

Third International Workshop on Language Production



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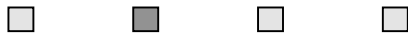
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Sunday, August 13th

- 8:30 – 9:00AM** **Coffee and Registration**
- 9:00 – 9:30AM** **Introduction to the workshop**
- 9:30 – 11:30 AM** **Integrating theories of single word and sentence production**
F.-Xavier Alario *Introduction*
Gary Dell *Lexical selection: From single words to sentences*
- 11:30 – 1:00PM** **Lunch on your own**
- 1:00 – 3:00PM** **Bilingualism**
Jubin Abutalebi *The neurocognition of language control in bilinguals*
Tamar Gollan *Accessibility versus dual-tasking: The many effects that bilingualism has on speaking*
- 3:00 – 5:00PM** **Poster Session I**

Monday, August 14th

- 8:00 - 8:30AM** **Coffee**
- 8:30 – 11:30AM** **Lexical access**
Jens Bölte & *Morphological processing in spoken word production research*
Pienie Zwitserlood
Karin Humphries *Feedback and monitoring in spoken word production*
Ansgar Hantsch *Semantic facilitation in the picture-word-interference paradigm: Implications for models of lexical access*
- 11:30 – 1:00PM** **Lunch on your own**
- 1:00 – 3:00PM** **Aphasia**
Brenda Rapp *Structure, function and representation in written language production*
Cristina Romani *Effects of syllable structure in aphasia: Implication for models of single word production*

PRESENTATIONS – SUNDAY

Lexical Selection: From Single Words to Sentences

Gary Dell

All theories of single-word production have some way of choosing the word to be produced and avoiding choosing the various competitors that arise during the lexical retrieval process. I will argue that specializing this selection mechanism so that it is sensitive to syntactic categories is a logical first step in transitioning between a single-word and a sentence-production theory. To illustrate such a transition, I briefly describe the interactive two-step model of single-word production and present picture-naming data from aphasic individuals that illustrate the need for sensitivity to syntactic categories in lexical selection. This sensitivity can be created in a model that learns to produce simple sentences incrementally from a message (Gordon & Dell, 2003). The selection mechanism in this model is the "syntactic traffic cop". It facilitates selection of items from appropriate categories while preventing inappropriate choices. I'll review some aphasic data from patients in which the cop is not working well and contrast those with cases in which the cop is doing fine. This model has the characteristic that the resolution of syntagmatic interference (via the cop) and paradigmatic interference (e.g. from semantic competitors in the same category) occurs at the same processing level.

The Neurocognition of Language Control in Bilinguals

Jubin Abutalebi

Over the past years there has been an impressive psycholinguistic effort to explore whether there is competition between two or more languages during word production. During my talk I will argue that data from bilingual aphasia conjunctly with data from functional neuroimaging strongly suggest that there is competition to control output in bilinguals. Neural data also indicate that competition may exist at a number of levels and that inhibition may be a key mechanism in language and lexical selection.

I will finally present a neurocognitive account of L2 production that may have crucial implications to the understanding of normal performance and the causal basis of recovery patterns in bilingual aphasia.

Accessibility Versus Dual-tasking: The Many Effects that Bilingualism has on Speaking

Tamar H. Gollan

University of California, San Diego

Bilinguals provide a tool for understanding language production. Whereas monolinguals only know one name for each thing (except for synonyms), each time bilinguals speak, they need to choose between two names (one in each language). A more subtle difference is that bilinguals use words in each language less often than monolinguals because bilinguals speak each language only some of the time. This hypothesis draws an analogy between bilingualism and frequency-of-use whereby increased use leads to increased accessibility. Support for this frequency analogy comes from bigger frequency effects in picture naming in bilinguals versus in monolinguals, and from bilinguals' vulnerability to tip-of-the-tongue or TOT states which typically involve retrieving low-frequency words. Other data seem to be better explained by assuming that when speaking one language, bilinguals must work to ignore activation of words in their other language. Previously we reported that bilinguals retrieved fewer correct exemplars from semantic categories than monolinguals. In a current study, we are examining the time-course of retrieval from semantic categories in bilinguals versus monolinguals, and in the dominant versus non-dominant languages to determine why bilinguals produce lower fluency scores. Results suggest that being bilingual is analogous to performing a dual-task during category fluency, and also that speaking the non-dominant language is even more dual-task-like than speaking the dominant language. Both dual-language activation and differences in patterns of language use are necessary to explain how the language production system handles the roughly doubled load associated with bilingualism.

POSTERS SESSION – SUNDAY

- [1] **Lexical effects on vowel production and perception in clear speech**
Rajka Smiljanic, Josh Viau, & Ann Bradlow
- [2] **Inner-speech slips exhibit lexical bias, but not the phonemic similarity effect-**
Gary M. Oppenheim & Gary S. Dell
- [3] **Non-target language competition in the picture-word interference task
Modified for Eye-Tracking**
Margarita Kaushanskaya & Viorica Marian
- [4] **Shaping the link between seeing and saying**
Stefanie E. Kuchinsky, Kathryn Bock & David E. Irwin
- [5] **The locus of texture effects in spelling**
Angela C. Jones & Jocelyn R. Folk
- [6] **Purple elephants and orange giraffes: Phonology-based determiner
competition in English**
Katharina Spalek, Herbert Schriefers & Kathryn Bock
- [7] **The effects of word order and noun type on agreement with conjoined subjects**
Heidi Lorimor, Erica Middleton & Kathryn Bock
- [8] **Abstract sentence representations in 3-year-olds: Evidence from language
comprehension and production**
Giulia Bencini & Virginia Valian
- [9] **Tense marker productivity and sentence production automaticity in young
children**
Matthew Rispoli & Pamela Hadley
- [10] **Learning to use appropriate referring expressions**
Danielle Matthews
- [11] **Grammatical repairs in spoken language production: Evidence from Aphasia**
Adam Buchwald
- [12] **Phonologically marked verb inflections in agrammatic speech production**
Dirk-Bart den Ouden & Cynthia K. Thompson

- [13] **Treatment and generalization of functional categories in agrammatism**
Cynthia K. Thompson, Lisa H. Milman, Michael Walsh Dickey, Janet O'Connor,
Borna Bonakdarpour, Steve Fix, JungWon Janet Choy & Diane Arcuri
- [14] **Production of German compounds**
Heidi Gumnior, Andrea Krupik, Mariel Rinke & Pienie Zwitserlood
- [15] **Speakers' monitoring of their addressee's understanding during the telling of a narrative**
Kathleen M. Eberhard, Sarah Boyd, Chris Larson, Carole Kennelly, Alice
Feldman & Catherine Linn
- [16] **The time course for structuring embedded clauses in sentence production**
Christopher Crew & Zenzi M Griffin
- [17] **Phonological neighborhood density guides lexical access in native and non-native language production**
Henrike Blumenfeld & Viorica Marian
- [18] **Noun phrase structural priming at the beginnings and ends of sentences**
Alissa Melinger & Alexandra Cleland
- [19] **Grammatical gender effects on bilingual cognition: Evidence from speech errors**
Stavroula-Thaleia Kousta, David P. Vinson, & Gabriella Vigliocco
- [20] **Conceptualisation in speech production: an ERP and a fMRI study**
Boukje Habets, Bernadette M. Jansma & Thomas F. Münte

PRESENTATIONS – MONDAY

Morphological Processing in Spoken Word Production Research

Jens Bölte & Pienie Zwitserlood

Investigations of spoken-word production for a long time concentrated on the following questions (1) do processes operate in serial, cascaded, or parallel fashion and (2) are units representing syntactic information independent from phonological information. Our early picture-word interference experiments with morphologically complex words as distractors or as targets addressed similar questions. As a whole, the data support the existence of morphemes as units in word production, and clarify the processing steps involved.

My talk will add to the picture emerging from experiments on morphological complexity in speaking in two ways. First, I will present new data concerning the classic lexeme and lemma division. The evidence clearly suggest that compounds are represented as a whole at some level (lemma?), and that facilitatory effects of morphological overlap between complex picture names and distractors result from a shared morpho-phonological level.

The second focus of the talk is that the morphologically complex words as picture names can be used to address questions which are quite different from the ones specified above. For instance, under which circumstances do we produce underspecified utterances? A description of these circumstances will be the main topic of my talk. Speakers typically over specify their utterances, thereby violating Grice's Maxim of Quantity in a positive manner. Hearers receive more information than they need, but they at least have no problem understanding the listener's intention. I will show that speakers specify morphologically complex utterances to a sufficient level only under certain conditions. Often enough, they produce underspecified utterances, which would require a negotiation process in a normal communicative encounter to achieve a common ground. Thus, the production of morphologically complex words allows to investigate conceptual processing over and above morphological processing.

