LABORATORY-INDUCED SPEECH ERRORS IN HINDI

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ABSTRACT

Although speech errors are claimed to be universal, we have observed no naturally-occurring errors in Hindi which break up words. We therefore tried to induce such errors in Hindi speakers using a laboratory method. Subjects saw printed word pairs which appeared in rapid succession and were randomly required to pronounce some of them out loud, occasionally in reverse order. Some trials resulted in errors. Approximately 3% of all trials yielded errors which involved fragmentation of words, considerably less than the 10 to 40% error rate reported for English. The reason for the lower error rate in comparison to other languages remains to be discovered.

INTRODUCTION

Although there has been scientific interest in speech errors for nearly a century, it is only in the past few decades that there has been a virtual explosion of studies by linguists interested in showing how such errors shed light on issues in linguistic theory [1, 2, 3, 4, 5, 6, 7]. There seems to be an implicit claim in much of this literature that speech errors should be found in all languages; Fromkin has made this claim explicitly (personal communication). To date, errors have been reported primarily for Western Indo-European languages, e.g., German [8], Dutch [6], English [5]. We are aware of a collection of Japanese speech errors (S. Hiki, personal communication). This still leaves the vast majority of languages—even language types—unaccounted for. Relevant to this is the impression of the first author of this paper, a native speaker of Hindi, that she has never encountered in her own Hindi speech or that of others speech errors of the type that break up parts of words, e.g., spoonerisms of the sort '...it is kistomary to cuss the bride' (for '...customary to kiss...').

A SKETCH OF HINDI PHONOLOGY

Hindi has a relatively large number of segments: 20 stops (including affricates), 4 fricatives, 9 sonorant consonants—of these 33 consonant types, 25 can be geminate as well—, 11 oral and 10 nasal vowels [9].

Although medial consonant clusters are abundant and quite complex, initial and final clusters tend to be few, especially in native vocabulary, amounting largely to #C + glide- and -st# or -homorganic nasal + stop#, respectively. Most Hindi words range from one to three syllables; four and more syllables per word are uncommon. The prosodic structure of Hindi is controversial and will be discussed further below.

Hindi words, like those of most Indo-European languages, may be morphologically quite complex, showing affixes (both prefixes and suffixes). In a few cases grammatical categories are marked by vowel ablaut.

EXAMINING THE ANECDOTAL EVIDENCE

What is the observation? As mentioned above, the observation is that speech errors that involve divisions of words or morphemes into fragments (henceforth WF for 'word fragmentation') with, optionally, their rearrangement into 'erroneous' or unintended strings (whether these strings themselves constitute valid words or not) do not occur naturally in Hindi. The types of errors that seem to be relatively easy to find in other languages, e.g., anticipation: "a [me]... < a man's natural inclination", perseveration: "John gave the boy" → "...gave the boy", transposition: "keep a tape" → "keep a cape" [5].

Observational error? What are the possibilities that this observation is faulty—that the errors are there but are overlooked for some reason? We believe this is unlikely for the following reasons.

1. The same observer (that is, the first author) has detected many grammatical errors (e.g., lack of concord) in the speech of Hindi speakers, as in / lakr ko pakar kar kut+b ko maro / for /...kut+b.../ (literal translation: "stick (postpos.) hold (verb particle) dog (postpos.) beat", free translation: "Take the stick and beat the dog"). Further, this observer has had no trouble observing WF errors made by English-speakers speaking English and even by Hindi-speakers (including the first author herself) when they speak English, e.g., "...crogged freeways < ('clogged freeways')

2. The first author has also asked several other Hindi-speakers, including many trained linguists, if they have observed any speech errors in Hindi (providing them examples from English, if necessary) and their impressions have always coincided with hers: no such errors in Hindi.

It would seem that the anecdotal evidence on the scarcity of Hindi WF speech errors is not marred by observational bias. Nevertheless, as in any issue of this sort, it would be highly desirable to
introduction. 

Baars and Motley [1] have introduced a method with several variants—for obtaining speech errors in the laboratory (see [1], [2], [3], [4], [10]). We decided to apply one of these variants to Hindi speakers so as to get speech errors in the same way they did. Their method has been applied successfully to speakers of languages other than English [3]. We chose to present stimuli orthographically (using the Devanagari script), requiring the occasional utterance of the stimulus phrases in original or reverse order, and using a stimulus which would yield meaningful words if produced with initial consonants reversed.

The method. 

A series of two word phrases were presented orthographically one after another to subjects (SS) for a brief interval. At unpredictable times, SSs were given a signal to pronounce out loud the last phrase that they read (which was then no longer visible). Sometimes the signal required that they pronounce the two words in the same order and at other times in reverse order. Given the pressure of time, etc., SSs were liable to produce some of these spoken trials with speech errors. To present the two word sequences in Devanagari to our SSs we used a "memory drum"—in advantage of paper (on which the stimulus words are written) that is fast enough for a controllable interval, such that only one line is visible at a time. We presented 145 two word sequences written in black ink with 40 randomly interspersed instructions ('same' or 'reverse') written in red ink to 11 adult male native speakers of Hindi (Indian students at University of California, Berkeley, who could read Devanagari). SSs were paid for their participation. With six SSs the two word sequences were presented at ISI's as long as that usually used by Baars and Motley in their studies—since since Devanagari is graphically more complex than the Roman alphabet, justifiable. We used a faster rate of 1.15 SSs were given 12 stimulus sequences each of these instruction words as practice. 

