

ON TONGUE TWISTERS

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INTRODUCTION

Slips of the tongue have so far been studied in two, fundamentally different and mutually exclusive, though complementary ways. One is the collection of spontaneous errors, their classification and analysis. The other, much less common, and considerably more novel, is inducing slips under laboratory conditions, where artificial stimuli are created and applied to subjects under time pressure, with an instruction to manipulate the input in strictly controlled ways (see Baars, Motley and MacKay (1975); Motley and Baars (1979); Dell (1980)).

The complementariness of the two procedures flows from the naturalness of the former and methodological rigour of the latter. Yet, there is a third option which combines the advantages (and, to some extent, the drawbacks) of the aforementioned methods: the investigation of traditional tongue twisters (TTs) current in the spoken lore of the language. Like spontaneous slips, those generated by TTs are natural in the sense that they result from naive speakers' verbal interaction and no linguist's control is imposed on them. Like experimental errors, however, they are to some extent organized and exhibit a certain amount of metalinguistic awareness on the part of their creators.¹ In fact, they share this property with a variety of other types of speakers' verbal behaviour, where the metalinguistic and poetic functions of language predominate, like many kinds of puns and verbal humour, acronym formation, tip-of-the-tongue phenomena, unorthodox spellings, language puzzles of all sorts, folk etymologising, etc. Many of these have been stock-in-trade of

¹ Whoever they may be. I assume, however, that they are (normally) not linguists. While this appears to me to be a safe assumption, it should be pointed out that some conclusions of this study are rather sensitive to the legitimacy of the premise.

comedians, 'humour page' editors, entertainers, and collectors of linguistic bric-a-brac the world over (e.g., Espy 1975).

Strangely enough, linguists have been reluctant to investigate these phenomena in any detail in an apparent conviction that no interesting and objective insights might be gained from looking into speakers' *language conscious* behaviour. Explicit linguistic judgement has been resorted to only for validation of hypotheses, and not as a generator, or organizer, of language output. I try to show in this paper that certain non-trivial observations can be made of what speakers explicitly know about the phonological structure of their language and of the way this knowledge is manifested in tongue twisters.

The paper is organized as follows: In section I some general remarks on the nature of TTs in English and Polish are provided. A TT-reading experiment is described in section II, and the results are discussed in section III. Finally, section IV holds conclusions and summary. The TTs used in the present experiment are enumerated in the Appendix.

I. TONGUE TWISTERS

One difficulty in analysing speakers' rendition of TTs is the problem of deciding what counts as a legitimate TT in terms of this study. While the case of a lady selling sea-shells on the sea shore is fairly easy to classify, and the inquiry about a wood-chuck would cause little doubt, how should one treat 'rubber baby buggy bumpers', or 'pass these things to the sixth sailor'? The former is normally classified among traditional TTs (e.g., Espy (1975:11) or Urdang (1968:1384) but, intuitively, is not at all difficult to pronounce (cp. the results of the experiment below). The latter is hard on one's tongue, but is an admitted creation of a linguist (Munro MacKenzie 1973:98)² and as such is of no use in this article. Neither are dictionary definitions of help here. Dictionaries of linguistics characteristically ignore the issue altogether. Others define TTs as *any* "words difficult to articulate rapidly, usually because of a succession of similar consonantal sounds" (Morris 1975:1353). If taken seriously, this might mean a list of words, for example, with no connected meaning whatsoever. Schourup (1973:587-8) defines the tongue-twister as: "a native-directed grammatical unit [...] that is difficult to produce at certain speeds by virtue of containing patterns of various sorts such that at least one of them is incomplete or in some other way aperiodic". Due to the lack of precision ('certain', 'various sorts', 'some other way') Schourup's definition is far from helpful in actually classifying phonic strings as TTs or non-TTs. In fact, the definition of a TT closest to the one accepted in this work is given in

² If the sad case of dismissal in Leith (cp. TT No 13) is, as claimed by Munro Mackenzie "a traditional test of drunkenness", then it is definitely too strong, as judged by the number of errors it elicited in both English and Polish speakers in this study.

the Great Soviet Encyclopedia, specifically mentioning the fact that 'skorogavorka' (notice the emphasise on speed of speaking) is a "small jocular folklore genre" (Vviedienskiy 1965:253).

