being pragmatically important. Fluent aphasics were more sensisitve to prosodic and structural prominence, and non-fluent subjects to the position of constituents in sentences.

OTHER ACTIVITIES 1980

GLOW-CONFERENCE. The Institute sponsored the annual meeting of GLOW (Generative Linguistics in the Old World), a European-based association of generative linguists. The meeting took place at the Institute, April 10-13; there were almost 200 participants.

PRESS-CONFERENCE. The Institute introduced itself to the German and Dutch press on October 1-2.

PAPERS PRESENTED. The following papers were read elsewhere by the Institute's staff and fellows:

W. Deutsch, "Children's knowledge of nominal compounding", Nijmegen University, April.

— "Speakers' and listeners' memory for sentences", Tagung Gedächtnismodelle und Sprachverarbeitung in der Kognitionspsychologie und Computerlinguistik, Bielefeld, May.

— "Developmental changes in referential communication", Dutch Psychonomic Society, Nijmegen, May.

— "Zur Ontogenese von Besitz und Eigentum", 32. Kongress der Deutschen Gesellschaft für Psychologie, Zürich, September.

— "Zur Ontogenese von Besitz und Eigentum", Nijmegen University, December.

W. Deutsch & T. Pechmann, "Form and function in the development of reference", XXII International Congress of Psychology, Leipzig, July.

G.B. Flores d'Arcais, "The use of syntactic and lexical information during sentence processing", XXII International Congress of Psychology, Leipzig, July.

— "Perception and Language", Japanese Psychological Congress, Japan, August.

G.B. Flores d'Arcais, "Studies in comparative sentences", Symposium on
Cognitive Psychology, Sapporo, August.
— "The acquisition of connectives in children's language", The National
Language Institute, Kyoto University, Kyoto, September.
— "The acquisition of connective in children's language", Department
of Education, Kyoto University, Kyoto, September.
— "Syntactic and lexical factors in language processing", Kwansei-
Gakuin University, Hyogo, September.
— "Human Information processing and Language", Kwansei-Gakuin Uni-
versity, Hyogo, September.
— "Recent contributions in the domain of syntactic and semantic
processing in contemporary psycholinguistics", Keio Symposium
in Cognitive Science, Keio University, Tokyo, September.
— "The perception of complex sentences and the acquisition of
connectives", Department of Psychology, Tokyo University and
Dokkyo University, Tokyo, September.
— "Mind and Language", Keio University, Tokyo, September.
— "Perceptual organization and linguistic structure in the de-
scription of an event", Tokyo University, Tokyo, September.
— "Psycholinguistic research in The Netherlands and Europe",
Tokyo University, Tokyo, September.
— "What is the use of syntax in language perception?", Academia
della crucia, Florence, December.
A. Friederici, "Agrammatism", Workshop on Information-processing
Approaches to the Aphasias, European Association of Psycholinguis-
tics, Paris, April.
— "Structural and Semantic Processing in Broca's Aphasia: Dissociable
Aspects of Performance?", 18th Annual Meeting of the Academy of
Aphasia, Base River, Mass., October.
R. Jarvella, "Utterance structure and speech production", "Speech acts
and grammar in aphasia", and "Some segmental dependencies in
language processing", Göteborg University, May.
— "Some segmental dependencies in language processing", Lund
University, May.
— "Lexical dependencies in sentence processing", XXII International
Congress of Psychology, Leipzig, July.

A. Karmiloff-Smith, "Pronominalization and non-pronominalization in
connected discourse", Chicago Linguistics Society, April.
— "Language as a problem-solving situation", Workshop in Cognitive
Science, Committee on Cognition and Communication, Chicago, April.
A. Karmiloff-Smith & M. Kail, "Recherches de psycholinguistiques
génétiques sur l'anaphore. Conduites métalinguistiques ou conduites
langagières?", CNRS, Paris, February.
M.-L. Käsermann, "Die methodologische Bedeutung und konkrete Analyse
von Interaktionssequenzen in der Untersuchung von Problemen der
Sprachentwicklung beim Kinde", Workshop Mutter-Kind Interaktion,
Heidelberg, May.
— "On children's handling of requests", XXII International Congress
of Psychology, Leipzig, July.
G. Klann-Delius, "Spielerklärungen bei Kindern", 2. Jahrestagung der
Deutschen Gesellschaft für Sprachwissenschaft, Berlin, February.
W. Klein, "L'acquisition des pronoms personnels allemands par les
travailleurs espagnols et italiens", Symposium Acquisition d'une
Language Etrangère: Perspective de Recherche, Paris-Vincennes, April.
— "Moral argumentation among children and adults", and "Language
problems of foreign workers", Göteborg University, May.
— "Logik der Argumentation", Jahrestagung des Instituts für deutsche
Sprache, Mannheim, June.
— "Der Ausdruck der Temporalität im angesteuerten Spracherwerb",
Universität München, June.
— "Reguläre Ellipsen im Deutschen", Universität Klagenfurt, June.
— "Spatial orientation in route directions", SSRC Conference on
Spatial Orientation, Minneapolis, June.
— "Knowing a language and knowing how to communicate", Symposium
Language, Literature and Society, Tilburg, September.
— "Sprache ausländischer Arbeiter", MPI für Biologie, Tübingen,
December.
— "Der Erwerb der deutschen Personalpronomina durch ausländische
Arbeiter", Universität Konstanz, December.
W. Levelt, "Linearization in discourse", Salk Institute, La Jolla,
February.
— "Surface form and memory in question answering", and "Linearization
in spatial descriptions", Göteborg University, February.