Feedback and Monitoring in Spoken Word Production

Karin R. Humphreys

In theories of spoken word production, a central question is whether the process is strictly feed-forward, or whether there is feedback between levels of representation. One of the strongest arguments for feedback is in the lexical bias effect, in which phonological speech errors tend to form words, rather than non-words. However, this effect can be explained either by feedback, or a monitoring/editing process, in which non-word utterances are selectively edited. This session will discuss the debate over the mechanisms involved in the lexical bias effect, and look at the evidence for each position. As part of this discussion, it is critical to look at the capabilities of the self-monitoring/editing system, rather than rely on sometimes post-hoc explanations of what an editor is able to do. While speakers are clearly able to edit their speech under some circumstances (one does not say "shit" in front of one's grandmother), it remains unclear precisely what speakers can or

cannot edit online. This session will discuss some of current theories, and evidence for what kinds of speech can be edited, what cannot, and what the underlying mechanisms might be. A crucial step forward for this argument over the existence of a lexical editor, as well as for understanding the process of language production more generally, will be to better specify the processes underlying monitoring and editing.

Semantic Facilitation in the Picture-word-interference Paradigm: Implications for Models of Lexical Access

Ansgar Hantsch, Jörg D. Jescheniak & Herbert Schriefers

Current models of lexical access share the assumption of lexical competition (i.e. semantically related lexical representations compete for selection during language production). Empirical evidence supporting this assumption has been provided by numerous studies reporting specific interference from to be ignored semantically related distractor words during object naming in the context of the picture-word interference paradigm. The majority of these studies, made use of picture-word pairs from the same level of abstraction (i.e. within-level effects: e.g. target: fish, distractor: dog). By contrast, corresponding evidence from distractor words bearing a hierarchical relation to the target (e.g., target: fish, distractor: carp) is sparse and inconclusive. Recently, the reliability of the semantic interference effect has been put into doubt by studies reporting semantic (between-level) facilitation where semantic interference is predicted by current models of speech production.

In this talk, I will present a series of experiments supporting the notion of semantic between-level competition. The implications of the contradictory data patterns for models of lexical access will be discussed. A second series of experiments is reported, investigating some possible explanations for the opposing semantic effects in the picture-word interference paradigm. Results speak against an overhasty adjustment of the conception of competition in lexical access in language production.

Structure, Function and Representation in Written Language Production

Brenda Rapp

The system for producing written language is a recent cognitive acquisition in human history and, therefore, has not participated in shaping the human genetic blueprint. Its evolutionarily recent status raises questions concerning the extent to which it is parasitic on other more fundamental abilities such as spoken language or object recognition. In addition, there are questions regarding the organization of the cognitive machinery and the nature of the representations that allow for the expression of orthographic knowledge. In this talk, I will argue that evidence from cognitive neuropsychology reveals an orthographic system with a complex internal structure that represents and processes abstract orthographic representations. The evidence indicates that the orthographic and phonological systems, while making use of similar operating and representational principles, have an intimate yet autonomous relationship.

I will specifically focus on the evidence from individuals who have suffered neural injury that reveals the internal structure of the system for written language production. This evidence shows that the processes of lexical selection, morphological assembly, orthographic encoding, orthographic buffering and letter selection are instantiated in the brain with sufficient independence that they can be selectively disrupted. Their disruption can then be used to examine the specific manner of their operation and the nature of the representations they manipulate. I will go on to focus on work that examines the specific characteristics of these representations and processes.

Effects of Syllabic Structure in Aphasia: Implications for Models of Single Word Production

Cristina Romani & Claudia Galluzzi

We will review the literature on the phonological errors made by aphasic patients with a particular emphasis on effects of syllable structure. We will then present data which show that aphasic patients with different impairments differ in their tendency to simplify syllable structure. Patients with deficits affecting articulatory programming simplify while those with more central phonological deficits do not. These last patients, instead, make errors of phoneme selection. In spite of these differences, however, patients in both groups, present strong effect of syllabic structure. Errors affect certain syllabic positions much more often than others, even when the same phonemes are involved and phonotactic constraints are not an issue.

Our results provide evidence against theories of aphasia that claim phonological errors result from weakening syllabic and phonotactic constraints (e.g., Berg, 2005). They also challenge theories where syllabic structure is assigned only late in the speech production process, after lexical access and phoneme selection have been completed (e.g., Goldrick & Rapp, 2006). If this were the case, we would not expect the phonological patients, who have trouble with phoneme selection, to show such strong effects of syllable structure. We believe that syllable structure helps with lexical storage by providing an ordering mechanism and by restricting the phonemes which may occupy given positions. In both types of patients, head positions within the syllable will receive stronger lexical activation than branching positions and, thus, will be more preserved. In addition, the articulatory patients will simplify syllabic structure to accommodate reduced articulatory capacity.

POSTER SESSION – MONDAY

- [21] **Semantic integration and the timecourse of planning complex noun phrases**
Neal J. Pearlmutter & Eric S. Solomon
- [22] **Argument structure encoding in the production of verbs and sentences:
An eyetracking study**
Cynthia K. Thompson, Michael Walsh Dickey, Soojin Cho, Jiyeon Lee & Zenzi M. Griffin
- [23] **Using evidence from elicited writing errors to inform models of language
production**
Debra Pollock & Karin Humphreys
- [24] **Does lexical information influence syntactic production? Results of reaction
time and sentence type analyses**
Jennifer Cupit, Elizabeth Rochon, Ron Smyth & Carol Leonard
- [25] **Production of functional categories in agrammatic Broca's aphasia**
Jiyeon Lee, Lisa H. Milman & Cynthia K. Thompson
- [26] **Online, speaker-driven influences of lexical neighbors on phonetic variation**
Melissa Michaud Baese & Matthew Goldrick
- [27] **Mass matters**
Erica Middleton & Kathryn Bock
- [28] **Is there a syllable frequency effect independent of a phonological
neighbourhood effect? Psycholinguistic and neurolinguistic evidence**
Marina Laganaro, Valérie Schwitter & Armin Schneider
- [29] **Aphasic picture-naming errors reveal the influence of lexical variables on
production stages**
Audrey K. Kittredge, Gary S. Dell & Myrna F. Schwartz
- [30] **Producing assimilated sounds in combining novel compounds**
Annett Jorschick, Christian Dobel, Jens Bölte & Pienie Zwitserlood
- [31] **Time course of gender and phonological encoding during silent monitoring
tasks estimated by ERP: parallel or serial processing?**
Christian Camen, Valérie Schwitter, Stéphanie Morand & Marina Laganaro
- [32] **Processing of extrafoveal objects during multiple-object naming: Effects of
foveal load and ageing**
Linda Mortensen, Antje S. Meyer & Glyn W. Humphreys

- [33] **Why so many coda SLIPS?**
Ann Stuart Laubstein & Ron Smyth
- [34] **Acquisition and representation of grammatical gender: A PDP approach**
Jelena Mirkovic, Maryellen C. MacDonald & Mark S. Seidenberg
- [35] **What does the garden gnome with the garden chair? – Influence of morphologically complex distractors in a picture-picture paradigm**
Andrea Krupik, Jens Bölte & Pienie Zwitserlood
- [36] **The semantic and syntactic contribution to closed-class word selection**
F.-Xavier Alario
- [37] **What the brain does while your tongue twists: An ERP study**
Jörn Moeller & Thomas F. Münte
- [38] **Where to look first - Initial eye movements in describing action scenes**
Reinhild Glanemann, Christian Dobel, Jens Boelte & Pienie Zwitserlood
- [39] **Psycholinguistic analysis of PET-imaging data with an ecologically valid language production task**
Whitney Anne Postman, Jeffrey Solomon, Sandra Bond Chapman, Siri Tuttle, Monica R. Christian & Allen Braun
- [40] **A novel approach for studying speech errors**
Carson T Schütze & Christina Kim

PRESENTATIONS – TUESDAY

Speech Production: Insights from PDP Neurocognitive Models, Aphasia and Dementia

Matthew Lambon Ralph

Some of the most prominent theories of speech production are primarily based upon studies of normal participants. Considerable and challenging data are provided by two other lines of enquiry, however: computational (PDP) models and neuropsychological/aphasiological studies. This will be illustrated with respect to the critical role that semantic memory/conceptual knowledge plays in speech production. By combining behavioural and neuroanatomical data from different patient groups (semantic dementia and stroke aphasia) and computational PDP models, streamlined models of "lexical access" emerge.

