JOURNAL OF VERBAL LEARNING AND VERBAL BEHAVIOR **14**, 382–391 (1975)

Output Editing for Lexical Status in Artificially Elicited Slips of the Tongue

BERNARD J. BAARS
University of California, Los Angeles

MICHAEL T. MOTLEY
Department of Speech Communication
California State University, Los Angeles

AND

DONALD G. MACKAY
University of California, Los Angeles

It was shown previously that spoonerisms (such as *bad goof—gad boof*) can be elicited by having subjects articulate a target (*bad goof*) preceded by bias items which contain at least the initial phoneme (/g/) of the desired error outcome. The present study takes advantage of the fact that two very similar targets such as *darn bore* and *dart board* will often have very different *outcomes* (e g., the error outcome *barn door* is meaningful while *bart doard* is not) Any systematic difference in the rate of errors between these types of targets must be attributable to processes which take place after recoding of the target into its corresponding slip It is thus possible to directly evaluate the effect of editing processes which apply only to the error outcome, and not to the target word pair It is demonstrated that for lexical (L) targets, L outcomes are significantly more frequent than nonsense (N) outcomes. For N targets, the same generalization obtains, but only in a context that contains lexical filler items There is no difference in the overall spoonerism rate on the basis of the lexical status of the error outcome unless the context clearly contains other lexical items In such a context, nonlexical outcomes appear to be suppressed. Theoretical implications are discussed

It seems intuitively obvious that we generally tend to "guard" our speech. We do not usually "blurt out the first thing that comes to mind"—to use only two of the idioms which encode this common belief in our everyday speech. The very notion of a speech error, a slip of the tongue, presupposes the existence of some sort of rule-governed plan prior to the act of speaking, as well as the fact that we occasionally fail to adhere to this plan. More accurately, perhaps, several plans exist (since errors are themselves lawful), some being more appropriate than others—and few things are more embarrassing than executing the wrong plan.

We would like to thank Prof John C Hay and Mark Galizio (University of Wisconsin—Milwaukee) and Katharine McGovern (University of Minnesota) for their kind comments on this work.

Slips of the tongue have been investigated by linguists and psychologists for at least eighty years (Meringer & Maier, 1895; Wundt, 1897; Freud, 1938), often very insightfully. The considerable literature of naturalistic investigations of slips of the tongue places some real bounds on the phenomenon (Fromkin, 1973; MacKay, 1972; Motley, 1973). Controlled experiments, however, are rare, and the existing studies of output editing in speech production involve rather indirect, inferential measures of the editing processes (e.g., Rosenberg & Cohen, 1966). Paradoxically, we all know that speech production is edited, but are unable to prove it very convincingly.

Manipulation of output processes is difficult, but perhaps not impossible. A common party game provides a nontrivial experimental demonstration of this point.[1] One person asks another to respond by saying *duck* whenever the first person (the interlocutor) says *busy*. This is repeated rapidly several times. Then the interlocutor quickly switches to *dizzy*. Quite often the subject will respond with *buck*.

There are several points to note about this: (*a*) There is a switch on the part of the subject of the two nonadjacent initial consonants (*busy duck—dizzy buck*) so that both initial consonants have leap-frogged over the other sounds of the words. This describes a spoonerism, of course.[2] Notice that the error cannot be due to some simple kind of articulatory interference, since the subject never pronounced the initial /b/ before the slip. Therefore the error appears to be a genuine slip of the tongue, rather than a tongue twister. (*b*) The subject is invariably surprised at having made the slip. In the case of some rather salacious variants of this game (where the target word pair is not obscene, but the outcome is, as in *fuzzy duck*) it is particularly striking that the subject literally does not know what he is saying until after he has said it. This slip appears to be a failure of an editing process at quite a high level. Since the pronunciation still appears to follow English phonology, purely articulatory editing would seem to be unimpaired. But such issues do not have to be left to post hoc reasoning. The game represents a true experimental manipulation of the speech production system, so that such questions can be put directly to the test.

