SELF-MONITORING OF INNER SPEECH AND OVERT SPEECH

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ABSTRACT
In this paper I present evidence from both completed and interrupted and both elicited and spontaneous speech errors and their repairs that (1) self-monitoring for speech errors can be directed at inner and at overt speech, and (2) self-monitoring employs different criteria for inner and overt speech. It is suggested that self-monitoring of inner and self-monitoring of overt speech have different functions.

INTRODUCTION
As early as 1975 Baars, Motley and MacKay suggested that in speech production there is pre-articulatory editing of inner speech, during which speech errors are detected and corrected before they surface in overt speech. This assumption was needed to explain the phenomenon of so-called lexical bias in phonological speech errors, that is the phenomenon that, at least in their experiments, phonological speech errors more often create real words than would be expected by chance. The idea is that nonword errors are more often detected and rejected than real-word errors, causing a greater frequency of real-word errors in overt speech. The need for such rapid and fluent pre-articulatory editing was rejected by Dell (1986). He explained lexical bias from immediate feedback of activation between phonemes and lexical units within the speech production system proper. However, Levelt (1989) and Levelt, Roelofs and Meyer (1999) rejected feedback, and revived the original explanation by Baars et al., assuming that self-monitoring (their name for pre-articulatory editing) of inner speech employs the same speech comprehension system that is used for self-monitoring of overt speech and for perceiving and understanding other-produced speech (Fig. 1).

Figure 1. Simplified diagram of a theory of speech production and self-monitoring as proposed by Levelt (1989) and Levelt et al. 1999.
If indeed the same mechanism is responsible for self-monitoring of inner and of overt speech, and self-monitoring of inner speech suffers from lexical bias, one would expect to find the same lexical bias in the detection and correction of overt speech errors. However, it was shown that, in spontaneous speech, where a strong lexical bias in phonological speech errors was found, there was not a trace of lexical bias in the detection and correction of overt speech errors (Nooteboom, in press). This could be taken as support for Dell’s position, that lexical bias cannot be explained from self-monitoring of inner speech. However, there is another explanation.

It might be argued that self-monitoring of inner speech and self-monitoring of overt speech have different functions. Self-monitoring of inner speech most probably is to prevent errors in inner speech from becoming public. Self-monitoring of overt speech more likely aims at limiting any damage that may be caused by errors that have already become public. If this is correct, one would expect self-monitoring of inner speech to operate differently, and possibly use different criteria from self-monitoring of overt speech. More specifically, one would expect self-monitoring of inner speech to be more in haste and therefore to rely more on easy-to-use global criteria, such as, for example, a criterion of lexicality. Self-monitoring of overt speech might rely more easily on time-consuming strategies, such as repeating the current phrase in the repair (Cf. Levelt 1989).

The problem with hypothesized self-monitoring of inner speech is that the whole operation is supposed to be covert, and thus not easily investigated. However, this is not always the case. Levelt (1989) argued that if someone says v..horizontal, where v.. obviously is the first sound of an erroneous form vertical, detection must have taken place in inner speech, because the duration of the v.. sound is shorter than a humanly possible reaction time. Similarly, Blackmer and Mitton (1991) argued from the fact that sometimes the offset-to-repair interval following such an early self-interruption has a duration of 0 ms, that not only the self-interruption but also the repair must have been prepared during inner speech. If Levelt (1989) and Blackmer and Mitton (1991) are right, their observations make it possible to separate overt reactions to inner speech from overt reactions to overt speech, and thus investigate whether self-monitoring of inner speech differs from self-monitoring of overt speech. Below, I will describe an experiment designed to elicit spoonerisms, and to make it possible to compare very early self-interruptions with completed self-interruptions.