Becoming Syntactic

Franklin Chang

Adult sentence production depends on syntactic knowledge that is language-specific and hence learned. But the relationship between the learning and use of syntax is still not clear. To better understand the relationship, Chang, Dell, & Bock (2006) developed a connectionist model of syntax acquisition and adult production. The model's language acquisition mechanism used a domain-general implicit sequence learning mechanism (error-based learning in a simple recurrent network) that is powerful enough to develop abstract syntactic structures. This mechanism and the representations that it extracts can explain many important features of structural priming in adults. In particular, it can explain why structural priming persists and why it seems to vary in its dependence on structural frames and thematic roles in different constructions.

The model also helps to address debates about the language learner's innate endowment for syntax. These debates have been fueled by task differences between explicit tasks like production and implicit tasks like preferential looking. The model showed that the same representations can yield different results in these two tasks and also provided a demonstration of what kinds of innate constraints were necessary to explain these results.

Modeling these two domains showed how syntax acquisition and production mechanisms might interact to explain behavioral data. The model's architecture and message also made claims about the neural architecture of sentence production and the way that messages might depend on spatial representations. Predictions that stem from the model's assumptions will be presented.

Processing Load in Reference Production and the Distributional Patterns It Creates

Jennifer Arnold

Reference production involves choices between attenuated lexical forms (e.g., she, it) or acoustic attenuation, and more explicit forms (e.g., names or descriptions) and acoustic prominence. Attenuated forms tend to be used for referents that are accessible or predictable in the discourse, for example something recently mentioned. While this relationship is often explained in terms of the needs of the listener, evidence suggests that speaker-internal factors also affect on-line choices about referring expressions. I review evidence that speaker effort and production load create probabilistic distributions at the discourse level. I argue these patterns become available for use during comprehension, e.g. more frequent discourse patterns are understood more quickly. (See MacDonald, 1999 for a similar proposal at the syntactic level.)

Evidence comes from three areas of research. First, speakers are disfluent more often when referring to discourse-new objects (Arnold & Tanenhaus, in press), or to complex, novel objects (Arnold, Hudson-Kam, & Tanenhaus, 2006). Second, discourse-new words tend to have shorter duration when the task constrains the speaker's choices, facilitating message planning (Watson, Arnold, & Tanenhaus, 2006). Third, ordering choices are driven by the accessibility of words and concepts (e.g., Arnold et al., 2000; Bock, 1982; 1986; Ferreira, 2003). This, together with a tendency to for topic-based discourses, creates referential patterns where pronouns and unaccented noun phrases tend to refer to things that occurred early in the previous utterance, e.g., first-mentioned / subject entities (Arnold, 1998; 2001). All of these regularities affect on-line reference comprehension.

Producing Ums, Uhs, You Knows, and Likes

Jean E. Fox Tree

Laypeople's views of ums, uhs, you knows, and likes as interchangeable speaker production flaws contrast with scientists' views of these words as independent, functional expressions. Laypeople's concepts of the meanings and uses of these words were tested with open-ended questions that were content analyzed. Results revealed that people do possess folk notions of meanings and uses that dramatically distinguish markers from each other. Planning of these words was explored by comparing first and second tellings of spontaneous, personal stories (speakers were not warned in advance that they would be telling stories, nor that they would be telling stories twice). These tellings were further compared to listeners' retellings of the speakers' stories. Results revealed further distinctions between ums, uhs, you knows, and likes. Analysis of multiple retellings of a Monty Python story further support conclusions. Topics for discussion include: How far in advance can discourse markers be planned? Are discourse markers functional, or are they garbage? and If they are not garbage, why do so many people think they are?

POSTER ABSTRACTS – in alphabetical order

The Semantic and Syntactic Contribution to Closed-class Word Selection

F.-Xavier Alario

Open and closed-class words have been hypothesized to be processed by different mechanisms during language production. In this research, we address the issue of closed-class word selection by investigating how determiners are retrieved during noun phrase production. We used a variant of the Stroop interference paradigm. Participants were asked to name pictures of common objects with determiner + noun phrases (e.g. “La Table”, the table). At the same time, they ignored distractor determiners printed on the pictures. We manipulated the semantic and syntactic features (e.g., number, gender, type of determiner) that were shared or that contrasted between the distractor determiners and the target determiner. The pattern of results is discussed in relation to current models of closed-class word selection.

Online, Speaker-driven Influences of Lexical Neighbors on Phonetic Variation

Melissa Michaud Baese & Matthew Goldrick

A number of studies have shown phonetic variation can be lexically conditioned. Words from more dense phonological neighborhoods are produced with hyperarticulated vowels and more coarticulation (Wright, 2004; Munson, in press; Scarborough, 2003). This study examines the source of this variation.

We first demonstrate lexical properties can condition consonant variation. In word reading, voice onset times (VOTs) are longer for initial consonants in words with vs. without minimal pair neighbors. For example, /k/ in <cod> (with neighbor <god>) was produced with a longer VOT than /k/ in <cop> (with no neighbor *<gop>).

To determine if this variation represents an attempt to minimize listener confusions, we placed the target words in a closed set context. When the neighbor (e.g., <god>) was absent from the context, VOTs were still longer for words with vs. without neighbors. This suggests that variation is not driven solely by listener modeling. To determine if the variation is produced online rather than simply learned, the target words were also placed in a context with the neighbor present. In this context, VOTs were even longer when the target's neighbor was present vs. absent, suggesting that variation can be modified online. The implications of these results are discussed.

Abstract Sentence Representations in 3-year-olds: Evidence from Language Comprehension and Production

Giulia Bencini & Virginia Valian

We use comprehension and production data to test the abstractness of three-year-olds' syntactic representations. In a comprehension task with reversible passive sentences with animate participants, 53 children between the ages of 35 and 42 months performed above chance (58 %) in pointing to the correct depiction of a sentence. In a syntactic priming task, 18 children primed with passives produced significantly more passives (16) in describing pictures with inanimate participants than did 18 children primed with actives (3). Control children, who did not receive priming, produced no passives. The priming here was genuinely abstract rather than lexical: our experiment used full lexical noun phrases as arguments, presented a given verb only once, had strict criteria for what counted as a passive, and provided minimal input – only 8 primes. Young three-year-olds represent sentences abstractly and have syntactic representations for Noun, Verb, "surface subject" and "surface object" as well as semantic representations for "agent" and "patient". Children can flexibly map the semantic and syntactic relations. These findings support Early Abstraction accounts of acquisition according to which children's grammars use formal syntactic categories and structural relations from the beginning of combinatorial language.

Phonological Neighborhood Density Guides Lexical Access in Native and Non-Native Language Production

Henrike Blumenfeld & Viorica Marian

The role of phonological neighborhood density in lexical access was examined during native- and non-native language production. German-English and English-German bilinguals were tested in a German picture-naming task using stimuli with high- and low-density neighborhoods. Accuracy of picture naming was influenced by phonological neighborhood, with high-density neighborhoods facilitating lexical access in both the native and the non-native languages. However, latency of picture naming was facilitated by high-density phonological neighborhoods only in the non-native, but not the native, language. This suggests that proficiency modulates the effect of phonological neighborhood on speed of access. Lower language proficiency may be associated with increased sensitivity to neighborhood density due to less experience with a lexical item (familiarity and practice) and smaller vocabulary size (number of phonological neighbors available). Results confirm that phonological neighborhood density guides lexical access in naming, and extend this finding to production in a non-native language.

Grammatical Repairs in Spoken Language Production: Evidence from Aphasia

Adam Buchwald

Among the set of cognitive processes posited in psycholinguistic theories of spoken language production is the translation (or ‘mapping’) from a basic representation of sound structure retrieved from long-term memory to a more elaborated representation that may engage cognitive systems required for motor planning and implementation. A related notion from linguistic theory is that of phonological grammar, which generates the set of well-formed output representations from typically less-elaborated lexical representations. Here, we are concerned with unifying these ideas, and characterizing the grammar in the spoken language production processing system.

This paper reports on the spoken language production of aphasic speaker VBR, whose deficit leads her grammar to "repair" complex sound structure representations. We will discuss three separate patterns that reveal the actions of the spoken production grammar: insertions in word-initial consonant clusters (e.g., bleed --> [b@lid]); deletions of the on-glide from diphthongs (e.g., cute --> [kut]); and accurate production of affricates (e.g., chain). Importantly, these repairs are structure-specific; the nature of the change (or non-change) to a sound structure sequence crucially relies on the abstract representation of that sequence. The paper additionally addresses: 1) the level in the spoken production system where these grammatical repairs are instituted; and 2) the source of the grammatical knowledge, by exploring factors that increase or decrease the likelihood of repair.