Although our own work with artificially elicited speech errors (Baars & Motley, 1974; Baars & Motley, Note 1; Motley & Baars, Note 2) was not directly inspired by this particular game, it does provide a convincing, if informal, demonstration of the kinds of phenomena we have observed under a variety of conditions. It meets two of the conditions which we consider criterial for human slips of the tongue: that slips are unintentional (as shown by the fact that people appear to be surprised or sometimes embarrassed by their own utterance, recognizing it to be in error), and that slips are output, not input errors. An intentional mispronunciation of a word would certainly not be considered a slip of the tongue, nor would a reading error be one. Rather, such slips are produced at some point subsequent to the input of the target (*busy duck* in the case above) and prior to articulation.

Our method for eliciting slips of the tongue has consisted of showing subjects a number of target word pairs on a memory drum, some of which were accompanied by an articulation signal which cued the subject to say the corresponding word pair as quickly as possible. Experimental targets were always preceded by three pairs of phonological interference words, which the subject did not articulate. These phonological interference words resembled to varying degrees the error outcomes which we were hoping to elicit from the subjects. That is to say, to induce the error *bad goof—gad boof* we introduced various elements from *gad boof* on the preceding memory drum exposures. The minimal effective bias needed to elicit the complete error for this example was the initial /g/ (Baars & Motley, Note 1) which indicates that when a subject is set to say a word pair starting with /g/, he will occasionally transform the entire target *bad goof* into the corresponding complete spoonerism *gad boof*. It seems extremely unlikely that the subject somehow reads the target as *gad boof*, indicating that the slips do not involve misperception of the target, as pointed out above.

In a related experiment (also presented in Baars & Motley, Note 1) spoonerisms were produced by presenting word pairs to a subject, and after the word pairs were occluded, telling them to articulate the words in either right-to-left or left-to-right order. When the required

[1] We would like to thank Professor John C. Hay for providing us with this example.

[2] For a detailed discussion of the technique described here applied to Lashley's classical problem of serial order in behavior, see Baars and Motley (Note 1).

order contradicted the normal reading order, many spoonerisms were created. This paradigm can also not be accounted for by reading error, since subjects only reversed the word order after the target word pair was already occluded. This technique serves as a converging operation to support the view that the word pairs are read correctly and articulated incorrectly.

Finally, as in the example mentioned above, some of the error outcomes were quite embarrassing to the subjects. It is hard to imagine that *tool kit* will be consciously read and stored as *cool tit*, or *dear queen* as *queer dean*. Yet these targets produced many spoonerisms. All these results would seem to support the contention that, like natural slips of the tongue, artificially elicited speech errors are unintentional and are not reading or listening errors (except in the degenerate sense that they may represent an incorrect readout from some prearticulatory buffer memory). The results from the experiments reported here will be found to give additional support to this view.

One of the significant implications of this technique lies in the fact that it permits a functionally separate manipulation of the input of the target versus the articulation of the corresponding error outcome. For example, suppose that the target *slip shod* is read and transformed, due to some preceding phonological bias, into the outcome *shlip sod*. The phoneme sequence /shl-/ has an extremely low probability of occurrence in English, so much so that it is not formally recognized to constitute part of English phonology. Therefore, if the target with this unusual outcome is compared to some other, similar target with a more common spoonerism outcome, and a significant difference is found as a function of error outcomes, one may reasonably argue that the difference is due to an editing process which occurs after the target is recoded into its corresponding spoonerism. Indeed, the point of recoding may be thought of as a functional separation between input and output processes. (The recoding mechanism is discussed in detail in Baars & Motley, Note 1).

The rationale for the following experiments is essentially the same, except that we make use of the fact that some word pairs spoonerize into nonsense word pairs (such as *dart board—bart doard*) while phonologically very similar targets are transformed into pairs of real words (*darn bore—barn door*). In the present experiment we are primarily concerned with testing the possibility of output editing of lexical versus nonsense word pairs. We are not now considering the question, for example, of the meaningfulness of the word pair per se, but only of the lexical status of the members of the pair. Nor does it follow, from the arguments presented here, that higher-level semantic processes are involved in the output editing of slips of the tongue (a question presently under investigation).

Two kinds of targets may be used to test the general hypothesis that the frequency of spoonerisms may change as a function of the lexical status of the outcomes. A nonsense syllable pair (e.g., *gad boof*) may spoonerize to a lexical error outcome *bad goof*. But a real word pair such as *darn bore* can also produce a meaningful spoonerism outcome *barn door*. Each of these cases is considered separately, and compared to similar-sounding targets which do not transform into meaningful slips.