The two word sequences occasionally formed what might be construed as a meaningful phrase but generally the words did not. The placement of the instruction words and whether they were to be read in the original or reverse order, were randomly placed in the list except for the testing instructions. Table 1 gives the list of words in random order of presentation to SSs. This table shows the sequence in which the words were presented. The table shows quickly and as accurately as possible and that they could earn 250 more if their speed and accuracy exceeded an unspecified threshold. In fact, there was no such criteria and all SSs were paid the same.

SSs were seated in a sound-treated room, facing the memory drum. The handwritten Devanagari characters were well illuminated and subtended approximately a 45° degree vertical angle in the SSs' visual field. A microphone was placed approximately 10 cm from the subject's mouth. In a way so as not to obscure the view on the digitizing screen, the responses were recorded on a high-quality analog tape recorder for later analysis. 

results. 

Table 2 presents the results in terms of number of correct responses and errors, the latter brought down (see indented columns) from errors to errors due to errors attributable to probable inflectional (due to secondary deviations of Devanagari sym- bols), errors attributable to probable intrusions (and thus more a memory error than a speech production error), and ambiguous errors (caused by different responses for the same of the WF speech errors is given in Table 3.

Discussion. 

Table 2 shows that at least that WF speech er- ers can be induced in speakers of Hindi in spite of the apparent lack of such in naturalistic situa- tions. The rate at which such errors occurs it therefore, 3.4, and even the SS for the shorter ISI, nonetheless less than the rate which by Baars and MacKay [3]. It is possible that this is due to variability in the rate (al- though Baars [10] suggests that the errors are successfully elicited at ISI rates from about 1.5 to 3 sec). However, the greater speech complexity of the Devanagari script requires longer CVs to be produced at about the rate it was read by the SS. A smaller ISI would do nothing to an appreciably higher percentage of uninteresting errors (no responses, misreadings, etc.). This lower error rate, vis-à-vis those obtained in other experiments involving English, is compatible with the anecdotal observation that WF speech errors are uncommon in Hindi.

The experiment was not designed to and thus did not take any clues as to why Hindi exhibits so few errors of this sort. Furthermore, as noted byBaars and Motley [2] we have no way of knowing whether speech errors elicited experimentally have any properties of errors produced under natural conditions. However, since we work with speech errors, whether gathered naturalistically or in the laboratory, the majority of errors resulted in real words [4].

The question arises: how can we be sure that we count as WF errors were genuine speech errors, i.e., unintended production errors to (typing mistakes) made after the process of correct planning of the lexical sequence and not failures of memory, etc., that are later made before the planning of the lexical sequence? When the error was a non-word it was not a speech error as this is usually defined. However, in other cases they were treated as such in the interpretation. Baars and Motley [2] answered this question by operationally defining a slip as an error of output that systematically violates the target word's phonology and that involves the same practice here but recognize the desirability of refining the notion of 'speech error' in this type of experiment. It might be advisable, for example, to en- sure the face and i in two such series to the subject to indicate what they were believed to be speech errors.

general discussion. 

If it can be accepted that WF speech errors are scarce in Hindi, this immediately raises the ques- tion: how can we be sure that speakers of Hindi whose speech errors can be induced in speakers of Hindi in some contexts (e.g., in the laboratory, the vast majority of errors see [13]). Research by the first author [13] seems to bear this out. However, as in previous work with other languages, there exist error types that are not speech errors but are an understood part of each consonantai symbol. These are difficult to resolve; both are speech errors elicited experimentally have any properties of errors produced under natural conditions. However, since we work with speech errors, whether gathered naturalistically or in the laboratory, the majority of errors resulted in errors real words [4].

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Fig. 1. Hypothetical structure determining stress.

Speech errors which involve breaking up words into parts are scarce in Hindi: they have not yet been observed under naturalistic conditions and occur under laboratory conditions with much less frequency than has been found for comparable studies with English. Hindi, therefore, must either have a different prosodic structure, or, if there is such a structure, it is more 'costly' and may therefore be more subject to breakdown, the lesser salience of this level in Hindi--or its absence--might account for the scarcity of WFE speech errors in the language. This, of course, is speculation and needs further investigation.

CONCLUSION

Speech errors which involve breaking up words into parts are scarce in Hindi: they have not yet been observed under naturalistic conditions and occur under laboratory conditions with much less frequency than has been found for comparable studies with English. Hindi, therefore, must either have a different prosodic structure, or, if there is such a structure, it is more 'costly' and may therefore be more subject to breakdown, the lesser salience of this level in Hindi--or its absence--might account for the scarcity of WFE speech errors in the language. This, of course, is speculation and needs further investigation.

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REFERENCES