Time Course of Gender and Phonological Encoding during Silent Monitoring Tasks Estimated by ERP : Parallel or Serial Processing?

Christian Camen, Valérie Schwitter, Stéphanie Morand & Marina Laganaro

This study investigated the relative time courses of different processes within lemma retrieval and phonological encoding, respectively silent gender and phoneme monitoring in a yes/no task. Neurolinguistic and psycholinguistic studies suggest that grammatical (gender) and phonological information are retrieved independently and that gender can be accessed more quickly than phonological information. Event-related brain potentials was recorded using high resolution EEG system (128 channels) in order to obtain temporal information about these encoding processes. Firstly, behavioural results show similar reaction times between gender and word onset phoneme monitoring conditions, and longer RT when monitoring the second syllable onset. Temporal segmentation analysis (defining dominant maps topographies using cluster analysis) revealed a yes/no effect in all tasks. There is no timing difference between gender monitoring and word onset monitoring: both effects fall within the same time window (240 ms). Monitoring a second syllable onset generates a later yes/no effect at about 460 ms. The lack of timing difference between gender and first phoneme suggests that lemma retrieval and phonological encoding are done in parallel. Word onset is retrieved simultaneously with gender, while the longer RT and the later yes/no effect for second syllable onset reflect that segmental encoding continues incrementally to the following phonemes.

The Time Course for Structuring Embedded Clauses in Sentence Production

Christopher Crew & Zenzi M Griffin

Converging evidence suggests that speakers plan a proposition-sized message before each clause rather than planning larger messages for complex sentences (Ford, 1982; Ford & Holmes, 1978). Syntactic frames may be specified before each clause as well (see Ferreira, 2000, for review). However, evidence has been fairly indirect for inferring message and structure planning. We used eye movements during picture description to investigate the time course for structuring embedded clauses somewhat more directly. Participants heard questions that biased an active or passive transitive structure or neither. They answered questions based on scenes that depicted someone communicating or thinking about an embedded event, eliciting descriptions like "A woman is thinking about (a man being chased by a bear/a bear chasing a man)." Based on earlier experiments, shifts between agents (bear) and patients (man) were expected to occur less often after biased questions, which provided multiple structural cues, than after unbiased ones. The timing of a difference in shifts would then reflect when speakers considered order of mention and committed to an active or passive embedded clause. Preliminary analyses suggest that speakers structure embedded clauses surprisingly early in uttering main clauses, at least when the wording of the main clause is provided in a question.

Does Lexical Information Influence Syntactic Production? Results of Reaction Time and Sentence Type Analyses

Jennifer Cupit, Elizabeth Rochon, Ron Smyth & Carol Leonard

An important question within the psycholinguistic literature concerns the relationship between lexical selection and syntactic production. Previous work focusing on lexical accessibility (e.g., Bock, 1986, 1987) examined whether participants chose active or passive structures when describing a picture; semantically-related distractors (with an estimated SOA of -2000 msec) resulted in more descriptions with the target word as subject, while phonologically-related distractors had the opposite effect. Interestingly, studies in which participants were required to use a specific construction in all responses (e.g. 'the X and the Y'), bound by SOAs of -150, 0, and +150 msec (e.g., Meyer, 1996, Meyer & Schriefers, 1991) yielded the opposite pattern -- semantic inhibition and phonological facilitation, in reaction times.

Using a picture-word interference task with no constraints on the participants' sentence productions, we measured both choice of syntactic structure and RT to sentence initiation at SOAs of -1000, -150 and +150 msec. Results (N=47) show facilitation with both phonological and semantic distractors, in the choice of syntactic structure (active/passive), contrary to previous findings. There were no statistically significant effects in the RT data. We discuss these findings in terms of the interaction between lexical activation and the unconstrained online construction of a syntactic frame.

Speakers' Monitoring of Their Addressee's Understanding during the Telling of a Narrative

Kathleen M. Eberhard, Sarah Boyd, Chris Larson, Carole Kennelly, Alice Feldman & Catherine Linn

According to Clark (1996), conversation is a purposeful joint project consisting of a hierarchy of goals and sub-goals. Achieving a conversation's overall goal requires evidence of the successful completion of the subgoals. Hypotheses based on this assumption were tested by recording speakers' eye movements (via a free-head eye-tracker) and utterances as they spent about 10 minutes telling an uncommon folk-tale to an addressee. The data of interest concerned when speakers fixated their addressee's face and if their addressee provided positive evidence in the form of backgrounded acknowledgements (i.e., backchannels) such as head nods, "mhm", "okay", etc. or exemplifications, such as iconic facial gestures (e.g., grimaces, looks of disappointment, etc.), comments, and assessments (e.g., "wow", "oh my"). Consistent with findings from previous studies, most speakers' average fixation duration on their addressee's face was shorter than their average fixation off the face. Although the rate at which addressees provided evidence varied considerably across the dyads, head nods were the most frequent form of positive evidence, and all forms occurred more often, albeit not exclusively, when the speaker's fixation was on the addressee's face than when it was off.

Where to Look First - Initial Eye Movements in Describing Action Scenes

Reinhild Glanemann, Christian Dobel, Jens Bölte & Pienie Zwitserlood

Griffin & Bock (2000) and Meyer & Dobel (2003) described an initial apprehension (preview) phase preceding a formulation phase in sentence production. We investigated the influence of various factors on the distribution of first gazes on sentence-relevant regions of photorealistic action scenes. We varied (a) the position of the fixation cross that participants were required to fixate before each trial, (b) the temporal restrictions for producing the sentence, (c) pre-knowledge of actions and verbs by booklet, and (d) the task, by instructing participants to use proper names ("Thomas...") versus impersonal mentioning of the two actors ("The man..."). In all manipulations the action and agent regions received together around 97% of first gazes. The distribution of gazes on these two regions of interest varied between conditions. Agents were fixated more often and longer if they were referred to with proper names and if the fixation-cross was placed in a location above their heads. In contrast, action regions were fixated more often (with durations > 300 ms) if the fixation-cross was placed below the image, when the actions' names were introduced by booklet and when actors were named impersonally. We conclude that the initial processing phase for sentence production is influenced by visual factors and task demands.

Production of German Compounds

Heidi Gumnior, Andrea Krupik, Mariel Rinke & Pienie Zwitserlood

Two picture-word interference experiments investigated whether morphological processing is independent from semantics (Exp.1) and explored the nature of semantic inhibition (Exp.2)

Experiment 1 Targets (Handtasche, handbag) were combined with three distractors:
(1) morphologically related, same semantic category (Reisetasche, travelling bag)
(2) morphologically related, different semantic category (Plaudertasche, chatterbox) and
(3) morphologically unrelated, same semantic category (e.g., Lederkoffer, suitcase).

Experiment 2 Next to condition (3) from experiment 1 (Handtasche-Lederkoffer), targets were combined with a simple word distractor from the same category as one constituent of the target, but without any semantic relationship to the compound as a whole (Fuss, foot, related to “Hand” in Handtasche) In addition, this distractor was also paired with a picture of the compound constituent with which it was categorically related (Hand, hand)

Categorically related distractors without morphological overlap always produced semantic inhibition. However, distractors merely related to one of the constituents produced no effect on compound naming. Shared morphemes sped up naming regardless of category membership. Implications of these results for the lexical representation of morphologically complex words will be discussed.

Conceptualisation in Speech Production: An ERP and a fMRI Study

Boukje Habets, Bernadette M. Jansma & Thomas F. Monte

During conceptualisation an idea is transferred into a linguistic representation. One aspect, called conceptual macro planning, handles the serialization of real events and their linguistic ordering within a sentence. We investigated the neural correlates of this process with ERP (high temporal resolution) and slow event-related fMRI (high spatial resolution) using the same experimental manipulations. Subjects saw a sequence of two objects, followed by a coloured fixation cross. Their task was to produce a sentence, describing the use of the objects in a chronological/natural (“after”) and unnatural (“before”) order. The colour of the fixation cross cues the utterance format. ERPs revealed an increased central-parietal positivity between 350 and 400 ms for “before” compared to “after” conditions, indicating more demands on processing resources for the conceptualisation of unnatural sequences.

Using fMRI, we found more activation in the left and the right inferior frontal gyrus (BA 45) and in the left superior/middle temporal gyrus (BA 21/22) for the unnatural sequences compared to the natural sequences, i.e. areas related to speech processing. Together, these results reflect the spatio-temporal characteristics of linearization during conceptualization in speech production.

