

The Perfect Speech Error

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Anomalous utterances are not at all anomalous. This paradoxical message was brought to the readers of *Language* in 1971 by Vicki Fromkin's comprehensive study of slips of the tongue, and of their implications for the mental representation of language and the process of language production. Although slips of the tongue are anomalous with respect to what their authors intended to say, they are non-anomalous in that they exemplify clear structural rules. They are by no means random.

The example which Fromkin set with this paper, and with the anthology (Fromkin 1973) published shortly afterwards, prompted great interest in speech-error research in psychology and in linguistics. In 1977, at the Twelfth International Congress of Linguists in Vienna, Fromkin organised a symposium on speech errors, which was attended by more than thirty active error researchers. The book which resulted (Fromkin 1980) shows a research area full of excitement and theoretical debate. To Fromkin is due the credit for motivating this last decade and a half of productivity.

It is in homage to its pioneering predecessor that this essay too bears a paradoxical title. How can an error, which is by definition an imperfection, be perfect? To answer this question, it is necessary to consider the rationale for error research, and some of the problems which confront it.

THREE ADVANTAGES OF SPEECH-ERROR RESEARCH

There are at least three reasons for the popularity of speech-error research. Firstly, errors are easy to collect; everyone makes them, and as long as the researcher keeps pen and paper handy, important observations can be undertaken during everyday activity, such as watching television, dining or shopping:

- (1) Here's Alderman coming up now — boils to Boycott ... (Target Utterance: bowls to Boycott)

- (2) Let's see what this tastes like — ah — much what I thought like.
- (3) The only way you could do that madam would be if the Stop and Shop company had a coupon out and the Taster's Choice coupon had a company out.

Secondly, speech errors fill a gap in psycholinguistic methodology. Experimental psycholinguistics has studied language comprehension far more deeply and extensively than it has studied language production. This is because it is simply easier to study comprehension in the laboratory: the experimenter is able to exercise complete control over the input materials. Comparable control cannot be exercised over what people choose to say, so that laboratory studies of production tend either to lack validity (if the experimental situation is constrained to such an extent that the normal conditions of production cannot be guaranteed) or to be difficult to interpret (if the subjects' productions are relatively unconstrained). Speech errors cannot replace laboratory experimentation, but they provide enough material to sustain theorising about language production at a level not embarrassingly behind comprehension theory. System malfunctions are a respectable way to study other psychological systems, too: for instance, the study of visual illusions has yielded many insights into the processes of normal visual perception. Speech errors offer a similar oblique insight into the processes of normal language production.

The third advantage of speech errors as research material is that they provide a truly inter-disciplinary source of data. It is sometimes maintained that scientific disciplines are to be distinguished by the data they study and the methodologies they call upon. This is obviously untrue in the field of speech errors. Linguists and psychologists alike have found speech errors a fertile field of study, and there have been no obvious differences in the types of error to which they have turned their attention, or in the methods of collection and analysis which they have employed. What distinguishes the linguistic versus the psychological study of speech errors is only the question to which the research is ultimately addressed. The linguist wants to understand the structure of language, and is interested in performance errors for the light they may shed on the rules and representations which will constitute the best model of the grammar. The psychologist wants to understand mental processing, and studies speech errors as a reflection, albeit indirect, of the operations involved in the production of utterances. The striking characteristic of speech-error research is that precisely the same type of data, collected and analysed in precisely the same way, can illuminate both of these concerns. A couple of examples will illustrate this point.

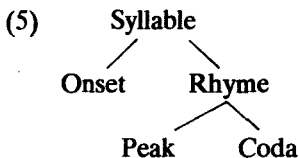
TWO INTER-DISCIPLINARY EXAMPLES

- (4) a. ... how dig it deeps (T: how deep it digs)
 b. It makes an order which — it makes a difference which order
 c. So it's only your next two breakfasses really (T: breakfasts)

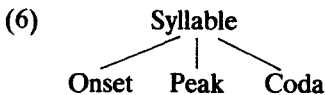
The errors in (4) demonstrate *accommodation* of a morpheme to its phonetic environment. In (4a) the stranded tense marker was pronounced [s], as is appropriate following a [p], rather than [z], as it would have been pronounced on *digs* in the intended utterance. In (4b) *order* occurs where *difference* should have occurred, and the indefinite article is *an* rather than the intended utterance's *a*. (4c) comes from a speaker who regularly pronounces *breakfast* [brɛkfæs] but *breakfasts* [brɛkfæsts]; here the pronunciation of the singular form has received a regular plural [ɛz] (cf. *fusses*), as opposed to the [s] form which would normally be appropriate after a released [t] (cf. *feasts*).