METHOD
The method used for eliciting spoonerisms was basically the same as the one used by Baars et al. (1975), who employed phonological priming by a varying number of silently read preceding word pairs such as dull bear, duck bus, dark bowl, on the pronunciation of a test word pair such as barn door that has to be spoken aloud. In this task every now and then the subject makes a spoonerism, turning barn door into darn bore. The current experiment was done in Dutch with CVC CVC stimuli, and with 50 Dutch subjects. There were 36 filler stimuli, 18 test stimuli with expected real-word outcomes and 18 test stimuli with expected nonword outcomes. There was a total of 3600 responses (See also Nooteboom, 2003a and 2003b). Different from the experiment by Baars et al., subjects were encouraged to listen to themselves and make a self-repair in case an error was made, and were allowed time to do this.
RESULTS
The experiment gave only 56 completed and 67 interrupted spoonerisms of the primed and expected kind. However, if one includes speech errors of all possible kinds, there were a great many more, both interrupted and completed. In 289 cases a repair was made. These errors were broken down according to how much of the CVC CVC structure was realized. Also offset-to-repair intervals were measured. Results are presented in Fig. 2.

![Figure 2](image-url)  
**Figure 2.** Number of elicited and repaired speech errors broken down according to the length of the CVC CVC fragment spoken and according to the duration of the interruption-to-repair interval.

Obviously, very short offset-to-repair intervals, often less than 100 ms (in 13 cases 0 ms), tend to co-occur with very short spoken fragments, confirming the finding by Blackmer and Mitton (1991) that not only self-interruptions but also self-repairs are often already planned in inner speech, and also confirming that self-monitoring of inner speech is in a hurry. Errors that are most likely only detected after they have become overt are repaired at a much more leisurely pace, nearly always taking more than 200 ms (and in 10 cases more than 400 ms), confirming that self-monitoring of overt speech bothers about different things than haste. These data strongly support the idea that self-monitoring can be directed at both inner speech and overt speech, but employs different strategies for inner and overt speech.

The next question, of course, is whether self-monitoring of inner speech does, and self-monitoring of overt speech does not employ a criterion of lexicality. This question can be answered by inspecting early interrupted and completed spoonerisms of the primed and expected kind. The experiment gave 56 completed spoonerisms, 37 in the word-word condition, and 19 in the nonword-nonword condition, confirming the existence of lexical bias in phonological speech errors. The experiment gave 67 interrupted spoonerisms, 28 in the word-word, and 39 in the nonword-nonword condition. A X² test shows a significant interaction between completed versus interrupted and word-word versus nonword-nonword ($X^2=7.21; df=1; p<0.01$), suggesting that the lexical bias found in the completed spoonerisms might have been caused by the suppression of nonword-nonword spoonerisms in inner speech. Unfortunately, in the experiment too few completed spoonerisms of the expected kind were repaired to investigate a possible lexical effect on detection and correction of overt speech errors. To this end an analysis was made of a collection of spontaneous Dutch speech errors (cf. Nootteboom, in press). In this collection there are 467 repaired phonological speech errors, 237 real-word...
errors and 230 nonword errors. Of the 237 real-word errors 219 are completed and 18 interrupted before completion. Of the 230 nonword errors, 195 are completed and 35 are interrupted before completion. A $X^2$ test shows a significant interaction between completed versus interrupted and real-word versus nonword errors aborted ($X^2= 6.7; df=1; p<0.01$). This confirms that self-monitoring of inner speech does and self-monitoring of overt speech does not employ a criterion of lexicality.

CONCLUSION

The data presented strongly support the idea that overt self-repairs can be reactions both to inner speech and to overt speech. It is also demonstrated that overt reactions to inner speech reflect a criterion of lexicality, whereas overt reactions to overt speech do not. If one assumes that overt reactions to inner speech, i.e. very early self-interruptions, reflect the operation of self-monitoring of inner speech that mostly stays completely covert, i.e. the “prearticulatory editing” hypothesized by Baars et al., then the current data confirm the idea by Levelt (1989) and Levelt et al. (1999) that lexical bias in phonological speech errors can be explained by nonwords being more easily detected and suppressed than real words in self-monitoring of inner speech. An explanation of lexical bias from phoneme-to-word feedback (Dell, 1986) would be superfluous. The fact that self-monitoring of inner speech employs a global criterion of lexicality, whereas self-monitoring of overt speech does not, can be related to different functions of the two types of self-monitoring. Self-monitoring of inner speech supposedly is meant to prevent errors in inner speech of becoming public, and therefore is in a hurry. A global criterion of lexicality comes in handy. Self-monitoring of overt speech supposedly is meant to limit damage to communication of errors that have already been made public. It has the time to compare the intended word form with the erroneous word form, and therefore is in no need of a global criterion of lexicality.

REFERENCES


