DO TONGUE TWISTERS OCCUR NATURALLY?

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ABSTRACT

We define a generalized tongue twister which encompasses both the 'traditional' multi-word tongue twisters as well as introducing the notion of an intra-word tongue twister. We examine the occurrence of generalized tongue twisters in spontaneous speech occurring in court cases and conclude (not surprisingly) that generalized tongue twisters occur infrequently.

INTRODUCTION

A tongue twister is a phrase which is difficult to say because of the repetition of a certain letter or certain similar sounds. Considerable research has been carried out on the problems of reading and producing tongue twisters [1,2,3], much of this concerned with the way in which speech (silent or read) slows down at a tongue twister. Table 1 below lists a number of tongue twisters (some of these appear in [1,2,3]). While all of the examples are syntactically and semantically well formed, they appear to be unlikely to occur in verbal discourse (unless it's discourse about tongue twisters). Given this, do tongue twisters occur naturally in verbal discourse, particularly if speakers are under stress? We hypothesized that tongue twisters would generally be avoided.

We took verbatim court transcripts and analyzed them for the occurrence of tongue twisters using the operational definition that "a tongue twister is a sequence of sounds in which the same or a closely-related consonant phoneme occurs more than twice within a short phoneme distance." Under this definition "the tall toddler talked timidly to Tom" is a tongue twister, while "the small toddler spoke bravely to her sister" is not. The definition also allows for what might be called "intra word tongue twisters"; an example would be the word "phenomenon."

Table 1. Examples of multi-word tongue twisters

1	The bootblack brought the black book back
2	Which witches wished wicked wishes
3	Five French friars fanned the fainting flea
4	The Swiss wristwatch strap shop shuts soon
5	The wild wind whipped Whit from the wharf
6	A dreary don droned on dully
7	Peter picked a pick of pickled peppers
8	She sells sea shells by the sea shore
9	The spacious zoo sits beside a sandy seashore
10	Barbara burned the brown bread badly
11	Francis Forbe's father fries five flounders
12	Nasty Noreen noticed the neat note
13	The puzzled priest processed the perplexing paper
14	The tired dentist dozed but he drilled dutifully
15	Naughty Nan's knitting knotted nighties
16	The press published the poem and promised to pay for permission
17	Pack a pair of purple pampers
18	The talented teenager took the trophy in the tournament
19	The sparrow snatched the spider swiftly off the ceiling
20	The taxis delivered the tourists directly to the tavern

The transcripts of two court cases (c1 and c2) were used as data. Sizes of these cases are shown in table 2. Each transcript was divided into a number of phrase blocks, as defined by the punctuation, and each of the phrase blocks which contained at least five words was considered a candidate to be a tongue twister.

Table 2. Case details

Case	Words	Phrase blocks	Candidate phrase blocks
c1	202000	29368	15630
c2	500000	49760	18276

The majority of the tongue twisters in table 1 have the property that a single phoneme occurs in the word initial position for at least 50% of the words, for example, numbers 1, 7 and 10 in table 1. (Note that not all tongue twisters have this property, for example, numbers 8 and 19 in table 1.) A tongue twister such as number 8 is characterized by the alternation (or close distance between) a number of minimal pairs (she/sea; sells/shells); number 1 also exhibits this property (back/black). We searched the transcripts for phrases with either of these properties. Both tests did not did not have requirement of a word-initial consonant, and the minimal pair test was also relaxed to test for phrases with at least two minimal pairs, which also includes repeated words. The results for these tests are summarized in table 3.

Table 3. Phoneme and minimal pair results

Case	Majority phoneme	Minimal pair
c1	22	888
c2	100	1894

Of the 22 examples of potential multi-word tongue twisters found for case c1, the 'twister sound' was the diphthong /aɪ/ in seven cases and the semi-vowel /w/ in six cases, with the remainder being small numbers of various consonants. (The results for case c2 are similar - approximately 85% of the twister sounds are accounted for by /aɪ/ and /w/.) When the examples were examined individually, none was considered to be particularly difficult to say; the most difficult probably being "when we went to organize a workshop." Given that vowels and semi-vowels generally are not sounds over which people stutter [4], it is not surprising that these examples were not seen as difficult. Tables 4 and 5 respectively give examples of phrases with a majority twister sound, and phrases having a number of minimal pairs.