EXPERIMENT I

Method

Subjects. Eighteen experimentally naive students (ages 17–35) from introductory Speech Communication classes at California State University, Los Angeles participated. All were fluent native speakers of English

Apparatus. A memory drum manufactured by Behavioral Control Associates (Milwaukee) was used to display word pairs at 0.9 sec intervals, with an interexposure time of about 0.1 sec. On target exposures, the memory drum automatically activated a delay timer which turned on a 0.25-sec signal buzzer, 1 sec after the target exposure. The buzz served as a cue to the subject to say the preceding word pair out loud. The subject was therefore required to momentarily retain each word pair he saw, not knowing which word pair would be buzzed.

Stimuli. Since it is not practical to randomly select word pairs which happen to systematically spoonerize into meaningful slips, two lists of word pairs were developed in which each target word pair consisted of real lexical items which transformed into real-word spoonerisms. In addition, each of these word pairs was chosen so that it could be changed into a complementary word pair merely by altering the last consonant of each member of the pair. This complementary word pair had the property that it spoonerized into a meaningless error—both words of the outcome error were nonsense syllables. For example, the lexical (L) word pair *darn bore* turns into *barn door*, a lexical outcome. But the phonetically similar L word pair *dart board* becomes *bart doard*, a nonsense (N) slip. In this way, every lexical–lexical (L–L) word pair had a matching complement differing only in the last consonant, which defined an L–N spoonerism. The Appendix contains a complete list of the stimuli.

Each subject was given one of two matching lists. Each matching list contained 20 word pairs, 10 L-L and 10 L-N with any target randomly assigned to List I or List II, and presented alternatingly to the subject. If List I contained some L-L word pair in the *n*th position, List II would have the complementary L-N word pair in the same position. The two lists were thus matched precisely.

The target word pairs from each experimental list were embedded in a longer list of 233 word pairs, 32 of which were also buzzed. Previous experience had shown that these control items (not preceded by bias pairs) almost never produce spoonerisms, but they were included to draw attention from the bias pattern preceding each experimental target word pair, and to maintain pacing. The experimental targets were always preceded by three pairs of bias word pairs, which duplicated the initial consonants and vowels of the desired error.[3] None of the bias pairs were identical to the desired error. Of the three bias pairs, one differed from the predicted error only in the last consonant, the others each contained one word resembling the corresponding word of the slip as much as possible, except for the last consonant. An effort was made to break any obvious pattern of bias items. Every first bias pair was presented twice to increase exposure to the interference.

Instructions. Subjects were instructed to pay attention to each word pair, and, upon hearing the signal buzz, they were to say the preceding (occluded) syllable pair as quickly as possible. A practice list was given, containing approximately 10 word pairs. In order to encourage subjects to speak as loudly as possible they wore earphones with white noise of medium loudness.

Results

Forty-two error utterances were obtained altogether, of which 32 resulted from L-L word pairs and 10 from L-N word pairs. The median scores (and interquartile ranges) were 1.8 (.4 to 2.9) for the L-L targets and .5 (.0 to 1.0) for the L-N condition. No spoonerisms were observed for the nonbiased control targets.

For the purpose of analysis, a complete spoonerism was required to have at least the

[3] In Baars and Motley (1975, Note 1) it was demonstrated that for bias items to be effective, they needed only the first consonant of the second target word in the position of the first consonant of the first word. That is to say, for the slip *bad goof—gad boof*, only the initial bias /g/ was needed. However, this method is less efficient in producing slips than the present one, in which we bias toward both initial consonants and both medial vowels of the error. Previously we were interested in minimizing the bias condition which preceded the point of recoding of the target, while in the present experiment we are interested in manipulating events which take place after recoding.

initial consonants and medial vowels of the predicted outcome for both words of the target slip. That is, for *bad goof–gad boof* a complete spoonerism was required to have at least *ga . . . boo . . . .* A partial spoonerism was counted for a single word of this pair (*ga . . .* or *boo . . .*). For the L-L condition there were 16 partial and 16 complete spoonerisms, while the L-N condition gave five partials and five completes. Forty-seven percent of the individual words in the L-L errors were completely identical to the predicted slips, compared to 66% for the L-N error words. Of the spoonerisms defined by the above criteria, 98% of the individual words in the L-L slips were lexical items, while only 47% of the L-N words were.