In view of the problems specified above, I have tried, as far as possible, to analyse only those TTs which have been provided, *and referred to*, as tongue twisters in sources other than pronunciation handbooks or EFL manuals. The Polish TTs are those known to me or my (non-linguist) friends since childhood, and thus there is a good chance that they have been current in the language for quite some time. In fact, all Polish informants tested have been familiar with some of them, as well as with a few of English TTs.

The selection of TTs actually used is a subset of all the items I have managed to collect. The choice I made, however, was controlled by strictly technical considerations. That is, I had to keep the number of tested TTs down to a manageable level to ensure a reasonably unproblematic informants' cooperation. For the same reason TTs in the form of longer poems or exchanges have been avoided. Hopefully, this does not affect the validity of conclusions.

The number of Polish TTs considered in this article is only one third of the English. This reflects, I feel, rather nicely the difference in status of the phenomenon in the two languages. As far as I know, there is no common term for a tongue twister in Polish³ and the notion has a rather low sociolinguistic significance in this country. While the reasons may be interesting, ethnographically speaking, no more will be said about this issue here.⁴

II. EXPERIMENT

The experiment conducted for this study was designed to answer three basic questions about TTs: (1) in what (if any) ways do TT-induced errors differ from spontaneous errors as collected in various corpuses over the last 20 years or so (UCLA, MIT, London-Lund, Dutch, etc.) and from laboratory-induced errors, (2) how do errors made by English speakers compare to those made by Poles when reading English TTs, and (3) what are the similarities and differences between slips produced by Polish informants reading English TTs and those made by them reading Polish TTs. As no native English persons speaking Polish were available, the appropriate test, making procedures symmetrical, could not be carried out.

The procedure was as follows: 40 native Polish speakers, all of them with

³ *Kakofonia*, or *tautacyzm* are stylistic terms of related, but different, meaning to the one embodied in the word *tongue twister*.

⁴ Anecdotally, non-native speakers of Polish may well feel that the language is tongue-twisting as it is, and there is no need to invent anything...

a post-graduate competence in English read a list of 23 English TTs and 8 Polish TTs, in the order shown in the Appendix. They were instructed to use their habitual tempo and voice quality, and were not allowed to prepare the reading of the text beforehand. The selection and order of the sentences as well as the fact that they were TTs was not disclosed to the speakers. No instruction was given as to what should be done when an error occurred. As can be seen, the aim was to ensure as much naturalness as possible to allow speakers a choice of strategies to suit their particular reading and/or speaking habits. In this sense the procedure was radically different from that of a typical slip-inducing experiment, where such variables as the rate of speaking, the amount of text visible to the informant and the output aimed at are strictly controlled.

One similarity was that speakers were asked to *read* the material and not *repeat it*, as might, *prima facie*, be preferable, considering that TTs are predominantly a *spoken* genre. There are two main reasons why repetition was not used as a method of eliciting TTs. First, it imposes a rather heavy strain on the memory of an informant, invariably leading to stops and requests for repetition in longer TTs, thus invalidating the procedure. Second, as has been remarked a number of times in the literature (e.g., Cohen 1966:179), the reading slips are in fact very similar to speaking slips, which suggests that at a certain level the two mechanisms of production may converge.

All 40 readings were recorded and later analysed. The same procedure was applied to 10 native speakers of English, with the obvious expectation that they did not read Polish TTs.

The recorded material was analysed in the terms of errors committed and rate of speech. Errors were taken down in their immediate context for each speaker and TT. In case where an error was noticed by the speaker and corrected, no further slips were recorded if they occurred, as it was felt that in such conditions the super-high degree of monitoring on the speaker's part will seriously bias the results, i.e. the number and quality of subsequent errors. The number of such multiple-error sequences was small. Thus, for each speaker-TT slot there was at most one error recorded. This facilitated subsequent calculations.

Only explicit errors were recorded, i.e., either the error was actually committed (regardless of whether it was noticed by the speaker or not) or a new start was made at mid-sentence, even though no external slip had occurred. The latter case was taken to show the undercover workings of the internal monitor (see Laver 1969) and to testify to the actual occurrence of a slip. This was, however, felt to be different from a simple hesitation pause, when a speaker may be involved in a number of activities (e.g. scanning ahead in the sentence) or may quite simply lose concentration for a moment, and there is no evidence of any error in the proper sense. Thus, hesitation with

a restart has been counted as a slip, whereas simple hesitation has not (cf. Garnham et al. (1981:806) for a different treatment and some discussion).

