

Auditory Sentence Processing: an Introduction

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Published online: 5 April 2009

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Mensch: A German word which, in Yiddish, means “a good person”. A mensch is a particularly good person with the qualities one would hope for in a dear friend or trusted colleague; a gentleman. In 2000, Dave Swinney and Roelien Bastiaanse started a joint project on online sentence processing in Dutch and English. This project, entitled “*The role of the verb in online auditory sentence processing in Dutch*” was financed by the Dutch Science Foundation (Nederlandse Organisatie voor wetenschappelijk Onderzoek: NWO). One of the collaborators on this project was Lew Shapiro, who initiated a parallel study in English. The foci of the project included verb gap filling and the violation of verb-object order in Dutch. The methods employed involve methodologies that allow for millisecond level investigations of auditory sentence processing; Cross Modal Lexical Priming (CMLP) and Event-Related Potentials (ERP). This project was the beginning of a long-lasting collaboration between San Diego and Groningen. The project resulted in a workshop which focused on the exploration of sentence processing across multiple populations: children and adults with and without language impairments, second language learners, and aphasic individuals. The central focus of the workshop was on the use and sensitivity of the CMLP technique. The present volume is a culmination of the work presented at this workshop. Cross Modal Priming (CMP) is one of the most fruitful techniques for measuring online (real time) auditory sentence processing. It was developed in 1979 by Dave Swinney for his famous investigation on the online activation of ambiguous word meanings within sentence contexts. In this study he showed that when a listener hears an ambiguous word, both a primary and secondary meaning are activated, regardless of biasing context. After this study, Dave Swinney used this technique to explore many theoretical issues in psycholinguistics and neurolinguistics. Perhaps most

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influential were his studies on online gap-filling. He and his collaborators showed that listeners reactivate the displaced antecedent of verb immediately at the offset of the verb, i.e., at the gap site. Until the collaboration with the Groningen research group, the majority of real time sentence processing research using the CMP-technique has been carried out using English and focused on dislocated NPs. The Groningen research group mainly worked on verbs in Dutch and together with Dave Swinney, they started a project on the processing of sentences with dislocated verbs. This special issue opens with the results of this study entitled “*The time course of verb processing in Dutch sentences*”. **De Gode et al.** found that verb gaps are not filled by re-activating the meaning of the verb at the gap site. Rather, verbs remain active during the entire clause, but this activation stops as soon as a complementizer is perceived. This is a different pattern than what is observed from the activation of nouns in Dutch. Like in English, the meaning of the dislocated noun is de-activated soon after the noun has been processed and then re-activated at the position of the gap. Another study borne from this project and published in this issue is **Den Ouden & Bastiaanse**, “*The electrophysiological manifestation of Dutch Verb Second violations*.” In this ERP study violations of verb positions were explored. In Dutch, the finite verb can be in a different position, dependent on the status of the clause: in an embedded clause, it is in the final position, i.e., post object. Whereas if it appears directly before or after the subject in the matrix clause, the verb appears in second position. Violations of the verb positions in an embedded clause result in a P600, but no (E)LAN. This pattern goes against theories that suggest that speakers of S-O-V languages, like Dutch, have a preference for a finite verb following a subject. The third paper on healthy adult speakers is Hoeks et al., “*Fill the Gap! Combining Pragmatic and Prosodic Information to Make Gapping Easy*.” Here, the authors investigate the influence of metalinguistic factors on sentence reconstruction. In two experiments, both context and prosody were manipulated. Both factors turned out to have an independent and strong effect on sentence interpretation. Poirier, Shapiro, Love & Grodzinsky present their CMP work with aphasic individuals (“*On-line Processing of Verb-phrase Ellipsis in Aphasia*”), specifically exploring the way in which verb phrase ellipses are processed in real time. In VP ellipsis (e.g. The man wrote a letter and the woman did too.) there is a gap found in the second clause which refers to a prior occurring verb phrase (noted as the strike through material in the example). Following up on prior reports that Broca’s patients have difficulty in the real time linking of a gap to a displaced NP antecedent (as shown by Swinney and colleagues), patients diagnosed with either Broca’s or Anomic aphasia were presented with sentences containing an elided verb phrase. The results revealed that Anomic participants re-activated the meaning of the object NP from the verb phrase found in the first clause immediately upon processing the gap (as do younger, normal controls), but individuals with Broca’s aphasia do not. In a departure from the focus on CMP, **Thompson and Choy** (“*Pronominal resolution and gap filling in agrammatic aphasia: Evidence from eye movements*”) present their work using an eye-tracking paradigm to explore the processing of pronominal and gap constructions. In a series of studies, the authors argue that while offline comprehension of anaphor processing is impaired in aphasic patients, their ability to link an anaphor (pronoun or gap) with its prior occurring antecedent is preserved.

The paper by **Love, Walenski and Swinney** follows with an exploration of how rate of speech input can affect the way in which individuals process sentences in real time. In this paper (“*Slowed speech input has a differential impact on on-line and off-line processing in children’s comprehension of pronouns*”) analyses of the effects of speech rate on comprehension of pronouns and reflexive constructions in typically developing children is presented. Pronouns are referential, in that they refer to something already mentioned in the preceding text. The listener should link the pronoun with its antecedent, which is something children

learn relatively late. This study analyzes the effect of speech rate on this linking process in children from 5–12 years old. During online processing, children react just like adults: slower speech rate breaks down the automatic processing routines that are typically found for online anaphoric resolution. Offline, however, slow speech rate results in better processing of personal pronouns, whereas there is no effect on (the already good) performance using reflexive pronouns.

The final paper by **Felser & Clahsen** (“*Auditory grammatical processing in child and adult language learners*”) gives an overview of their studies on auditory sentence processing, where they compare the behavior of children and second language learners of German using several techniques (CMP, ERP, eye tracking). They show that there are clear differences between online processing in these two populations. There is evidence that second language learners rely less heavily on grammatical parsing than children and adults native speakers. All in all, we think that the present issue gives a nice overview of issues currently under investigation in several labs that work on real time auditory sentence processing.

All of this work has been (and still is), to a large extent, inspired by the work of Dave Swinney, who tragically passed away in April 2006. Dave was extremely helpful in setting up the CMLP facilities in Groningen and invited the students to work with him and Lew at UCSD and SDSU. It was a great shock for us that Dave passed away, just a few months before the first student of the project, Dieuwke de Goede, was to graduate in Groningen.

We are very grateful that the *Journal of Psycholinguistic Research (JPR)*, of which Dave Swinney has been the Associate Editor for so many years, has been willing to offer us a platform for publishing this special issue. Dave collaborated with many of the authors on the studies described in this special issue and all of us have been inspired by him. Those who knew Dave also knew how supportive and generous he was to students and to his colleagues. We dedicate this special issue to Dave, a true mensch.

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