Fromkin (1971) pointed out that such errors are both linguistically and psychologically important. On the one (linguistic) hand, they show that speakers always observe the phonotactic constraints of their language; on the other (psycholinguistic) hand, they show that morphophonemic specification (e.g. regular inflections, choice of *a* versus *an* etc.) must be a relatively late process in the production of an utterance.

Errors involving constituents of syllable structure similarly motivate both linguistic and psychological theorising. Consider what may be held to be the standard model of syllable structure in (5), as proposed by, for example, Fudge (1969):



Clements and Keyser (1983) argue for an alternative structure, that in (6):



Speech errors provide one line of evidence which Clements and Keyser cite in favour of their proposal. Syllable structure has long been known to be relevant to the form of speech errors. Meringer and Mayer (1895), and numerous researchers since, have pointed out that misplaced phonetic

segments tend to end up in the syllabic position they would have occupied in the target utterance, as in (7):

- (7) a. You — flat and placid? (T: fat and placid)
 b. a choik to the gent account (T: a cheque to the joint account)
 c. a black chenk (T: a blank cheque)
 d. like a liltng willy (T: a wilting lily)
 e. give your mug a ha (T: ma a hug)

Clements and Keyser argued that syllable-branching structure should be reflected in the movement of elements. If the correct model of syllable structure is (5), then onsets should be able to move, as in (7d), as should rimes (7e), and within each of these levels of structure, constituents of the onset (7a), peaks (7b) and codas (7c). What should not be able to happen is for an onset and only part of a rhyme, e.g. the peak, to move as a unit. Yet such errors do occur:

- (8) a. The leaf is rukung. (T: The roof is leaking)
 b. That's the worst lard. (T: the last word — from a British speaker, i.e. no /r/)
 c. Who wants a [ʃɒni rʌkələt] mousse? [T: a runny chocolate mousse)

Clements and Keyser used the existence of errors like (8) to assist in motivating their model (6) of the syllable as consisting of three equal constituents.

The situation is further complicated by errors like (9a), in which onset and coda have moved together, stranding inflectional syllabic appendices; (9b), in which, according to some syllabic analyses, the moved elements include parts of two syllables; and (9c) and (9d), in which ambisyllabic consonants have exchanged with non-ambisyllabic:

- (9) a. climz [klɪmz] I have hild [hɑɪld] (T: hills I have climbed)
 b. you've gotta eat the chilter ... (T: Cheddar and Stilton)
 c. has devilered [dævɪled] — delivered [dəlɪvəd] a warning.
 (British speaker)
 d. a rare genetic arebation (T: aberration)

What is noticeable, however, is that errors like (8) and (9) are considerably rarer than errors like (7); this prompts Fudge (1987) to argue that the syllabic structure model in (5) still offers a better account of the majority of speech-error data than the model in (6).

From a psychological point of view, the same conspicuous regularities of syllabic structure in errors have motivated a strong argument against

associative chaining in speech production (Mackay 1972), as well as the claim that speech production includes a level at which syllabic structure is explicitly represented (Fromkin 1971; MacKay 1972; Crompton 1981). Stemberger and Treiman (1986) analysed errors involving initial consonant clusters, i.e. branching onsets; in such errors, the second member of the cluster is far more likely to be moved or lost than the first. Stemberger and Treiman pointed out that simple activation-based explanations cannot account for this pattern; clusters must be specified in terms of primary and subsidiary components.

ONE MAJOR PROBLEM

Is it the case, then, that *any* speech error provides good grist for the psychological and linguistic mills? Regrettably, some errors turn out to have imperfections. The principal reason for imperfection is that many errors invite more than one possible explanation.

Ambiguity of categorisation

The most common ambiguity of interpretation in speech-error research arises with anticipations which may be exchanges which are incomplete because the speaker has detected them in mid-error (e.g. (10a-c)): this ambiguity has been familiar to speech-error researchers at least since Meringer and Mayer (1895).

