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Experimentally eliciting phonetic and sentential speech errors: methods, implications, and work in progress[1]

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I. RATIONALE

Linguists and psychologists have noted the potential value of studying speech errors since the 1890s (Meringer & Mayer 1895; Freud 1938; Fromkin 1973; MacKay 1972). The reasoning has been that involuntary errors may lay bare certain aspects of the speech production system which are hidden in normal, errorless speech. Today we are closer than ever before to realizing this hope, because (a) we have more complete samples and analyses of spontaneous errors (Fromkin 1973; MacKay 1970; Garrett 1975) and (b) because of considerable success in recent years in attempts to elicit errors of varying complexity in the laboratory (MacKay 1971; Baars & Motley 1974; Motley & Baars 1976). This paper reports some extensions of the experimental approach, extensions which apparently enable us to elicit almost any arbitrary error at any level of complexity.

Collections of spontaneous errors can show the range of variation that occurs in natural speech; however, such naturalistic error corpora have the drawback that they permit only *post-hoc* inferences concerning the causes of the errors. The major advantage of an experimental manipulation[2] is that causal hypotheses can be tested *pre hoc*, and situations can be pre-designed to test one explanation and exclude all others. In addition, experimental manipulation of the error rate can help us to create the means for testing hypotheses which the natural situation would hardly permit us to approach (e.g. Baars, Motley & MacKay 1975; Motley & Baars 1976; Motley & Baars, in preparation). However, the naturalistic and experimental avenues are complementary and should produce a set of converging results that together clarify the process of speech production.

II. METHODS

Our program of research began several years ago with some techniques for eliciting human spoonerisms (Baars & Motley 1974, 1976). More recently, we

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[2] The word *manipulation* is used here in the technical experimental-design sense to mean the ability to use some phenomenon as an independent or dependent variable in an experiment. It does not necessarily imply perfect deterministic control of that variable. In our case, it simply means that the error rate for a given experimental situation can be predicted and controlled, not that some one subject on some one item will necessarily produce a pre-designed error. However, over a group of subjects one can elicit a certain rate of pre-designed errors.

have been able to generalize these techniques to obtain word-blends, subject–object switches in sentences, switches of words between two clauses in 'parallel construction', and errors resembling haplologies. The general principles involved seem to be as follows.

Speech errors can be elicited by:

1. creating competition between two possible utterances, and
2. permitting little time for self-monitoring or editing of the resulting anomalous plans for production.

We know of at least eight techniques for producing slips of the tongue that employ these two principles in various ways. It can also be maintained that these same principles are responsible for most, if not all, spontaneous errors (Baars 1976) but this claim is obviously more difficult to prove.

In all our methods to date, words or sentences are presented at a rapid pace (one exposure per second is common). The stimuli represent two competing plans for production which can either be presented to the subject directly or only one can be presented and the subject instructed to transform it rapidly in some pre-defined way. In all cases the task is designed so that the subject is unsure of what exactly he will be saying until the moment before speaking. Thus information about word order (for example) may be delayed until the last moment. This rapidity is necessary to simulate the normal speed of speech production and to conform to principle 2 above.

The lists in Figure 1 may be used to demonstrate one such method. Column 1 contains CVC word pairs, some of which are followed by the word SAME and some by REVERSE. Cut a narrow horizontal slit in a 3 in × 5 in card so that only *one* word-pair is visible per exposure, and move it down the list so that each word pair can be seen for ½ to 1 second. The rapid pace is important. Reach each word pair silently, and whenever the cue SAME or REVERSE appears, say the immediately *preceding* pair of words out loud as quickly as you can. Naturally, SAME indicates that one should say it in the same order as read, and REVERSE demands the reverse order. This task is quite efficient at producing spoonerisms of all kinds (consonant as well as vowel switches between the two target words). In experimental settings, we tend to reach a 20–40% error rate with this technique.

