Speech errors as evidence for language production processes. A historical journey from Meringer to Leuninger

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1 Introduction

Retracing the history of psycholinguistics the earliest speech error corpora of and Meringer and Mayer (1895) mark the beginning of a now long tradition of speech error research. Early models of language production have been developed by investigating slips of the tongue collected in huge paper-and-pencil corpora (Garrett 1975). The analysis of speech error data can provide insights into language production processes. Therefore slips of the tongue have been considered a "window to the mind" due to their systematical pattern (Fromkin 1973). Over many years these corpora served as the primary data class for psycholinguistic theorizing.

2 Critical Objections

However, doubts have been raised with respect to the objectivity, reliability, and validity of spontaneous speech errors as evidence for language production processes (Ferber 1995). The traditional corpora are collected in an off-line fashion, i.e. the contributors record the slips with as much context as possible immediately after hearing the data. By using this technique, especially observer biases, selective collecting, and random effects due to many contributors and many subjects are unavoidable pitfalls of these early corpora. These shortcomings run the risk of drawing wrong conclusions concerning the frequency distribution of error types.

As a result of these objections novel and methodologically more rigorous research paradigms have been established such as the word picture interference paradigm with reaction time measurements, PET and ERP studies as well as neurolinguistic measurements which superseded speech errors as primary data (Meyer 1992). By

means of these on-line data, very specific claims could be made regarding the time course of lexical access (Levelt, Roelofs, & Meyer, 1999). In order to improve the sampling of speech errors new elicitation methods such as the SLIP technique and others (Baars 1992) have been designed. Experimentally induced slips allow for verifying specific hypotheses. With such experimental designs it is possible to restrict the reaction of the subjects (dependent variable) by means of controlling the conditions (independent variable).

Recent methodological advances in corpus linguistics have led to a reappraisal of slip data. By overcoming the above mentioned shortcomings objectively recorded slips can be used as reliable and valid data, indeed.

3 The experimental design I

The present study is based on an improved elicitation technique combining naturalness and objectivity of the data. The main goal of our research project, initialized, coordinated and supervised by Helen Leuninger, was to investigate both slips of the hand and tongue in order to assess modality-dependent and modality-independent aspects of language production. Spoken languages are processed in the aural-oral modality, sign languages are processed in the visual-gestural modality. So far, there exists no corpus of slips of the hand in German Sign Language and only a few corpora for American Sign Language (ASL) (e.g. Newkirk et al. 1980). But also for Spoken German there exists no comprehensive objective corpus. To this end, we elicited slips of the tongue and hand and established two extensive corpora, one for Spoken German (DLS), and one for German Sign Language (DGS) in an experimental setting which comes closely to the condition of natural language processing. Therefore, our setting allows to verify the hypotheses and results of previous slip collections. Speakers and signers were asked to tell 14 picture stories varying in length under various cognitive stress conditions while being audio- and/or video-taped. The slip sequences were digitized and fed into an electronic-database.

Our more restrictive method guarantees a higher degree of objectivity and reliability than the usual slip collections, with respect to sampling and coding. In a slip corpus derived from audio- and videotaped spontaneous language production the actual error occurrence in the population should be properly mirrored. Moreover, their classification is more reliable due to the availability of the audio- and video record. We analyzed and categorized the slips according to the following main criteria:

type of slip: anticipation, perseveration, substitution (semantic, formal), blend, fusion, exchange, and deletion

affected unit: phonological feature, segment, morpheme, word, and phrase

locus of repair: before word, within word, after word, and delayed

4 Results

In principle, in both languages all the above mentioned slip categories do occur. The same holds for the affected linguistic units. However, the quantitative distribution of slip category and affected unit differs due to the grammatical design of both languages. As for affected units, we obtained more word errors, but considerably less morpheme errors in DGS as compared to DLS. Phrasal slips were very rare in DGS. As for slip categories, we obtained more fusions in DGS, but almost no phrasal blends. The reverse is true for DLS. Fusions were not found, whereas we obtained a significant number of phrasal blends.