- (10) a. Johnson-Waird — Johnson-Laird and Wason
 b. There just isn't time for everyone who washes — who wishes to ask Dr Warrington questions.
 c. Today we have John Warwick — John Heritage from the University of Warwick.

However, many other ambiguities of error categorisation can arise. In (11a), for example, the intended word *sort* is pronounced *thought*. In standard British English, the two words differ only on place of articulation of the initial segment. Is the error therefore a substitution of the segment [θ] for the segment [s], or is it a substitution of the feature Alveolar for the feature Dental? Note, however, that the word preceding the error began with an alveolar segment; is the error perhaps a perseveration of this feature? Finally, note also that the corrected utterance contains the word *thought* almost immediately following the error position. This suggests that the error is most likely to have been an anticipation — either of the word as a whole, or of its initial segment.

- (11) a. When I first heard musicians of that thought — of that sort, I thought ...
 b. There's some troubles with his studies, namely — mainly that he pooled data.
 c. not much to say — to speak of in the way of wind
 d. I don't know that normals are ever so grossly impaired that they would have to revert — have recourse to overt repetition.
 e. What does one of those things costs?

Similarly, (11b) could be described a form-based word substitution (Fay and Cutler 1977), or an exchange of sounds within a word; (11c) might be a meaning-based word substitution, or an anticipation of the vowel in *way*. Likewise, in (11d), *revert to* and *have recourse to* occur in similar contexts, and could reasonably be considered as potential participants in a meaning-based substitution; but the occurrence of *overt* immediately following the error location suggests that *revert* may have arisen from anticipation.

(11e) allows at least three incompatible explanations. A syntactic account could describe it as erroneous tensing of the verb *cost*, indicating perhaps that the inflection marker has been copied to both auxiliary and main verbs at an earlier stage of the derivation, or that the final verb has been tensed in response to the presence of a gap immediately following it. Just such an explanation would be postulated for (12) below. However, (11e) could also arise from perseveration of an affix, as in (13); although the phonetic form of the suffix on *does* and on *things* is [z], while on *costs* it is [s], this can be explained by the accommodation processes discussed above. Both of these explanations, finally, are incompatible with the intuition reported by the speaker of (11e), namely that the error was a late hyper-correction, an attempt to avoid the type of verb-agreement error which occurs relatively frequently with phrases such as *one of those things*, as in (14).

- (12) How long will the plausibility judgement takes?
 (13) ... they'd always be masked by blinked (T: blinks)
 (14) One of the kind of procedures that we have used involve sources of noise.

Ambiguity of processing level

Most major types of error (anticipation, perseveration, exchange etc.) can occur at a number of different linguistic levels (the segment level, the word level etc.) This makes for another source of ambiguity. Even when the type of error is clear, the structural level involved may not be. For instance, in (15a) two elements have been exchanged — but have the whole words

exchanged, or only their initial segments, or just the place-of-articulation feature of the initial segments? (15b) is an anticipation — but an anticipation at the word or segment level? (15c) is an omission of a single segment but, because the segment in question is a vowel, the effect of the error is to reduce the number of syllables in the utterance. Is (15c) therefore a syllable-omission error (with the coda being preserved and amalgamated with the preceding syllable), as in (16), or a segment-omission error, as in (17)?

- (15) a. with the run one — one run coming off it
 b. and Arthur Lowe, of 'Dead's Army' — 'Dad's Army' fame, is dead.
 c. most models of acquired dyslexias — dyslexias
 d. The bit that's added in lexical decision is the decision face — phase.
 e. My opinion is that on an MIT — MOT ...

(16) I was visualling ... (T: visualising)

(15d) is a substitution error — but it could be substitution of the whole word, of the final segment, or of the [+] versus [-] marking on the voicing feature. (15e) is also a substitution, of one letter name for another — but both MIT and MOT are meaningful abbreviations to the speaker, so did the substitution involve only the medial letter, or the whole three-letter name and hence the whole lexical unit?

Ambiguity of source

Finally, even if the type of error is clear and the level at which it occurs is clear, ambiguities may still remain; this may, for instance, occur with substitutions where the context offers both an anticipatory and a perseveratory source, as in (18a-c).

- (18) a. there's going to be some tricky thing — things in trying to ...
 b. in this cru[s] — this crucial case
 c. His Secretary of Stake — State, Mr Haig, is going back ...