The rate of speech was measured with a stopwatch and expressed as syllables per second. This was done to test for relations between the tempo at which a given TT was pronounced and the number of errors elicited. As most definitions of TTs emphasize the speed rate factor, the hypothesis was that there should be some correlation. To avoid additional complication, only the time taken from the beginning of a given TT to the occurrence of an error was counted and then divided by the number of syllables so far uttered. It was, at times, impossible to measure time precisely enough, either because an error occurred too close to the beginning of the sentence or speaker's performance deteriorated to a point where it was virtually meaningless to measure speech rate, or for other, extraneous, reasons. These cases (shown in Table I) were not taken into account in the further procedures of calculating means, variance, etc.

Syllable was chosen as a unit of measurement, as against the foot, for two reasons. First, speakers' performance was not consistent enough to unequivocally decide about the number of rhythmic feet in each case. And second, due to a totally different rhythmic structure of the two languages, no comparison between English and Polish TTs would have been possible. The syllable was thus chosen as the most neutral and convenient unit of measurement.⁵

The time measurement, as described, is, admittedly, rather gross. In an experiment of larger proportions more precise methods of timing would be called for. As it is, however, it may be hoped that unavoidable errors will have a tendency to cancel out. Considering that the conclusions are always drawn from aggregate measures, the imprecisions should not affect them to a serious extent.

III. RESULTS AND DISCUSSION

Some results of the experiment are collected in Table I. This is organized into three columns: English speakers (Eng), Polish speakers reading English TTs (PolEng), and Polish speakers reading Polish TTs (Pol).

The number of tokens in each case is a product of the number of speakers and the number of TTs each speaker read. Considering the number of errors elicited, the anonymous creators of TTs exhibit a fair amount of metalinguistic sophistication, managing to induce one error in five TTs, on the average. This is only 10% points fewer than is normal in carefully planned laboratory

⁵ An informal test showed that the correlation between the two types of measurement for English speakers is indeed rather high ($r = 0.92$, significant at $p < .001$), and it might be expected that similar results would have been obtained had rate been measured in feet per second.

Table I.

PARAMETER	Eng	PolEng	Pol
Number of TTs	23	23	8
Number of speakers	10	40	40
Number of tokens	230	920	320
Number of errors	42	180	74
— as % of tokens	18.2	19.5	23.1
Uncorrected errors	17	64	27
— as % of errors	40.5	35.5	36.5
Whole sentence restarts	7	21	15
— as % of errors	16.7	11.6	20.3
'False corrections'	2	35	8
— as % of errors	4.7	19.4	10.8
Mean rate in sylls/sec	3.6	3.6	4.8
Mean intra-speaker st. dev.	1.11	1.12	1.30
— as % of rate	30.8	30.9	28.2
Inter-speaker st. dev.	0.37	0.45	0.59
— as % of rate	10.1	12.3	12.3
Inter-speaker range	3.0–4.1	2.4–4.9	3.5–6.0
of rate in sylls/sec	(= 1.1)	(= 2.5)	(= 2.5)
Untimed TTs	9	48	25
— as % of tokens	4	5	8

experiments (cf. Baars 1980:313-14). As will be seen, Polish TTs caused speakers more problems, but the difference is not particularly significant, and so I will indulge in no speculations as to the reasons of this fact.

The errors are then tabulated in various configurations. No significance tests have been performed here as the numbers are small, but it is interesting to observe that Poles restarted reading a TT from the beginning after an error had been detected (overtly or covertly) nearly twice that often for Polish TTs as they did for English TTs. This may reflect the fact that in the first three Polish TTs an error normally occurred early in the utterance, and going to the beginning of the word was virtually equivalent to restarting the whole TT. On the whole, it was observed that, as in spontaneous slips of the tongue (cf. Noteboom 1980:94), only the last word started is reiterated in correction, unless there are multiple errors and/or the utterance deteriorates beyond recognition.

The number of uncorrected errors squares nicely with the figure for spontaneous slips, as noted by Noteboom (1980:94), namely 36%.