The Locus of Texture Effects in Spelling

Angela C. Jones & Jocelyn R. Folk

Evidence from dysgraphic individuals and neurologically intact spellers alike suggests that the orthographic representations used for spelling may be textured; letters within a word may vary in representational strength. Dysgraphic patient, JRE (Rapp, Folk, Boteler, Skultety, 1998), who had damage at the level of the graphemic buffer, produced more errors on consonant digraphs than on non-digraph consonant clusters (e.g., cruSH vs. cruST). A sample of neurologically intact spellers also demonstrated evidence of texture (Jones & Folk, 2005). While spelling concurrent to performing a secondary task that impaired the buffering process, the neurologically intact spellers produced fewer errors on the dominant vowel within vowel digraphs compared to the vowel used less often to spell that particular sound (e.g., trAin vs. traIn). Rapp et al. (1998) suggested that the texture effect could arise from two possible sources: interaction of the sublexical and lexical processes at the graphemic buffer or from differing levels of difficulty in acquiring graphemes. The current study seeks to identify the source of this effect by examining the spelling performance of JDO and MMD, two dysgraphic patients who have damage to both the lexical and sublexical spelling processes.

Producing Assimilated Sounds in Combining Novel Compounds

Annett Jorschick, Christian Dobel, Jens Bölte & Pienie Zwitserlood

Speech sounds are often assimilated onto adjacent sounds: green bank to greembank. Since research is mostly descriptive, little is known about how often assimilation really occurs. We investigated assimilation of place of articulation and voice in Dutch and German. Similar to Cutler and Otake (1998), subjects combined words or pseudo-words into non-existing compounds, e.g. tuinkost (garden-food).

Assimilation occurred (1) more often in Dutch than in German, (2) more frequently for voice than for place, but (3) equally often in word and pseudo-word compounds. As assumed in linguistic research, neither language showed progressive place assimilation. Regressive place changes showed only in Dutch. In line with underspecification theory (Lahiri & Reetz, 2002), underspecified place [coronal] was more often assimilated than specified labials or velars.

Voice changes occurred regressively and progressively. Due to final devoicing, only voicing of unvoiced obstruents was investigated regressively. Voicing occurred more often for underlying voiced (/Grad/) than for voiceless (glatt) word-final obstruents in German, but was equally frequent in Dutch. These data are challenging for the question of complete neutralisation. Progressively, far more devoicing than voicing was found, posing problems for underspecification, since [+voice] is assumed to be specified, while [-voice] not.

Non-Target Language Competition in the Picture-Word Interference Task Modified for Eye-Tracking

Margarita Kaushanskaya & Viorica Marian

Visual word recognition and interference of a non-target language (Russian) during picture naming in a target language (English) were simultaneously tested in Russian-English bilinguals using a Picture-Word Interference Task modified for use with eye-tracking. In Experiment 1, Russian-English bilinguals were found to look more at Russian words that contained letters common to the two languages (but which mapped onto different phonological representations) than at bigram-matched non-word controls. Additionally, Russian words interfered with picture naming to a greater extent than non-word controls. In Experiment 2, Russian-English bilinguals were found to look more at Russian words spelled using English-specific letters (that mapped onto viable phonological Russian words) than at bigram-matched non-word controls. Unlike in Experiment 1, both types of stimuli interfered with picture naming in English to a similar degree. Results of the two experiments confirm that visual word recognition in bilinguals is largely non-selective: Information that overlaps in orthography and/or phonology across the two languages activates both languages in parallel. Moreover, results suggest that language production in bilinguals also proceeds in parallel, and activation of lexical information for the non-target language interferes with picture naming in the target language. Eye-movement and reaction time data, while yielding similar patterns of results in Experiment 1, were found to diverge in Experiment 2, suggesting that processes of activation (of the non-target language) and interference (with target-language production) in bilinguals are influenced by phonological/orthographic overlap between the two languages, and may be underlied by different cognitive mechanisms.

What Does the Garden Gnome with the Garden Chair? – Influence of Morphologically Complex Distractors in a Picture-picture Paradigm

Andrea Krupik, Jens Bölte & Pienie Zwitserlood

Speech production models differ with respect to the processing steps mediating between concept and articulation. Some models posit strict seriality of processing stages (Levelt, Roelofs, Meyer, 1999); others assume cascading between different information types (Caramazza, 1997; Morsella & Miozzo, 2002). We investigated the information flow in speaking by assessing whether the naming of a particular picture is affected by meaning and form overlap of multiple accompanying pictures, which are not to be named. The relation between a target picture (*garden chair*) and its two distractor pictures was associative (*lawn mover*), same category (*cupboard*), associative combined with morphological overlap (*garden gnome*) or same category combined with morphological overlap (*rocking chair*).

We observed facilitation in case of morphological relatedness, regardless of whether the distractor was associatively or categorically related, indicating lexical encoding up to the level of word form. In our opinion, the facilitatory effect for associatively related distractors originates from spread of activation at the conceptual level, replicating earlier findings from picture-word interference studies (Bölte et al., 2005; Costa et al., 2005).

Assuming spread of activation our null-effects for categorically related distractors (Meyer & Damian, *subm.*; Damian & Bowers, 2004) seem inexplicable at first sight. We suggest that facilitatory conceptual effects and inhibitory lexical effects cancel each other out.

Aphasic Picture-naming Errors Reveal the Influence of Lexical Variables on Production Stages

Audrey K. Kittredge, Gary S. Dell & Myrna F. Schwartz

Most studies of word retrieval speed and speech errors have located the influence of lexical frequency at phonological (or word-form) access in contrast to specific-word (or lemma) access. By contrast, several recent theories assign the facilitative effect of early-acquired words to the lexical or conceptual level. However, there are chronometric and aphasic speech error data pointing to an influence of frequency on production stages that are sensitive to semantics, and there are also claims that age-of-acquisition affects phonological processes. To investigate these issues, we analyzed the errors and correct responses of 31 aphasic subjects on the Philadelphia (Picture) Naming Test. A hierarchical multiple logistic regression analysis on each response type revealed that both within and across severity groups, semantic errors were associated with low-frequency names, while the occurrence of nonword errors was influenced by phonological variables (length and phonological density). Taken together with previous findings, the data evince a lexical access process that is sensitive to experience (e.g. frequency) at all stages, but to word-form factors primarily at later stages. Age-of-acquisition had a more limited influence, with late-acquired names tending to trigger “other” errors (mostly omissions and circumlocutions), suggesting that these words may have more weakly specified semantic representations.

Shaping the Link between Seeing and Saying

Stefanie E. Kuchinsky, Kathryn Bock, and David E. Irwin

There is a tight link between how speakers look at a scene or event and the sequence of words they use to describe it. In general, looks to objects immediately precede references to those same objects. The present work examined the nature of this link and how experience shapes it. We explored the changes in eye-movement patterns that accompanied incidental changes in the forms of time-telling expressions elicited by structural priming. Expression priming (i.e., the use of time expressions matching the primed form) was not observed on the trials that immediately followed the primes, but emerged on later trials. However, the effect of a prime on eye movements was immediate: On the trial following a relative (e.g., “ten past three”) prime, participants looked earlier and more often to the minute hand, regardless of the expression they produced (e.g., relative, “twenty till one,” or absolute, “twelve forty”). This decoupling of eye-movement patterns and production patterns suggests that changes in attention to the elements of familiar scenes do not directly precipitate changes in production. Instead, the normal linkage between seeing and saying reflects a coordination of different action systems that emerges gradually, with eye movements anticipating upcoming changes in expression.

Is There a Syllable Frequency Effect Independent of a Phonological Neighbourhood Effect? Psycholinguistic and Neurolinguistic Evidence

Marina Laganaro, Valérie Schwitter & Armin Schneider

The observation of a syllable frequency effect in production latencies in normal speakers (Carreiras and Perea, 2004; Cholin, Levelt, & Schiller, 2006) and in production accuracy in aphasic speakers (Laganaro, 2005; Stenneken et al., 2005) has been an argument in favour of a functional role of stored syllables in speech production. A phonetic locus of the syllable has been postulated in theoretical models (Levelt, 1999) and in a study analysing the origin of the syllable frequency effect in normal speakers (Laganaro and Alario, 2006). A possible confound of the syllable frequency effect, which has not been controlled for in those studies is phonological neighbourhood density.

Here we present two studies carried out with normal speakers and with six aphasic speakers in which we analysed the syllable frequency effect with pseudo-words composed of high or low frequency syllables and controlled for similarity with real words. In normal speakers, production latencies are measured in a delayed production with or without interfering task; in aphasic speakers production is elicited with immediate reading and repetition tasks on the same pseudo-words material.

Psycholinguistic and neurolinguistic results converge, showing a robust facilitatory syllable frequency effect only when pseudo-words do not have phonologically similar real words (no phonological neighbourhood). This pattern of results suggests that syllable frequency does affect production in the absence of phonological neighbours, but that phonological neighbourhood interacts with syllable frequency.