NO SIMPLE SOLUTIONS TO THE AMBIGUITY PROBLEM

These ambiguities of interpretation are to a certain extent insurmountable, simply because the processes of speech production are inaccessible to observation. In some cases it seems justifiable to assign an error to one

category rather than another on the basis of overall category frequency; for instance, (19a) could be a malapropism or a sound addition ([ajvri] for [ajvi]); it is more likely to be the former since the latter is a rare type of error.

- (19) a. What we've had to do is hack down our ivory.
 b. One spice — spouse might say ...

Similarly, (19b) could also be a malapropism, but in this case such an interpretation seems less likely, because the substitution would involve a mismatch on the mass/count distinction, and such mismatches are rare (they do not occur at all in the Fay and Cutler (1977) malapropism corpus). (19b) could also conceivably be a word-formation error, since *spice* is often produced as a joke plural of *spouse*. But by far the most likely interpretation of (19b) is that it is a segment anticipation of the vowel from the following word, *might*. Segment anticipations are among the commonest forms of error.

However, even simple error frequencies may be unreliable. Recall that many errors which are categorised as anticipations may in fact not be anticipations at all, but incomplete exchanges; (10a-c) were examples of this kind of uncertainty. Therefore it is impossible to know precisely just how common segment anticipations, for example, really are. For this reason categorisation on the basis of category frequency can only rarely offer a satisfactory solution to the problem of error ambiguity.

Error ambiguity is only one of a number of problems which speech-error researchers face. For instance, some types of error may be more perceptible than others; and slips of the ear on the part of the collector may result in some slips of the tongue being misheard as correct utterances. However, decades of speech-perception research have provided abundant data on the probabilities and characteristics of misperception, and Cutler (1981) has argued that evaluation of error distributions in the light of what we know about misperceptions can to a large extent overcome the problems of differential perceptibility. The problem of error ambiguity unfortunately does not allow a comparably accessible solution. A consolation for error researchers in this situation is that by no means all errors are ambiguous.

SIMULTANEOUS MULTIPLE SOURCES

Some errors, of course, unambiguously demand an explanation involving more than one mechanism. Baars, Motley and MacKay (1975) and Dell and Reich (1981) have demonstrated that segmental errors are significantly more likely to result in real words rather than nonsense words. (20a) and (20b) are a segment perseveration and a segment anticipation respectively

which, as these writers would predict, have resulted in real words. Such errors imply that the operation of the mechanisms which produce segment errors must be modified by lexically sensitive factors at some level of production, be this an editor at the output stage (Baars, Motley and MacKay 1975) or the indirect effect of monitoring via the normal perceptual apparatus (Levelt 1983), or interactive effects of the lexical selection process itself on segment-sequencing operations (Dell and Reich 1981).

- (20) a. I want to go super-APEX to Tampax. (T: ... to Tampa)
 b. When you do that Right Nose — Right Node Raising ...

In other cases, the form of an error seems to be partly determined by phonological or semantic context, or by morphology. (21a) and (21b) are vowel alterations which have a source in following context, but it does not seem accidental that in both cases the vowel does occur in morphological variants of the same stem.

- (21) a. As soon as you just put up a sign-up sheet, it would be fill — full in five minutes.
 b. They're beginning — they're beginning to apply in large numbers.

- (22) because they're such crubby subjects

(22) was explained by the speaker as a blend of *crappy* and *cruddy*, and indeed it is a likely result of a combination of these two words, with the place-of-articulation feature of the [p] of *crappy* intruding into *cruddy*; but is it coincidental that the sequence [ʌb] anticipates the identical sequence in the following word *subjects*? (23a-e) are substitutions of one kind or another in which the semantic context is highly compatible with the erroneous utterances; such correspondences strongly suggest that semantic factors have facilitated the substitution.

- (23) a. How long did the actual splicing tape? (T: ... take?)
 b. I'm refereeing the paper by R. and it's 11,000 words wrong.
 c. Is there evidence that as you change the speed rate ... (T: ... the speech rate)
 d. Well cut scissors go with well cut husband. (T: Well cut slippers go with ...)
 e. It's a good thing the stink didn't have a nose (T: ... the sink didn't ...)

The substitution of [p] for [k] in (23a) is one of the most common segment substitutions (Shattuck-Hufnagel and Klatt 1979); but the utterance referred to the splicing of magnetic tape. Similarly, in (23b) the segment

substitution is a common one; there are multiple sources in the utterance for the intrusive [r]; but the paper in question should have been no longer than 5,000 words and the speaker was expressing disapprobation. *Speed* in (23c) is related to *rate*, and *scissors* in (23d) to *cut*; *stink* communicates the very reason for the utterance of (23e).