W. Levelt, "On-line processing constraints on the properties of signed
and spoken language", Dahlem Conference on Signal and Spoken Lan-
guage: Biological Constraints on Linguistic Form, Berlin, March.
— "Das Max-Planck-Institut für Psycholinguistik", Senat of the
Max-Planck-Society, Düsseldorf, March.
— "Beinvloedt de letterlijke vorm van de vraag de formulering van
het antwoord?", Nijmegen, May.
— "A series of lectures on speech production, and on learnability",
Stanford University, May-June.
— "Linearization in discourse", Louvain University, November.
W. Marslen-Wilson, "Autonomy hypotheses in language processing",
Fifth GLOW Colloquium, Nijmegen, April.
— "Producing interpretable discourse", Sloan Workshop on Language
Use, Chicago, April.
— "Properties of the on-line transfer function for auditory compre-
hension of language", Sloan Workshop on Neural Models of Language,
Amherst, May.
W. Marslen-Wilson & L. Tyler, "Towards a psychological basis for a
theory, of anaphora", Chicago Linguistic Parasession on Pronouns
and Anaphora, Chicago, April.
— "Speech comprehension processes", CNRS Cognitive Science Conference,
Abbaye du Royaumont, France, June.
— "Processing structure for spoken language understanding", XXII
International Congress of Psychology, Leipzig, July.
A. ter Meulen, "New models for Montague grammar", Amsterdam University,
November.
— "On partial interpretation", Groningen University, December.
T. Pechmann, "Pointing and Language as referential means", Tilburg
University, April.
T. Pechmann & W. Deutsch, "From gesture to word and gesture", Stanford
Child Language Research Forum, March.
T. Reinhart, "Are LF rules necessary?", Symposium on Levels of Syntac-
tic Representation, Paris, December.
— "Structural conditions for bound anaphora", Utrecht University, Dec.
— "Positive coreference: a reorganization of the anaphora picture"
and "Pragmatic aboutness", University of Konstanz.

T. Reinhart, "Foreground and background in language and perception",
IPO, Eindhoven, and Amsterdam University.
D. Swinney, "The on-line comprehension of idioms and metaphors",
Symposium on Metaphor Processes, American Psychological Association,
Montreal, September.
— "The cognitive nature of the reading process", Orton Society
Conference, Boston, October.
V. Ullmer-Ehrich, "Linguistische Aspecte der forensischen Argumentation",
Jahrestagung des Instituts für Deutsche Sprache, Mannheim, March.
— "Sprache und Recht", Evangelische Akademie, Lochum, August.
— "Diskursorganisation und Satzform", Düsseldorf University,
November.
J. Weissenborn, "The role of cognitive, interactive and linguistic
factors in the development of the discourse type 'Route directions'",
2nd Annual Meeting of the German Society of Linguistics, Berlin, March.
— "The acquisition of local reference in children", Technical Univer-
sity, Braunschweig, May.
— "Du läufst ganz geradeaus", Annual Meeting Max-Planck-Society,
School Lecture, Hannover, June.
— "Route directions in children. The ontogenesis of a cmplex verbal
task", Free University, Berlin, June.
— "Conditions pragmatiques de l'acquisition des rêfêrences spatiales",
Université Renê Descartes, Paris, June.
— "Children's route directions", Linguistic Society of America,
42nd Summer Meeting, Albuquerque, August.
— "The acquisition of spatial reference", State University of New
York, Buffalo, October.
— "The ontogenesis of local reference", University of Essen,
December.
J. Weissenborn & M. Kail, "A developmental cross-linguistic study of
the processing of lexical presuppositions: French MAIS and German
ABER vs SONDERN, 5th Annual Boston Conference on Language Develop-
ment, Boston, October.

TEACHING. The Institute's staff taught courses of various duration
at the following Universities: Universität Mannheim (Deutsch), Uni-
versität Frankfurt (Klein), Stanford University (Levelt), Nijmegen
University (Vonk), Freie Univeristät Berlin (Weissenborn).

COLLOQUIA and LECTURES were presented at the Institute by
B. Butterworth, M. Bierwisch, S. Dik, C. Fillmore, L. Fillmore,
S. Garrod, J. Gazdar, J. Hawkins, C. Heeschen, M.-L. Kean,
D. Lightfoot, R. Lineburger, A. ter Meulen, D. O'Connell,
S. Peters, T. Reinhart, L. Rizzi, T. Roeper, K. Scherer,
C. Sidner, M. Silverstein, D. Swinney, J. Valsiner, R. Wales,
and E. Williams.

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   the trouble with linguistics. J. of Pragm. 4, 537-542 (1980).

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   in Speech, Eds. H.W. Dechert and M. Raupack. Mouton, Den Haag
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signed and spoken language. In: Biological constraints on linguis-
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In: Toegepaste aspekten van de taalpsychologie, Ed. J.F. Matter,
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Marslen-Wilson, W.D.: Speech understanding as a psychological process.
In: Spoken language generation and understanding, Ed. J.C. Simon.
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