The results were carefully checked to eliminate possible intrusions of the exact bias word pairs which preceded each target. Thus, for example in the case of the target *dart board*, the response *bark loud* was not counted, even as a partial, because the response was identical to one of the preceding bias word pairs.

Since the error rate on L-L items did not differ substantially from List I to List II ($p \gg .10$ by Mann–Whitney U for combined partials and completes) they were considered to be parallel forms of the same list and collapsed for subsequent analysis. The same procedure applied to L-N targets ($p \gg .10$, same test). Thereupon a sign test was used to compare each subject's score in the L-L condition to his score for the L-N items, a difference that was significant at $p < .005$ for combined partials and completes (four ties), $p < .01$ for partial spoonerisms alone (nine ties), and $p < .001$ for completes (11 ties).

Discussion

The significant difference between the L-L and the L-N conditions indicates that something associated with the lexical status of the spoonerism outcome changes the frequency of occurrence of these slips. It is not clear from Experiment I whether a nonsense outcome is inhibited or whether a lexical outcome is boosted, or possibly both. However, it is almost certain that the difference is controlled by some process that can only decide to change the error frequency on the basis of the recoded target. There is simply no way to tell whether the spoonerism outcome is a lexical pair without first recoding it (by switching the initial consonants). It is for this reason that it seems meaningful to speak of editing processes operating on the recoded targets.

One major problem of interpretations seems to remain. It is conceivable that there is more going on during the editing phase than a check for the lexical status of the anticipated utterance. Specifically, Motley and Baars (Note 2) have shown that the transitional probability between the shifting initial consonants (/g/ and /b/ in *bad goof—gad boof*) and their surrounding phonemes can affect the rate of spoonerisms. It is not clear from that research whether the transitional probabilities for the target context or for the outcome context is responsible for this difference. Possibly both are at work. It does seem possible, however, that the lexical outcomes of the present experiment could be accidentally confounded with a greater transitional probability of the phonemes in the output stage. For example, the complementary input word pairs *darn bore* and *dart board* may have very similar phonemic probability of occurrence. But it is possible that the outcome *barn door* has a higher overall transitional probability than the complementary nonlexical outcome *bart doard*.

One may counter this by saying that, ultimately, the lexical status of a word must be highly correlated with the transitional probability of its component phonemes. However, there is a better answer to this criticism, as will become apparent in Experiment II.

Experiment II

Introduction

To test for editing for lexical status in slips of the tongue, logically, L-N items can be compared to L-L, or N-L to N-N. It does not seem practical to compare lexical and nonsense targets, since there are undoubted differences in readability, and so on, between real words and nonsense syllables. But for any given type of target (L or N), it is reasonable to compare L versus N outcomes. If there is an overall tendency to favor L outcomes, a difference would be expected when N targets were given, too; that is, when comparing N-L to N-N, N-L might be expected to be higher.

But there is a further question involved. When the subject is given a list of N-L targets, he is reading only nonsense words. Since there is no reason for him to expect any lexical items, he may not edit for lexical outcomes. For this reason it was decided to prepare two otherwise identical lists, each comparing N-L to N-N, one of which had no lexical context, and another which did.

A positive outcome of this design would mean that the functioning of the lexical editor depends upon expectations induced by context, and that factors such as the transitional probabilities of the error outcomes could not account for the higher error rate of lexical outcomes, since the actual spoonerism outcomes were the same for both the lexical context and the nonsense context.

Method

Subjects. Thirty-four subjects (ages 18–25) from introductory Psychology classes at the University of Wisconsin—Milwaukee participated. Seventeen were assigned to the N context and 17 to the L context condition. Again, all subjects were fluent, native speakers of English.

Apparatus. Apparatus used was the same as in Experiment I.