Now try the following experiment. In column 2 of Figure 1 there are a number of two-clause sentences in parallel construction, such as

(1) The lady talked to the man and petted the dog.

followed by the very similar

(1′) The lady petted the dog and talked to the man.

and so on. Using a procedure identical to the one above, go down this list rapidly (be sure to expose only one sentence at a time) and when the cue

Column 1	*Column 2*
could gore	He scratched his nose and rubbed his ear.
deep cot	He rubbed his ear and scratched his nose.
keen lap	He scratched his nose and rubbed his ear.
dumb seal	He rubbed his ear and scratched his nose.
SAME	REVERSE
big dues	We have to ride the horses and train the dogs.
lewd rip	We have to train the dogs and ride the horses.
REVERSE	We have to train the dogs and ride the horses.
bought cat	We have to ride the horses and train the dogs.
right mead	REVERSE
fail sun	The sunset was nice and the smog was light.
REVERSE	The smog was light and the sunset was nice.
lean cap	The sunset was nice and the smog was light.
SAME	SAME
maid pen	The food smells awful but the chef looks good.
make bowl	The chef looks good but the food smells awful.
met pile	The food smells awful but the chef looks good.
REVERSE	The food smells awful but the chef looks good.
rail seep	The chef looks good but the food smells awful.
heap cook	REVERSE
soul rock	The chairs were dusty and the windows were dirty.
SAME	The windows were dirty and the chairs were dusty.
might toss	The windows were dirty and the chairs were dusty.
bail toss	The chairs were dusty and the windows were dirty.
darn bore	REVERSE
REVERSE	The days were sunny and the nights were clear.
but goal	The days were sunny and the nights were clear.
dock loop	The nights were clear and the days were sunny.
REVERSE	SAME
taught far	She picked a flower and touched her nose.
SAME	She touched her nose and picked a flower.
main sin	She picked a flower and touched her nose.
mad dash	She touched her nose and picked a flower.
kill steep	REVERSE
REVERSE	The hunter shot his prey and called his partner.
dead level	The hunter called his partner and shot his prey.
long rice	The hunter called his partner and shot his prey.
REVERSE	The hunter shot his prey and called his partner.
	REVERSE

FIGURE 1. The targets for the experimental demonstrations.

REVERSE occurs, quickly reverse the order of clauses in the immediately preceding sentence, and say it out loud.

This type of target tends to elicit word-switches such as

(1*) The lady petted the man and talked to the dog.

III. WORK IN PROGRESS

In our current work we are studying the editing and self-monitoring of involuntary speech errors using the second technique described above. It is possible to have *almost*-identical target sentences which give rise to semantically neutral *vs.* semantically anomalous errors. For instance, the target sentence

(1) The lady talked to the man and petted the dog.

becomes

(1*) The lady petted the man . . . (etc.).

However, there is a sentence very similar to (1) which does not result in such an anomalous error. That is, the control sentence for (1)

(2) The lady talked to the man and went to the dog.

results in

(2*) The lady went to the man and talked to the dog.

which, though an error, is far less anomalous than (1*).

Error rates and delays in response-times to these targets should be sensitive to the semantic appropriateness of the possible error. This same approach appeared to demonstrate editing effects in previous work with spoonerisms (Baars, Motley & MacKay 1975) and our current work is intended to extend and explore this effect further.

IV. CONCLUSION

The course of spontaneous speech is frequently uncertain. We often do not know exactly what to express, or if we do know we may have some conflict about how to express it. We may have trouble retrieving some name or expression from memory, and a name often is retrieved from memory in an order different from the one in which we should say it. Perhaps we even start to express one thought, think better of it, and switch to another. All this occurs very often, as is obvious from verbatim transcriptions of spontaneous speech (Carterette & Jones 1974) And yet, our vocal apparatus can only carry out one production plan at a time.

It is this conflict between the various choices available to us and the 'bottle-

neck of articulation' that may be responsible for many errors. We have just begun to explore the theoretical implications of these ideas and the multitude of error-elicitation techniques to which they give rise.

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