Our findings are evidence for different processing characteristics in both languages (Hohenberger, Leuninger, Happ 2002). Spoken languages, on the one hand, are mainly characterized by horizontal processing, i.e., linguistic information is predominantly organized in a linear fashion with many small chunks carrying little information. Signed languages, on the other hand, are mainly characterized by vertical processing, i.e., linguistic information is much more organized in a fusional/simultaneous fashion with few big chunks carrying a lot of information which is distributed over various manual and non-manual articulators.

One of the most stunning findings was the almost complete lack of exchanges of any kind—word, morpheme, and segment exchanges—in both languages. The most striking difference between Spoken and Sign languages concerns their morphological typology. Therefore we designed an experiment focusing on morphological exchanges in concatenative and non-concatenative poly-morphemic signs and words in DGS and Spoken German. Morpheme errors can provide crucial evidence for morphological processing, in particular decomposition.

5 The experimental design II

In the experimental setting subjects were required to exchange poly-morphemic words and signs, respectively. Exchanges are elicited in a repeat-reverse paradigm (Baars 1992). Two short phrases which had to be learnt by heart were followed by a list of three pairs of phrases priming root exchanges. After being exposed to the priming list the subjects were asked to reverse or to repeat the critical poly-morphemic items from the target pair. In the repeat condition the target pair simply had to be repeated. Apart from whole word exchanges, root and affix exchanges can occur in which we are especially interested. Our hypotheses are as follows.

H1 (only for DGS): Morphemes distributed on different articulators (manual vs. non-manual) are easier to detach and should produce more root exchanges.

H2: Stems and affixes in a concatenating language such as Spoken German should be separated more easily than stems and non-linear morphemes in a fusional-simultaneous language such as DGS.

H3: Morphological information can be processed on different levels. On the first level, abstract morphological information is processed; on the second level the morpho-phonological form is processed. Non-concatenative morphemes can only be manipulated on the former level, concatenative morphemes on both.

6 Results

The findings in both languages correspond to our hypothesis that concatenative morphemes are separated more frequently. But it turned out that also simultaneous morphemes can be manipulated. Because of the modality differences of DLS and DGS we obtained different results. We obtained 5.2% of morpheme errors for DGS under the reverse condition, whereas the set of morpheme errors under the repeat condition amounts to 6.2%. As for DLS, we obtained nearly twice as many of morpheme errors under the reverse condition (13%) and the repeat condition (9%) as well. As opposed to Spoken German, DGS shows a non-concatenative fusional morphology, hence morphemes are produced simultaneously to a large extent. For this reason, less morpheme exchanges occurred in DGS.

As for the evaluation of the hypotheses, we can show that in both languages simultaneous morphemes can be separated. This relates to our third hypothesis, namely that abstract morphemes and concrete allomorphs are processed on different levels. The first hypothesis only holds for DGS. (In DLS, there are no different articulators expressing morphological information simultaneously.) Contrary to our hypothesis H1, the results for DGS show that non-manual morphemes on a separate articulator (e.g. facial expressions) do not detach from their manual base.

7 Conclusions

The comparison of two different data sets arising from the different experimental techniques – an extensive corpus study and a rigorous experimental study – provides complementary information for the investigation of language production processes. The comparison of DGS and Spoken German is the ideal test case for assessing the interplay between Universal Grammar (UG), typology and modality. UG determines the format of a possible (human) grammar while allowing for different modalities of processing and for language-specific variation. Both Spoken German and DGS are represented and processed by the same language components but expressed differently according to the respective modality.

8 Acknowledgement

Our contribution spans the history of slip research from the very beginnings of Meringer to the most recent extensions made by Leuninger with respect to methodology and modality. We want to honour Helen Leuninger for her ceaseless commitment to the advancement of sign language research and thank her for promoting our scientific research skills through the originality of her ideas, the broadness of her experience and her exceptional interpersonal teaching skills.

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