Stimuli. Two lists were prepared as above, with the difference that in each list all targets were nonlexical (N), while half of the error outcomes were L and half N. In the complementary list, the corresponding N targets differed by only the last consonant, and were spoonerized to the complementary outcome, as described in the method section of Experiment I. Thus, for example, *rafe sode—safe road* was compared to *rabe sofe—sabe rofe.* Altogether there were 156 words pairs in any list, of which 20 were targets; 10 N-L and 10 N-N. Eighteen word pairs served as buzzed controls (not preceded by any phonological bias) as described in Experiment I. Two out of every three bias word pairs were repeated to increase exposure to phonological interference, as were a number of filler word pairs.

This defined the stimuli for the N context conditions, in which the subject only saw nonsense targets, bias words, and filler items. For the L context conditions, identical lists were used except that 55 filler word pairs (of which 12 were among the buzzed controls) were lexical word pairs. Therefore the four conditions were: N-L (N context), N-N (N context), N-L (L context), and N-N (L context). An effort was made to make the contextual changes phonologically constant as much as possible. Separate a priori comparisons were planned between L and N outcomes in the N context, and between L and N outcomes in the L context.

Results

Sixty-six error utterances were obtained, distributed over the four conditions as described in Table 1. Partial and complete errors were defined as in Experiment I, and possible intrusions of bias pairs were discarded as before. In the lexical context, 77% of all individual N-L slips were completely identical to the expected slip (whether partial or complete) while 44% of the N-N words were identical. For the nonsense context, 60% were identical for N-L and 61% for N-N. The nonidentical words differed primarily in their final consonants. Since some of the nonidentical words could nonetheless result in lexical items, these were also tallied. In the lexical context, 93% of the words from N-L slips were lexical items, while 28% of the slips from the N-N condition were. In the

TABLE 1

SPOONERISM RATE FROM NONSENSE TARGETS WITH LEXICAL VERSUS NONSENSE OUTCOME ERRORS

	Nonsense (N) context	Lexical (L) context
Lexical (L) outcomes		
Partial spoonerisms	21	17
Complete spoonerisms	19	19
Total:	40	36
Median (and interquartile Range)	2 0 (1.0–3.6)	2.0 (1.0–3.0)
Partials as a percentage of combined errors	54%	47%
Nonsense (N) outcomes		
Partial spoonerisms	19	9
Complete spoonerisms	13	5
Total.	32	14
Median (and interquartile Range)	1.7 (1.0–2.5)	.63 (.0–1.5)
Partials as a percentage of combined errors	65%	63%

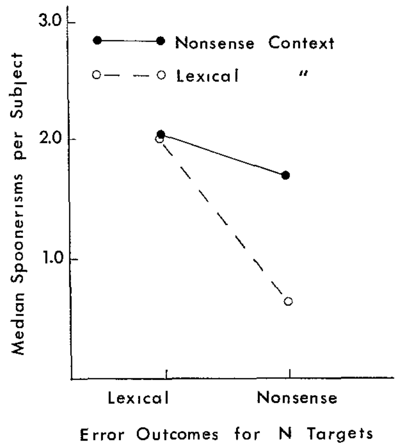

FIG. 1. When nonsense outcomes occur in the context of real-word pairs, the rate of spoonerisms is depressed below the level of the three other conditions

nonsense context, 76% of the words from N-L slips were lexical versus 34% of the words from N-N slips.

As before, there was no significant difference in frequency between the N-L errors of List I and those of List II, nor did the N-N error rate differ between the lists (both by Mann–Whitney U, $p > .10$) so the similar parts of both lists were combined.

Two a priori comparisons were performed. There was no difference (by a Wilcoxon Signed–Ranks Test, $p > .10$, six ties) between the L and N outcomes within subjects when the context only contained N items, as shown in Figure 1. However, when the context was changed to include L filler pairs, a significant difference emerged (Wilcoxon, $p < .01$, 4 ties). Inspection of Figure 1 shows that the difference is due to a depressed error rate in the N-N (L context) condition as compared to the other three conditions. Remarkably, the rate of L outcomes in Experiments I and II were very similar (medians of 1.8 and 2.0 respectively) while N outcomes (both in L contexts, since Experiment I only contained L targets) were also very close (.50 and .63).

