Feature Distance in Consonantal Slips of the Tongue: Psycholinguistic and Methodological Aspects

This study was carried out within a research project funded by the Deutsche Forschungsgemeinschaft (DFG) on *Modality-dependent and independent aspects of language production* in the scope of the DFG Schwerpunkt *Sprachproduktion*. In this project, slips of tongue and hand are compared in order to assess modality dependent and independent effects in language production. There exist two parallel corpora, one for errors of Spoken German, and one for errors of German Sign Language (Deutsche Gebärdensprache DGS). The slip data have not been accumulated in the traditional paper-and-pencil fashion but rather elicited by means of a more restricted experimental method. The deaf and hearing subjects were asked to sign or to tell 14 picture stories under various cognitive stress conditions. They were video- and/or audio-taped - a method which guarantees a higher degree of reliability than the usual slip collections.

This paper focuses on the spoken German slips of the tongue (n=944), especially on phonological errors (n=285) which were scrutinized for nearly all of the effects known from the literature, as summarized in Poulisse (1999). In particular, we investigate feature distance as a factor determining contextual phonological errors such as anticipations and perseverations. Besides this, there are methodological issues related to the experimental method we used (elicitation task) and the feature systems which we used for computing the feature distance. We wanted to find out which among competing feature systems is the most appropriate one to characterize our data. As a whole, the purpose of the study is to present the results a bias-free corpus can provide. There are various studies which have shown that most phonological errors differ in only one feature from their target segment (van der Broecke & Goldstein 1980, Klein & Leuninger 1988), the most affected feature being the place-feature, as in (i)

   (i)   Fu<u>ch</u>sschwan<u>ks</u>//schwanzsäge   (t $\rightarrow$ k)

This corresponds to our findings in DGS where phonological errors also tend to mostly affect only one (out of four) features, namely handshape. Thus, this effect can be observed independently of the modality.

In order to assess the appropriateness of the feature systems we compared the two most common ones, namely the International Phonological Alphabet (IPA) and the one Kloeke (1982) and also Wiese (1996) proposed for German. The determination of the feature distance varies depending on the feature system. Whereas the IPA posits only three major features, namely place, manner and voice, Kloeke's matrix comprises nine. With the IPA coding, we obtain 69,76% of one-feature changes, followed by 23,83% of two-feature changes and only 6,39% of three feature changes (see diagram 1). These findings correspond with other results found in the literature. According to Kloeke coding, we obtain a roughly equal distribution of one- and two-feature changes (32,52%) - due to feature implications and redundancies within the system - and a constant decrease of increasingly distant errors. Errors changing more than 6 features do not occur (see diagram 2). In spite of the different distribution, both feature systems are consistent with the assumption that the more similar two segments are the more likely they are to be substituted in a speech error. We clearly prefer the IPA analysis, because this system suffices with only three features which capture all actually occurring errors whereas the Kloeke system overgenerates in that it makes available too many feature changes (up to nine) which are not needed to accomodate the data. As for the IPA analysis, it is interesting to examine which feature combination in 2-feature errors occurs most frequently. Recall that in one-feature errors, the place feature is affected most often. In two-feature errors, the place feature most likely combines with manner (65,85%) and not with voice (29,27%) although the number of single feature changes for both manner and voice is nearly equal. A possible explanation for this is that there is a higher number of both place and manner subfeatures whereas the voice feature is only binary. We also explored into the possible interaction of feature distance with syllable distance as a second determining factor of contextual errors. Measuring the distance of the target from the intruder segment in terms of a structural measure (syllable) yields the impressive result that most errors are only one syllable away from their intruder, again with a sharp decrease over increasing syllable distance. The time window for contextual errors is only four syllables. However, there does not seem to be an interaction of the kind

that the longer the syllable distance is the closer the feature distance is, possibly due to an overall ceiling effect of feature distance.

We want to emphasize that feature distance is a main determining factor of contextual phonological errors and thus highly relevant in the process of language production. With our objective experimental method and our testing of two different coding systems we are able to draw valid inferences from our quantitative results to the actual phonological processes underlying human language production.