Production of Functional Categories in Agrammatic Broca's Aphasia

Jiyeon Lee, Lisa H. Milman & Cynthia K. Thompson

Individuals with agrammatism show selective deficits with respect to functional categories. The Tree Pruning Hypothesis (TPH, Friedmann & Grodzinsky, 1997) attributes this selective impairment to an agrammatic speaker's inability to project to higher nodes in the syntactic tree. This study examined the Complementizer Phrase (CP), the Tense Phrase (TP) and the Agreement Phrase (AgrP) of English in two sentence production experiments. In experiment 1, four Broca's patients were asked to produce sentences by using a complementizer (i.e. *whether*, *that*, and *if*), tense (-*ed*) and agreement marker (-*s*). In experiment 2, the patients' verb inflection ability was examined in greater detail by asking them to complete a sentence by providing a correct verb form. Our patients' data did not pattern with the TPH. All patients produced complex sentences successfully using a complementizer, while their use of tense (-*ed*) and agreement (-*s*) markers was impaired, indicating intact projection to CP, the uppermost node in the syntactic tree. Faulty implementation of morphological rules (i.e. verb inflection) was suggested as an alternative account (Arabatzi & Edwards, 2000; Thompson, Fix & Gitelman, 2002) based on (a) the patients' higher scores in nonfinite vs. finite verb conditions, (b) dominant substitution errors with various non-target morphemes, and (c) overgeneralization of regular forms to irregular verbs.

The Effects of Word Order and Noun Type on Agreement with Conjoined Subjects

Heidi Lorimor, Erica Middleton & Kathryn Bock

Previous work on agreement attraction has suggested that agreement is sensitive to structural relationships between lexical items. However, linear order also matters, and the relative strength of linear and structural effects is relevant to the scope of structural preparation in language production. We evaluated the effects of word order on agreement computation in English using conjoined noun-phrase subjects. Participants viewed pairs of pictured objects and named them as conjunctions within declarative or interrogative sentences. The sentences were elicited by instructions to provide the color of the objects in simple assertions (e.g., “The king and queen were red”) or questions (“Were the king and queen red?”). We found a significant word order effect, with more plural verbs produced in declaratives than in interrogatives (94% to 71%). Similar differences occurred when the contents of conjunctions varied between mass and count nouns. Declaratives with conjoined subjects containing count nouns yielded more plural verbs than interrogatives did (95% to 73%), and declaratives with conjoined mass-noun subjects likewise yielded significantly more plural agreement than interrogatives (87% to 56%). These results confirm the ability of conjoined mass nouns to induce singular agreement and provide converging evidence that linear order affects agreement production.

Learning to Use Appropriate Referring Expressions

Danielle Matthews

This training study investigates how children learn to uniquely identify stickers that they are attempting to obtain from an adult. The children are pre- and post-tested for their ability to uniquely identify stickers on a board holding a dense array of similar stickers. They produce three progressively response types: **pointing** (with demonstrative “*That one*”), **naming** (“*The girl one*”) and **uniquely identifying** (“*The girl eating*”). Only the last response type is sufficient.

Between test sessions the children are assigned to a training condition in which they either 1) ask for stickers from an adult who requests clarification as necessary 2) respond to an adults’ (sometimes imperfect) requests for stickers 3) observe one adult ask another (sometimes imperfectly) for stickers or 4) play with and hear an adult label stickers but observe no requesting. Training takes place over three, daily sessions. 240 children aged 2;6, 3;6 and 4;6 are participating.

Results from 216 children show improvements in all conditions. By far the most effective training regime was condition 1 (practice with production and receiving clarification requests). However significant improvements in the other conditions suggest that children also learn by observing others communicate and by strengthening their vocabulary.

Mass Matters

Erica Middleton & Kathryn Bock

A debate surrounds whether the syntax of count nouns (e.g., shirt/shirts) and mass nouns (e.g., silk/*silks) is meaning-based or grammatical (i.e., whether lemmas of mass nouns bear a singular specification; Chomsky, 1965). The current work evaluates whether English mass nouns are specified as singulars by comparing the effects of mass nouns and singular count nouns (which are unspecified for number, Eberhard, 1997; Berent et al., 2005) on subject-verb agreement and attraction. Participants heard, repeated, and completed fragments such as “The necklaces near the silk” as full sentences. The presence of singular specifications on mass nouns was evaluated by measuring whether mass nouns as subjects elicit more reliable singular agreement than singular count subjects when followed by a plural local attractor (e.g., “The silk near the necklaces”). A second experiment evaluated the tendency of local mass nouns (e.g., silk) to spuriously control verb number (i.e., attraction, as in “The necklaces near the silk *was* valuable”) compared to singular count locals (e.g., shirt). Mass nouns created less reliable agreement as subjects and no more attraction as locals than controls. The findings suggest mass nouns are not specified singular, consistent with a meaning-based explanation of count-mass syntax.

Acquisition and Representation of Grammatical Gender: A PDP

Approach

Jelena Mirkovic, Maryellen C. MacDonald & Mark S. Seidenberg

In standard language production theories grammatical gender is considered an abstract and semantically arbitrary syntactic category. Gender agreement is often investigated as an exemplary syntactic phenomenon, independent of semantic and phonological processing. However, recent studies in acquisition suggest that syntactic categories previously considered abstract may actually be induced from the probabilistic information available in the input. We tested this by exploring probabilistic semantic and phonological cues to gender in Serbian, where nouns are coded for gender, number and case. In a corpus analysis of 1221 noun forms we found that both semantic and phonological lexical information was correlated with grammatical gender. The hypothesis was tested further in a connectionist model trained to produce 1221 nouns forms from a distributed semantic representation in the input, with a distributed phonological representation at the output, and no explicit representation of grammatical gender. We hypothesized that grammatical gender can be viewed as coherent co-variation of semantic and phonological lexical properties. The model successfully learned the training corpus, despite no explicit representation of grammatical gender. Generalization tests indicated that the model encoded the co-variation of phonological and semantic properties of the words considered to belong to the same grammatical gender. Implications for theories of gender agreement production are discussed.

Noun Phrase Structural Priming at the Beginnings and Ends of Sentences

Alissa Melinger & Alexandra Cleland

This poster investigates whether embedding prime and target NPs in parallel positions within a sentence boosts the structural priming effect. In six experiments, we crossed the position of the modified NP in prime-target sentence pairs with the structural priming manipulation. In a picture description task, speakers produced sentences of the form NP1 is spatial term NP2. In target trials, either NP1 was modified [1] (Exp 1-3) or NP2 [2] (Exp 4-6). In prime trials, the modified NP was likewise either NP1 or NP2. In Exp 2 & 4 primes and targets were separated by an intervening trial and in Exp 3 & 6 there was no lexical repetition between prime and target NPs.

A large and reliable NP structural priming effect was obtained in all six experiments. Furthermore, structural priming interacted with position, but this interaction was driven by cases in which NP1 was the modified NP in both the prime and target. No benefit of parallelism was observed when both modified NPs were sentence final. The results may indicate an increased sensitivity of sentence topics, as opposed to focuses, to the priming manipulation.

- [1] Der lachende Arzt / Der Arzt, der lacht, ist unter dem Tisch.
The laughing doctor / the doctor who laughs is under the table.
- [2] Der Tisch ist links von dem lachenden Arzt / dem Arzt, der lacht.
The table is left of the laughing doctor / the doctor who laughs

What the Brain Does while Your Tongue Twists: An ERP Study

Jörn Moeller & Thomas F. Münte

In the current study subjects repeatedly recited typical German tongue-twisters as well as control sentences matched for length and content in time with equidistant click-tones serving as acoustic pacemakers, while their EEG was recorded from 30 positions of the 10-20 system. Synchronizing articulation with the timing of the clicks allowed exerting time pressure and thus provoking a reasonable number of typical sound errors as well as calculating event related potentials (ERPs) related to the articulation of specific word sequences.

The error pattern within one of the tongue-twisters ('Fischers Fritz fischt frische Fische, frische Fische fischt Fischers Fritz') allowed for a comparison of ERPs related to the production of identical sound errors within a certain word.

Waveforms associated with the production of the first three words ('Fischers Fritz fischt...') were found to show a negative deflection when the articulation of the third word involved the production of a characteristic sound error ('*/fɪ/*ischt'). The results are discussed against the background of electrophysiological signatures of performance monitoring as well as current models of verbal self-monitoring.