It is conceivable that if an editing process is at work, it might have a different effect on the rate of partials than on the rate of completes. An editor might be able to veto the output only after the first word of the error has been uttered. For this reason Table, 1 also shows the percentage of partial spoonerisms compared to all spoonerisms (partials plus completes). It appears that relative to the total, the percentage of partials rises indeed for all the N outcomes, in either N or L context. This suggests that there is some editing going on independent of the lexical status of the immediate context, but that it is not enough to lower the overall rate of errrors until a lexical context occurs.

Discussion

The results of Experiment II have a number of interesting implications. While it is clear that there is no overall tendency for the rate of errors to favor lexical outcomes, there is such a tendency when there is a reason for the subject to expect real words. It is clear that this sensitivity is not due to some artifact of the targets or of the spoonerism outcomes, since the difference depends purely upon the presence or absence of lexical items in the surrounding context of the targets. Any explanation at a level below that of a lexical editor would seem to be inadequate as an account for this effect.

One particularly striking result is the fact that the significant difference in errors is due to a decrease in the error rate for nonsense outcomes in a lexical context. While the error rate is essentially constant for nonsense and lexical outcomes in a nonsense context, as well as for lexical outcomes in a lexical context, it suddenly and dramatically drops for nonsense outcomes in a context of real words. It would appear that the lexical editor in this particular kind of task has essentially a veto power over anticipated output, especially when that output seems to violate certain context-induced expectations. One might have supposed that such an editor could boost, instead, the likelihood of lexical outcomes, but this did not happen. The simplicity of this editorial process suggests a very fast-acting yes-no decision-making device.

A negative finding serves as additional evidence for this explanation. It might be thought that part of an editorial function might be to rationalize an error output by quickly correcting it to look like a lexical item (if context indicated that this was appropriate). It is our impression that this may occur with reading errors, but very few of the spoonerisms were rationalized in this fashion. This does not mean that such a process of post hoc rationalization does not sometimes happen, but rather that, in our experimental situation, factors such as speed and cognitive load prevented any editing process from making more than a simple yes-no decision.

One may ask why nonsense outcomes are inhibited in a lexical context, but lexical outcomes are evidently (Figure 1) not inhibited in a nonsense context. One obvious answer is that it is more ecologically valid to avoid talking nonsense in our everyday life than it is to avoid talking sense in a nonsense situation. More precisely, perhaps, the lexical-nonlexical dimension as a whole is not monitored in a situation where all the word pairs are apparently nonsense syllable pairs. If it only comes into play when there are apparent lexical items in the context, the results would seem to be accounted for.

General Discussion

So far as we are aware, the present study represents the first direct experimental evidence for editing processes in speech production. It may be well to recapitulate the fundamental argument of this paradigm, and develop some of its implications.

Both experiments reported here support the contention that the error rate of artificially induced spoonerisms is affected by the lexical status of the error outcomes. However, the transformation of any target into the corresponding slip occurs, in all likelihood, after the target has been perceived. Hence any systematic change in the rate of errors as a function of error outcomes must be due to editing processes which take place after the target has been recoded into the slip. In Experiment II it was shown that this difference cannot be due to some peculiarity of the actual word pairs chosen, since the effect appeared as a function of surrounding context, while the targets and bias words were held constant.

In the natural situation, one of the criterial attributes of slips of the tongue is the fact that people are usually surprised or embarrassed at their own utterances. We have frequently observed this effect with artificially elicited slips of the tongue, especially when the outcome was clearly inappropriate (*tool kit—cool tit*) or when a nonsense outcome occurred in a list which consisted of mostly meaningful targets. The fact that these slips are unintentional is one of the most interesting points about them. Unfortunately the area of intentional behavior has been neglected too long, so there is little objective background to work from. It is clear, however, that slips of the tongue are not unintentional in the sense of unplanned: speech errors like these are highly systematic and predictable. One is forced into the position of saying that these slips are not consciously intentional. This is a distinction which would not have been uncongenial to Wundt, Freud, and Helmholtz. Nevertheless, future research would be desirable to clarify this issue.

It would seem that output editing occurs on a number of levels, the present experiment dealing only with a single one. For example, it seems intuitively obvious that if there is enough time to think about an inappropriate output such as *tool kit—cool tit*, the planned utterance would quickly be changed. This, in spite of the fact that the slip consists of lexical items in a meaningful context. The tendency to produce lexical slips more often is therefore by no means absolute, but dependent on considerations of time, cognitive load, and the specific meaning and social implications of the anticipated slip. These factors would appear to be testable, of course.