However, multiple-source errors are not to be deplored along with irresolvably ambiguous errors; on the contrary, they have the advantage of inviting theoretical speculation. For example, the tendency for segment errors to produce real words has prompted the variant explanations mentioned above. Similarly, Stemberger (1985) claims that errors such as those in (23) indicate that the processes of lexical access and of word-order sequencing occur in parallel. But it could also be argued that semantic influences on lexical selection, or on segmental ordering in an output buffer, might be explained in a serial autonomous production model (in which the flow of information is naturally from semantic to phonetic) by assuming that the semantic processing yielding a particular lexical entry has simultaneously activated one or more related and hence potentially alternative entries; one of these then becomes more likely to be mistakenly selected in place of a phonetically similar item, in a malapropism error (Fay and Cutler 1977). Errors like (23c), in which the semantically intrusive word *follows* the error, suggest that lexical selection of a given word is not dependent on lexical access of the word which precedes it in the output sequence being completed; the reason for this could be either that syntactic sequencing follows lexical access or that lexical access of multiple concepts can occur in parallel. A more serious problem for a non-interactive model might seem to be posed by errors like (22), in which phonetic context has influenced the form of a blend, but these too can be explained in a serial model by postponement of the blending operation to a late stage when phonetic context is simultaneously available. A similar account to that given for (23) can be constructed for the malapropisms in (24), where a form-based substitution simultaneously perseverates the greater phonetic part of another word in the utterance.

- (24) a. and the President today made a not-so-resident — reticent proposal ...
 b. ... on which it writes out pieces of the computations and reputa- — representations that are going on

In this case the facilitation of a malapropism has been achieved by activation of entries related *phonetically* to a selected word. Errors like (23) and (24) suggest that both phonetic and semantic links between entries exist in the production lexicon, and add further support to the argument of Fay and Cutler (1977), that the production and comprehension lexicons are not separate.

THE GOAL OF SPEECH-ERROR RESEARCH

The preceding sections have illustrated how speech-error data can contribute to the modelling of language structure and processing. This, indeed, is the goal of speech-error research. It should not need to be said that the goal of speech-error research is *not* the explanation of speech errors.

Alas, any successful area of research runs the risk of becoming paradigm-bound. When this happens, research may be undertaken simply to extend knowledge about the methodological paradigm itself, rather than about the aspect of the world which the paradigm was designed to investigate.

A generation of researchers has been inspired by Fromkin's example and speech-error research has been a very successful area in the last decade and a half. It is perhaps not surprising that some more recent work has shown a few symptoms of paradigm imprisonment. The first such symptom is explanation of errors for their own sake — for example, a class of error may be identified which has not previously been described in detail, and a description of this class may then be proposed as a useful scientific contribution. The second symptom is *ad hoc* theorising — modifications to existing models of production may be proposed which serve no purpose other than to account for a particular error characteristic.

For why such undertakings are *not* good science, we can turn again to Fromkin (1971). The interest of speech-error research, as Fromkin puts it, is not in describing and classifying the errors themselves, but 'rather in how particular errors shed light on the underlying units of linguistic performance, and on the production of speech' (1971: 29). Errors in linguistic performance do not constitute a form of behaviour which is of intrinsic interest either to linguistics or to cognitive psychology. A model of speech errors does not advance science very far.

This is why the imperfections of some error data do not matter at all. Some errors are perfectly clear with respect to category, level and source; some errors are perfect illustrations of the operation of a particular mechanism in production. Others are not; but this is unimportant. It is important only to establish whether a particular error is ambiguous or not; if it is ambiguous, it can simply be dropped from the corpus. Errors are, after all, plentiful — like London buses, there'll be another one along in a minute.

The goal of speech-error research is not to account for all or even most errors, but to identify, for particular issues of psychological or linguistic theory, the particular errors or error classes which can provide relevant evidence. Speech-error researchers always look for individual informative errors rather than an exhaustive corpus. The goal of speech-error research is to find the perfect speech error.