Processing of Extrafoveal Objects during Multiple-object Naming: Effects of Foveal Load and Ageing

Linda Mortensen, Antje S. Meyer & Glyn W. Humphreys

Two experiments investigated the effects of foveal processing load and ageing on processing of extrafoveal objects. In a multiple-object naming task, the object to the right changed during the saccade towards it; either orientation or identity (replacement by another unrelated object). In Experiment 1, participants viewed a fixation mark until the right object appeared. Right-object processing was faster when the object changed orientation than identity, demonstrating extrafoveal processing. In Experiment 2, participants viewed and prepared to name a left object presented without or with a distractor while viewing the right object. In young participants, left-object processing was faster without than with a distractor and faster when the distractor was phonologically related than unrelated. The effect of right-object change was similar across distractor conditions, demonstrating that extrafoveal processing was unaffected by foveal load, consistent with serial object processing. Right-object processing was slower with related than unrelated distractors, demonstrating that a distractor that facilitates processing of an object may interfere with processing of the following object, possibly because the distractor is reactivated during speech monitoring. In older participants, all effects were similar, except that with related distractors, the effect of right-object change disappeared, possibly because monitoring interfered with their visual object processing.

Inner-speech Slips Exhibit Lexical Bias, But Not the Phonemic Similarity Effect

Gary M. Oppenheim & Gary S. Dell

Most people hear a little voice inside their head when thinking, reading, writing, and remembering. This phenomenon is inner speech, a form of mental imagery that is generated by the speech production system. The properties of inner speech errors can be used to investigate the nature of inner speech, just as overt slips are informative about overt production processes. Overt slips tend to create words (**lexical bias**) and involve similar exchanging phonemes (**phonemic similarity effect**), and these effects can be understood as arising from interactions at particular processing levels. A first experiment demonstrated lexical bias and phonemic similarity effects in overt speech, via a Baars and Motley (1974) style SLIP procedure. A second experiment used materials derived from the first to examine these effects in both inner and overt speech via a tongue-twister-like recitation task similar to Dell and Repka (1992). While lexical bias was significant in both inner and overt speech errors, the phonemic similarity effect was significant only for overt errors and the overtness x phonemic similarity interaction was significant. The lack of such effects in inner speech is consistent with a hypothesis that inner speech is impoverished at lower (featural) levels, but robust at higher (phonemic) levels.

Phonologically marked verb inflections in agrammatic speech production

Dirk-Bart den Ouden & Cynthia K. Thompson

One characteristic of agrammatic Broca's aphasia is impaired production of verb inflections. As to the origin of this impairment, the debate usually highlights two possibilities, viz. a deficit in the selection of diacritical features and a deficit in affixation itself. Nevertheless, an independent factor that might influence production of inflected verbs is the phonological markedness of output forms. We examined the production data of nine agrammatic speakers and measured the influence of phonological markedness of output forms on error rates, specifically looking at the interaction of this factor with type of affixation (simple present *-s* vs. simple past *-ed*). Three types of marked forms were distinguished: 1) syllabic inflections *-ez* or *-ed* that create a longer, bisyllabic form; 2) affixation resulting in a word-final cluster of three consonants; 3) affixation resulting in a word-final cluster of two voiced obstruents. Results revealed a main effect of Markedness, with more errors on phonologically marked items, and no interaction between Markedness and Tense. Errors on the production of grammatical morphemes in agrammatic aphasia do not exclusively originate either from a diacritical deficit or from an impairment in the process of affixation itself. Particular affixations may simply yield marked phonological forms, influencing error rates.

Semantic Integration and the Timecourse of Planning Complex Noun Phrases

Neal J. Pearlmutter & Eric S. Solomon

We examined effects of semantic integration (Solomon & Pearlmutter, 2004) on production of complex noun phrases. Participants described integrated and unintegrated pictures using previously-given nouns and a linking word, which was a preferred or unpreferred preposition (e.g., the airplane above the cloud / the cloud below the airplane) or a conjunction (e.g., the airplane and the cloud). The prepositions constrained noun ordering, while the conjunction permitted flexible ordering, allowing examination of whether planning is competitive or incremental (Ferreira, 1996). Picture-word SOA was varied (-750, -500, -250, 500, 1000, 1500, or 2000ms) between-participants to examine the timecourse of processing. We measured speech-onset latency and noun exchange errors. At all SOAs, exchange errors were more frequent for integrated than unintegrated pictures; and at long SOAs (1500, 2000ms), integration and preference also interacted, with a larger preference effect for integrated than for unintegrated pictures. These patterns support Solomon & Pearlmutter's hypothesis that elements of integrated messages are planned more simultaneously and suggest that this effect is maximized relatively late in the planning process. Speech-onset latencies showed interactions between SOA, integration, and linking word, implicating competitive processes at negative SOAs and for integrated conditions at short positive SOAs, and complicating Ferreira's incremental model.

Using Evidence from Elicited Writing Errors to Inform Models of Language Production

Debra Pollock & Karin Humphreys

Writing and speaking are obviously related, but to what extent are the processing and representations involved in each of these output modalities shared, and to what extent do they differ? The characterization of writing errors has previously relied on data that were a study of the author's own errors or collections of errors that were collected off-line. In this experiment, writing errors and speech errors were compared in an on-line task, which involved producing spoken and written sentences in response to pictures. Thus, writing errors are studied under experimental control that has been lacking in previous studies, and a basis for comparison with speech errors can be attained. Is writing phonologically mediated or does it involve a direct translation from lexical to orthographic representation? As per Berg, results indicate writing errors are overwhelmingly contextual in nature, tend to be within-word errors, and are more anticipatory in nature than speech errors. Initial results also indicate that the majority of writing errors are phonotactically legal. During a second experiment, using a digitizing tablet, it was found that participants made significantly less contextual errors and less between-word errors when writing in a situation where visual feedback is not present.

Psycholinguistic Analysis of PET-Imaging Data with an Ecologically Valid Language Production Task

Whitney Anne Postman, Jeffrey Solomon, Sandra Bond Chapman, Siri Tuttle, Monica R. Christian & Allen Braun

This neuroimaging study tested the feasibility of isolating components of unconstrained narrative production and relating them to distinct areas of brain activation.

Eighteen healthy adult volunteers produced unrehearsed narratives relating personal events while undergoing PET scans. Speech was recorded and scored according to various psycholinguistic measures. These were linked to changes in regional cerebral blood flow by running simple linear regression analyses on the 18 brain images with the subjects' scores derived from each of the measures as regressors.

Three highly cross-correlated measures of syntactic complexity (# Clauses and # Function Words per T-Unit, MLU), and Type-Token Ratio, a measure of lexical semantic richness, showed overlapping association with left perisylvian areas. However TTR was also associated with activation in the Inferior Parietal Lobule bilaterally. Inclusion, a measure of fluency taking into account pause fillers, false starts and repetitions, was associated with bilateral frontal and insular activation. Fundamental Frequency Range, a measure of intonation, and Cohesion, a pragmatic measure of maintenance of referential ties, were strongly correlated with activity in right prefrontal regions.

Our ecologically valid approach shows the viability of applying experimental constraints post-hoc to the free and natural generation of narrative, yielding results concurrent with lesion literature (Mar, 2004).

Tense Marker Productivity and Sentence Production Automaticity in Young Children

Matthew Rispoli & Pamela Hadley

This longitudinal study explores developmental relationships between growth in tense morpheme productivity and sentence production automaticity. Nineteen children were recorded for two hours every three months (21 to 33 months of age). Language transcripts provided two variables: (a) cumulative tense morpheme productivity score (Hadley & Short, 2005) from 21 to 30 months and (b) the sentence stall rate - revision rate difference score at 33 months (Rispoli, 2003). Differences scores were calculated for a minimum of 10 spontaneously produced active, declarative sentences, 3 to 5 phonological words long, with a verb being the only open class word. Growth in productivity score was modeled using Hierarchical Linear Modeling (Raudenbusch, Bryk & Congdon 2005). A quadratic-only model with random linear and quadratic coefficients was the best fit to the data. Fitted productivity score values at 30 months were computed and then used to predict stall-revision difference scores 3 months later. The fitted values were negatively correlated with the 33-month stall-revision difference scores ($r = -.742$ $p < .000$). These findings indicate that prior growth in the productivity of tense morphemes accounts for 55% of the variance in automaticity and reveal a developmental relationship between the initialization of generative mechanisms and sentence production.

A Novel Approach for Studying Speech Errors

Carson T Schütze & Christina Kim

We explore a new approach for studying speech errors. The task, adapted from syntactic priming research (Potter 1984; Potter & Lombardi 1990), requires subjects to say, after a brief delay, a sentence they read in Rapid Serial Visual Presentation (RSVP). During a simple distractor task, subjects must remember the sentence in order to subsequently repeat it. The time and memory pressures induce slips.