It is clear that the present technique could be used to investigate a number of other interesting problems. For example, the possible effect of transitional probability on spoonerism outcomes needs to be investigated, separated from possible confounding influences of the spoonerism input targets. A closely related problem is that of active coarticulation; that is, how much of normal coarticulation is the result of editorial planning and anticipation of the utterance, and how much is a passive result of the physical properties of the articulatory organs?

Semantic influence on the error rate of spoonerisms could be investigated with relative ease, to see if it is possible to meet some of the conditions of a Freudian slip. Work on some of these problems is now in progress, and results should become available in the near future (Motley & Baars, Note 3).

References

BAARS, B. J., & MOTLEY, M. T. Spoonerisms: Experimental elicitation of human speech errors *Journal Supplement Abstract Service*. Fall 1974 *Catalog of Selected Documents in Psychology*.

FREUD, S *Psychopathology of everyday life* In A. A. Brill (Ed.), *The basic writings of Sigmund Freud*. New York: Random House, 1938.

FROMKIN, V. A. (Ed.), *Speech errors as linguistic evidence*. The Hague: Mouton, 1973.

LASHLEY, K S. The problem of serial order in behavior. In L. A Jeffress (Ed), *Cerebral mechanisms in behavior*. New York: Wiley, 1951.

MACKAY, D G. The structure of words and syllables: Evidence from errors in speech. *Cognitive Psychology*, 1972, **3**, 210–227.

MERINGER, R. & MAIER, K. *Versprechen und Verlesen*. Stuttgart: Goschensche Verlagsbuchhandlung, 1895

MOTLEY, M. T. An analysis of spoonerisms as psycholinguistic phenomena. *Speech Monographs*, 1973, **40**, 66–71.

ROSENBERG, S., & COHEN, B. D. Referential processes of speakers and listeners. *Psychological Review* 1966, **73**, 208–231.

WUNDT, W. *Grundriss der Psychologie* Engelmann, Leipzig, 1897.

Reference Notes

1. BAARS, B. J., & MOTLEY, M. T. Spoonerisms as the result of conflict between Sequencers: Evidence from artificially elicited speech errors. Manuscript submitted for publication, 1974.
2. MOTLEY, M. T., & BAARS, B J. Output sensitivity to phonological markedness and transitional probability: Evidence from spoonerisms. *Human Communication Research*, forthcoming
3. MOTLEY, M. T. & BAARS, B. J. Semantic bias effects on the outcomes of verbal slips. Manuscript submitted for publication, 1975.

(Received February 18, 1975)

Appendix A

1. Lexical targets: Those targets with lexical outcomes are given first, with the complementary targets which spoonerize into nonsense outcomes after the slash.

could gore/cook goes
deep cot/deed cop
keen lap/keys lab
dumb seal/dump seat
big dues/bit duke

lewd rip/luke risk
bought cat/bull cap
right mead/rise mean
fail sun/fate sum
lean cap/lead cat
maid pen/make pal
make bowl/maim botch
met pile/mess pipe
rail seep/raid seas
heap cook/heat cool
soul rock/soak rot
might toss/mice taught
bail toss/bait tot
darn bore/dart board
but goal/bud goad
dock loop/doll loose
taught far/talk fawn
main sin/maid sick
mad dash/map dab
kill steep/kiss steam
dead level/deck leg
long rice/log ripe
sons toil/some toys
moon sore/mood song
heap bog/heal boy
bet gashed/bell gas
fate lame/fail lane

2. Nonsense targets: Those targets with lexical outcomes are given first, with the complementary targets with nonsense outcomes, second. (Materials for Experiment II.)

rafe sode/rabe sofe
mave geet/mafe geeb
fot gude/fov goom
vun wice/vum wige
wice nin/wibe nid
liss kong/lif kawm
dak pawg/dag pawk
lale peef/lafe peeb
bain med/bape mek
gad boof/gaz boov
pote vass/pode vazz
kip zote/kib zobe
feep kive/feeb kise
dop tol/dob tov
gize wal/gike wan
dood geal/dook geez
set goop/sen goom
doan tef/doak tep
gook toos/goove toope
guss bon/guz bof