THE PERFECT SPEECH ERROR

The perfect speech error must be unambiguous as to its category, its level and its source, and it must be theoretically interesting, preferably from both a linguistic and a psychological standpoint. (25), for instance, may not pass the inter-disciplinary test:

- (25) I've already picked three and a half pounds of blackberries this morning — three and a half [kwɪ] — pounds!

(25) demonstrates the substitution of a synonym of a homonym of the intended word! The speaker started to say 'three and half quid' as an alternative to the repetition 'three and a half pounds'. In this speaker's dialect, *pound* and *quid* are synonyms — but only when the reference is to a unit of currency; *pound* can also refer to a unit of weight, but *quid* cannot. Homonyms like *pound* are of great interest to psychologists (see Simpson 1984 for a review), and one of the liveliest issues is whether the separate meanings are in some sense stored together in the lexicon. (25) offers evidence of linkage between meanings of a homonym in word production, and is therefore of considerable interest to psychological models of lexical processing. It is of less immediate relevance to linguistic theory, however.

On the other hand, the errors in (26) may be more relevant to questions of language structure than of processing. The behaviour of consonant clusters in speech errors is of considerable linguistic interest (Fromkin 1971; Stemberger and Treiman 1986), as it addresses phonological questions of syllable structure.

- (26) a. I was wondering which way you were gonna [spələjs] — splice.
 b. ... and [bijamz pərənou] ... (T: Brahms piano music)
 c. [gna:də] — Gardner [gadnə] Centre

Clusters can move about in an utterance as a unit (see, for instance, (9a)) or they can separate (as in (7a)); this is well known. But (26) shows some less usual processes. In (26a) a three-element cluster has been split up by the intrusion of a schwa, which has therefore added an extra syllable to the utterance. A syllable has also effectively been added in (26b), but the error is more complex: the slot in *Brahms* between the first consonant and the vowel (i.e. the second slot in the onset cluster) has been filled by the equivalent material from *piano*. However, in the intended pronunciation of *piano* the onset is not the cluster [pj] (as in *pewor putative*); there is a weak vowel before the glide, which has moved with the [j]. From *Brahms*, the second element of the onset cluster has moved to *piano*, but to maintain the rhythm of *piano* a weak vowel has been inserted, giving [pərənou] rather than [prənou]. Finally,

in (26c) a cluster which does not occur in English, [gn], has been formed by anticipation of [n] from onset position in the second syllable to the secondary slot of the onset of the first syllable. Such errors are of importance to phonologists studying the representation of syllable structure. They are less directly relevant to psychological theory.

However, there are errors which seem quite perfect. It has already been pointed out above that the phenomenon of accommodation of bound morphemes to their phonetic environment is important both to psychology and to linguistics. Inflectional errors involving regularisation of irregular inflections, as in (27), or irregularisation of regular inflections, as in (28), are similarly significant, as they again suggest that inflectional processes are active in speech production.

- (27) a. They'd be breastfeeded, wouldn't they? (T: fed)
 b. I don't have to get drunked to be silly. (T: drunk)
- (28) a. They haven't wed — weeded their garden.
 b. We ought to go in because the lights have blunk. (T: blinked)

Two more verb-inflection errors will conclude this select set of perfect examples. Consider (29), in which the source of the non-word [gent] is clearly a blend of *go* and *went*; but that simple statement quite fails to do justice to the implications of this error at the syntactic as well as the morphological level.

- (29) Aren't you glad you not [gent]? (T: ... you didn't go?)

Perhaps the most famous verb-inflection error of all is (30), collected by Fromkin herself:

- (30) Rosa always date shranks. (T: Rosa always dated shrinks)

In (30), the past tense inflection intended for the verb has moved to the following noun, which happens to be derived from, and homophonous with, an irregularly inflected verb; the result is that the noun has taken the form of the verb's past tense. The importance of (30) has been acknowledged for linguistic analysis (Fromkin 1973: 32) and for psychological theory (Garrett 1980: 266). (30) counts as an unequivocal case of the perfect speech error. Given Fromkin's clear commitment, cited in the preceding section, to maximally informative, theoretically important particular errors, it is no surprise to find that (30) is Fromkin's favourite error (Fromkin 1975: 58).

ACKNOWLEDGEMENTS

Helpful comments on this paper were provided by Phil Johnson-Laird and Karalyn Patterson, who are pleased to be able to associate themselves with this volume honouring Vicki Fromkin's contribution to psycholinguistics and its associated fields.

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