Our approach addresses shortcomings of traditional methods: 1) Since responses are recorded, observer bias is minimized; 2) The main task involves the normal production system (contra Motley & Baars 1976); 3) Errors are sufficiently frequent to make experiments feasible. Most importantly, investigators have total control over structure and content of the target utterance.

Parameters can be varied to trade-off error frequency vs. task failure. To date, we have used 120ms/word presentation; 10.5 words/sentence; the distractor task required a Yes/No button press depending on whether a briefly-presented number word occurred among four Arabic numerals (FOUR // 3 9 8 1). This led to slips on 1/4 of sentences produced. Current experiments will provide quantitative data for comparing relative rates of various error types to those found with other methods; so far, all major types are attested.

Lexical Effects on Vowel Production and Perception in Clear Speech

Rajka Smiljanic, Josh Viau, Ann Bradlow

Previous research showed that phonological neighborhood density and word frequency influence word recognition (Luce and Pisoni, 1998) and vowel production (Wright, 2002; Munson and Solomon, 2004; Munson, to appear), suggesting an interaction of lexical and phonetic factors in speech production and perception. Here, we explore whether hyperarticulated, intelligibility-enhancing clear speech shows similar sensitivity to lexical-level structure. Nine American English talkers (5 females, 4 males) produced forty monosyllabic *easy* (frequent words with few lexical neighbors) and *hard* (infrequent words with many lexical neighbors) words in conversational and clear speech. Twenty-four subjects participated in a word-in-noise listening test. Results revealed a large effect of style on intelligibility and vowel production: words were more intelligible and vowels were longer and more dispersed in clear compared to conversational speech. Moreover, the female talkers produced larger vowel spaces than male talkers in both speaking styles. Vowels in *hard* words were marginally more dispersed than vowels in *easy* words in both speaking styles. However, within both speaking styles, easy and hard words were equally intelligible and of approximately equal duration. These results showed that phonetic properties of vowels were enhanced equally in clear speech regardless of their lexical properties.

Purple Elephants and Orange Giraffes: Phonology-based Determiner Competition in English

Katharina Spalek, Herbert Schriefers, & Kathryn Bock

Determiner competition refers to a situation where the retrieval of a target-determiner is delayed because other determiners are co-activated. Co-activation can happen through grammatical information (e.g., grammatical gender; grammatical number^{1 2 3 4 5}) or a combination of phonological and grammatical information (e.g., grammatical gender; onset of the noun phrase^{6 7}). The present experiment shows that determiner competition can also arise based purely on phonology. Participants named colored line drawings with noun phrases of the type "a/an [color] [noun]". Target pictures were presented in either orange (to elicit the indefinite determiner "an") or purple (to elicit "a"). With consonant-initial nouns, which normally call for the determiner *a*, onset latencies were shorter for NPs like *a purple giraffe* (mean: 724 ms) than an orange giraffe (750 ms). For vowel-initial nouns, which normally call for the determiner *an*, onset latencies did not differ statistically for NPs like *a purple elephant* (748 ms) and *an orange elephant* (737 ms). The data are consistent with a main effect of determiner (longer selection times for *an* than *a*, maybe due to frequency differences), which is modulated by whether the noun and the adjective activate the same determiner (speeding up selection) or whether they activate different determiners (slowing down selection).

Grammatical Gender Effects on Bilingual Cognition: Evidence from Speech Errors

Stavroula-Thaleia Kousta, David P. Vinson, & Gabriella Vigliocco

We used experimentally-induced speech errors to investigate whether bilingual speakers adapt to ‘thinking for speaking’ (Slobin, 1996) that is appropriate for their second language, whether they transfer semantic and grammatical properties from their first language into their second or whether acquisition of a second language affects the representations of a first language. We focused on the effects of grammatical gender on meaning by asking Italian (L1)-English (L2) bilinguals and Italian and English monolingual speakers to name pictures of animals under time pressure. The results from monolingual speakers replicated the cross-linguistic difference observed by Vigliocco et al. (2005): grammatical gender affected the naming errors of monolingual Italian speakers, compared to speakers of English (where gender is not a formal property). More importantly, the bilingual participants, all of whom had learnt English through formal instruction after the age of 6, performed like the monolingual Italian speakers when they carried out the task in Italian, but like the monolingual English speakers when the task was in English. These results demonstrate that bilingual speakers adapt to ‘thinking for speaking’ appropriate for their second language, a finding with implications for linguistic relativity as well as models of bilingual memory and bilingual lexical processing.

Why so Many Coda SLIPS?

Ann Stuart Laubstein & Ron Smyth

Error patterns for experimentally elicited slips of the tongue usually replicate patterns of speech errors in natural corpora (Stemberger 1992). However, using the Motley et al (1983) SLIP technique, we find more coda than onset errors, contrary to natural slips. In Experiment 1 coda errors were over-represented in single-syllable #C(n=41) and C# (n=64) stimuli, although the difference only approached significance ($p=.0754$); in CV and VC stimuli the #C errors (n=17) also did not outnumber the C# errors (n=21). Experiment 2 tested whether the low number of onset errors was due i) to their being elicited in pair rather than phrase stimuli (cf. Shattuck-Hufnagel 1987) or ii) to their status as singleton C onsets. Again the CC# coda errors (n=266) outnumbered the #CC onset errors (n=187). Onset errors were equally likely in phrasal or pair stimuli (n=93 vs. 94 respectively) and coda errors outnumbered onset errors in phrasal stimuli (n=178 vs. 93). Experiment 3 tested "word" medial onset vs "word" final positions using two syllable items CVCCVC, focusing on the final syllable: these items approximated natural slips more closely with 32 \$C errors vs. 17 C# errors. Replicating natural errors, initial onsets are more subject to exchange errors than other positions, and #CC onsets are more likely to move as units than to split apart. These experiments thus replicate natural errors and are compatible with distinct types of processing as well as distinct levels of processing for word onsets. However, it remains unclear whether SLIP methods overgenerate coda errors or undergenerate onset errors.

Argument Structure Encoding in the Production of Verbs and Sentences: An Eyetracking Study

Cynthia K. Thompson, Michael Walsh Dickey, Soojin Cho, Jiyeon Lee & Zenzi M. Griffin

Verb and sentence production are impaired in agrammatic aphasia. Furthermore, in both naming and sentence-production tasks, verbs with more complex argument structures (like three-argument verbs) are more impaired than verbs with less complex argument structures (like two-argument verbs) (Kim & Thompson, 2000, 2004; Luzzatti et al., 2002; Thompson 2003). This paper presents data from a study in progress examining the production of two-argument and three-argument verbs in sentence production and naming using eyetracking. Participants saw pictures of two- (n=20) and three-argument (n=15) actions while their eye-movements and speech were recorded. They were first asked to name the actions (verb naming, VN) and then to describe the scene depicted (sentence production, SP). Data from a group of unimpaired controls (n=12) showed that three-argument verbs had longer speech-onset latencies than two-argument verbs in both VN and SP conditions. However, the two tasks elicited different patterns of looks to Agents and Themes. Participants looked more at Agents in SP conditions before speech onset, while they looked more at Themes in VN conditions. This pattern is consistent with previous results showing incremental planning and encoding in sentence production (Ferreira, 1996; Griffin & Bock, 2000; Griffin & Mouzon, 2004). These data will be compared to those from a group of agrammatic aphasic speakers currently participating in the study.

Treatment and Generalization of Functional Categories in Agrammatism

Cynthia K. Thompson, Lisa H. Milman, Michael Walsh Dickey, Janet O'Connor, Borna Bonakdarpour, Steve Fix, JungWon Janet Choy, & Diane Arcuri

The Complexity Account of Treatment Efficacy (CATE) predicts that training more complex linguistic structures generalizes to less complex structures when these structures are linguistically related. CATE has been tested with noncanonical sentence structures, which are particularly difficult for agrammatic speakers. This research extends this result to functional morphemes associated with functional projections, IP and CP. Based on the location of functional categories in the syntactic tree, we predicted generalization within IP (between tense and agreement morphology) but not between CP and IP-related elements. Nine agrammatic patients were trained to produce sentences containing three types of functional morphemes (complementizers, past-tense inflection, and agreement). Pre and post-testing included both behavioral and neuroimaging measures. All participants showed improved performance on trained forms following relatively stable baselines. In addition, a variable pattern of generalization was noted, between tense and agreement morphemes (within IP). However, participants trained on complementizers showed no generalization to tense or agreement; nor did those trained on tense or agreement show change in production of complementizers. Neuroimaging results suggest that patients who were most successful in treatment showed increased left relative to right hemisphere activation.

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