'False corrections' are those cases where no overt slip appeared, and yet a correction was made (from whatever point). As explained in section II, these are taken to reveal the hidden operation of an internal monitor. A high proportion of such corrections in Poles speaking English may testify to particularly heavy internal editing taking place in this situation. This, in turn, is probably due to speakers' awareness that they are reading particularly

difficult texts and to their using a non-native language for this purpose. It is not difficult to envisage an experiment which would allow a separation of the two variables.

As far as the mean values of speech rate are concerned⁶, it will be noticed that the English TTs were read at the same speed by both groups of speakers, and the variance around the 3.6 syll/sec mean is virtually identical. While this may have come as a surprise, there is nothing unexpected in the higher average rate for Poles speaking their own language. The difference amounts to 1.2 syll/sec and is statistically highly significant ($p < .001$, $Z = 10.17$).

The average values of intra-speaker standard deviation are similar for all three corpuses of data, meaning that all speakers deviated from their mean rates of reading by a comparable degree. The inter-speaker parameters, however, show that there was significantly more variance in the speed of reading *among Polish* speakers. For example, there is 2.5 syll/sec difference between the slowest and the fastest Polish reader, which is over twice the value for English speakers. While this fact might be explained for English TTs via various degrees of language proficiency on the part of Poles, it is hard to account for the surprisingly large variance among Poles speaking their native tongue.

Correlation tests have been carried out in various configurations. The most interesting results are as follows. There was very strong correlation both in errors ($r = 0.74$, significant at $p < .001$) and speed ($r = 0.96$, significant at $p < .001$) over the 23 English TTs as read by Polish and English speakers. For example, a high average speed (or error rate) value for TT # X as read by Poles predicts with high degree of certainty a similarly high value for the same TT as read by the English. This means, roughly, that whatever is difficult to pronounce to the English speakers will also be so to the Poles. This, in turn, might be explained in either of two ways. The nature of TTs might be such that they caused malfunction at a relatively low, physiological level of speech encoding. This is, in fact an approach of Garret (1975) and Crompton (1981:711 n 21), where TTs, unlike other slips, are located at just such a level. If this were true, there would be no reason to expect inter-language explanation of the above phenomenon is possible, however. Polish speakers might simply have achieved a level of proficiency in English which approximates that of native speakers to the point of showing similar patterns of error proneness. While there will be some discussion of the 'which level?' question below, I do not feel able to solve the above issue at the moment.

Less interestingly, perhaps, there is correlation in the speed of reading between the English and the Polish texts over the 40 Polish speakers ($r = 0.52$,

⁶ They estimate population means at 95% confidence with an error of 0.22 syll/sec for Eng, 0.14 syll/sec for PolEng and 0.18 syll/sec for Pol.

significant at $p < .001$). In other words, a person reading fast in English will also probably do so in Polish. But notice that the strength of correlation is lower here than in the previous cases.

Finally, *no* significant correlation was found between the speed of reading and error rate, either by speaker or by TT, in either of the three corpuses (cp. Table II). This is, in fact, surprising, considering the common, dictionary-type, definitions of TTs or naive intuitions. However, there is no unanimity on the issue among the researches. For example, Dell and Reich (1980:283) say: "It has long been known that when people speak too fast they make many slips of the tongue". To which Cutler (1981:570) replies: "...attempts to demonstrate that error rates rise with rate of speech [...] have all, to my knowledge, met with failure".

Intuitively, slow speed should allow more time for internal monitoring and covert screening of errors. It is also reasonable to assume that when there is no time pressure the internal error production itself is low. If this is so, one would expect a relatively error-free flow of speech at slow speeds, other things being equal (and vice versa, as does in fact appear to be corroborated in laboratory-induced slips, where time pressure is essential). I do not know at the moment why this is not the case for the data at hand. The linguists' disagreement mentioned above, however, may well be due to the rather inherently complex interplay between speed and error, which may not be modelled by simple linear regression.

As will be seen in Table II, the TTs which gave speakers most trouble were numbers 4, 7, 13, 17, and 23. The typical errors encountered are: 'critical cricket cricket' (an apparent spoonerism, but doubtless under perseverative influence), '... sells sell-fish' (perseveration), '... dismithees us' (spoonerism), 'Shall sea...' (anticipation), and 'swim, swom, swim' (?).