Table 4. Majority twister sound examples

1	it is pretty clear is not it
2	is that it is not in Turkey
3	when we went to organize a workshop
4	some would say surprisingly enough
5	the date that this accord
6	someone had particular stainless steel skills
7	how did he represent himself

Table 5. Minimal pair examples

1	it is pretty clear is not it
2	is that it is not in Turkey
3	that is about as high as you can put it
4	they may be but that would have to be demonstrated
5	is that not what is suggested by the words
6	in interpreting the results in the area
7	it was on the basis of the geochemistry

We also examined the transcripts for the occurrence of intra-word tongue twisters. We looked for the occurrence of patterns of the form NxNxN, where N is a nasal consonant, and x is anything other than a nasal. We also looked for patterns such as NxxNxN and NxNxxN as well as PxPxP, where P is any plosive consonant. Table 6 lists all the patterns which were considered. Table 6 also shows the number of words containing a given pattern, and the number of distinct words containing that pattern; for example, the entry 66/20 for NxxNxN for case c2 indicates that there are 66 occurrences of words containing the pattern NxxNxN, but there are only 20 distinct

words in this set of 66. Examples of intra word tongue twisters are given in table 7.

Table 6. Intra-word tongue twisters

Pattern	c1	c2
NxNxN	192/26	306/29
NxxNxN	38/16	66/20
NxNxxN	12/7	14/9
NxxNxxN	6/6	7/5
PxPxP	210/39	349/63
PxxPxP	223/55	382/70
PxPxxP	134/45	215/53
PxxPxxP	156/44	250/64

Table 7. Examples of intra word tongue twisters

Pattern	Examples
NxNxN	prominent
NxxNxN	convenient
NxNxxN	mentioning
NxxNxxN	inconvenienced
PxPxP	typical
PxxPxP	probably
PxPxxP	independent
PxxPxxP	complex

What characterizes a tongue twister, and why are they difficult to produce? We asked subjects to rank the tongue twisters in table 1 by order of difficulty of reading them aloud. Table 1 is ordered by decreasing order of perceived difficulty of production, for example, (1) "The bootblack brought the black book back" is thought to be more difficult to read than (2) "Which witches wished wicked wishes." We did not test whether subjects perceptions corresponded with difficulty of production.

Haber and Haber [3] in examined the production errors of a number of subjects reading tongue twisters suggest (but do not test) a number of hypotheses about what makes a tongue difficult to say:

• twisters such as the "Swiss wristwatch strap shop shuts soon" and "which witches wished wicked wishes?" in which both initial and final consonant clusters are alternated rather than initial clusters only have more substitution errors. These

tongue twisters are ranked by our subjects as the two most difficult twisters to read.

• the intercession of unstressed syllables between alternated sounds decreases the twister property, for example "five French friars fanned the fainting flea" is harder than "Francis Forbe's father fries five flounders." Notice that "Nasty Noreen noticed the neat note" and "Naughty Nan's knitting knotted nighties" do not tend to support this hypothesis, however, nasal consonants do not tend to be twister sounds with great difficulty. Furhter support for this hypothesis is given by the ranking of "The sparrow snatched the spider swiftly off the ceiling" (19) relative to the other twisters involving fricatives and sibilants.

• the manipulation of reiterated words with minimal pair matches bootblack-black-back or sells-shells produces errors;

• some vowels, when juxtaposed cause difficulty in production for example, toy boat; wristwatch; strap shop;

• some syntactic patterns, probably those involving a sequence of primary stresses (black book back; five French friars fanned) invite twisted tongues;

• some sounds, namely the fricatives and sibilants above all, may be inherently difficult to manipulate rapidly. This hypothesis is supported by the rankings given in table 1.

Subjects were also separately asked to rank the phrases given in tables 4 and 5 by order of difficulty of reading aloud, and as for table 1, these tables are also listed in decreasing order of difficulty of reading.

CONCLUSION

Utterances exhibiting tongue twister properties occur very infrequently in verbal discourse, and the majority of those utterances which do exhibit one or more twister properties use a vowel as the twister sound. Intra word twisters are also infrequent.

REFERENCES

[1] Hanson, V.L., Goodell, E.W. and Perfetti, C.A. (1991),"Tongue-twister effects in the silent reading of hearing and deaf college students", *Haskins Laboratories Status Report on Speech Research* SR-107/108,July-December 1991, pp.171-180.
[2] McCutchen, D. and Perfetti, C.A. (1982), "The visual tongue-twister effect: phonological activation in silent reading", *Journal of Verbal Learning and Verbal Behaviour*, vol.21, pp.672-687.
[3] Haber, L.R. and Haber, R.N. (1982), "Does silent reading involve articulation? Evidence from tongue-twisters", *American Journal of Psychology*, vol.95, pp.409-419.
[4] Hunt, J. (1861), *Stammering and Stuttering*, republished Hafner Publishing Company New York 1967.