It is amazing how well this reflects the structure of spontaneous slips in terms of the quality of sound substituted. In Shattuck-Hufnagel and Klatt (1980), for example, the MIT corpus is studied, and it turns out that *s/š*, nasals, /w/, and voiceless stops are sounds most often confused in slips.

Schourup's (1973:590-1) conclusion that "three main sources of difficulty in tongue-twisters [...] are broken patterns, complete but aperiodic patterns, and transitions between similar sounds" is also supported by the data of this study, with, however, the necessary reversal of Schourup's 'sources' in the order of importance (notice the record-holders: 7, 13, 17).

To explain the surprisingly low error count on TT 1 I can only assume that this TT was particularly well known to speakers of both languages, and as such rather immune to error. TTs 2 and 10 probably also come in this category, as do Polish TTs 1 and 2.

In a number of ways tongue twister errors elicited in this study are like genuine, spontaneous slips: similarity of sounds is an important motivating

Table II

TT number	Polish speakers				English speakers			
	rate	SD	% rate	errors	rate	SD	% rate	errors
1	3.7	0.57	14.9	2	3.3	0.43	13.0	2
2	4.8	0.66	13.8	4	4.8	0.84	17.6	1
3	4.0	0.73	18.2	0	4.1	0.47	11.5	1
4	4.7	0.97	20.3	13	4.8	0.76	15.7	2
5	5.6	0.79	13.8	6	5.0	0.91	18.2	4
6	4.3	0.64	14.8	4	4.3	0.78	18.2	1
7	2.7	0.57	19.9	23	2.6	0.44	16.8	3
8	3.2	0.69	20.9	5	3.1	0.47	15.3	0
9	3.0	0.63	20.5	2	3.2	0.46	14.5	1
10	4.2	0.80	18.7	3	4.4	0.61	14.0	0
11	3.3	0.84	25.5	4	3.5	0.51	14.4	3
12	2.8	0.54	19.1	3	3.0	0.71	23.6	1
13	3.5	0.92	26.3	27	3.5	0.57	16.2	7
14	1.9	0.61	30.4	10	1.7	0.36	21.1	1
15	2.3	0.58	24.1	7	2.4	0.35	14.7	2
16	2.9	0.55	18.8	6	2.7	0.41	15.4	0
17	2.7	0.52	19.1	27	2.7	0.59	21.7	4
18	4.6	0.82	17.9	3	4.8	0.93	19.3	1
19	5.0	0.92	18.5	4	4.8	0.94	19.7	0
20	3.5	0.78	21.8	8	3.5	0.57	16.2	3
21	4.5	0.90	19.5	3	5.3	0.63	12.6	0
22	3.1	0.67	21.6	3	3.3	0.48	14.5	1
23	2.3	0.48	19.8	13	2.5	0.31	12.6	4

TT number	Polish speakers			
	rate	SD	% rate	errors
1	3.5	0.75	21.3	7
2	6.4	0.77	12.1	7
3	5.3	1.13	21.5	13
4	5.3	0.49	9.3	7
5	6.3	0.83	13.2	16
6	3.9	0.55	14.3	11
7	3.3	0.78	23.6	6
8	4.6	0.80	17.4	7

factor, slips involving vowels are rare, syllable-initial errors predominate. There are respects in which differences show up, however. For example, three quarters or more of spontaneous slips are anticipations, where a sound is

added, deleted, or transposed due to the influence of a sound not yet produced. The remaining slips are perseverations with a small amount of transpositions (cp. Cohen (1966) or Noteboom (1969). Unfortunately, a meaningful comparison with the errors elicited by TTs is made difficult by the fact that a number of TTs are structured in such a way as to virtually hinder any decision about the status of the error. For example, there is no way to decide whether 'sosa' in the Polish TT 4 is result of anticipation, perseveration, or both. However, counting errors of Polish speakers reading English TTs rendered a roughly equal number of perseveration and anticipations, even though I arbitrarily resolved doubtful cases in favour of anticipation. The true proportion, it would appear, must be greater than that obtained by Noteboom (1969:147) and Cohen (1966:179) in their slip-inducing experiments where subjects were asked to read slip-prone texts under time pressure, and perseverations reached 40%. In this connection Noteboom (1969:147) offered a hypothesis that "the percentage of perseverations increases considerably when the speaker is forced to pronounce phrases that are intuitively felt as difficult". If so, it is still far from clear why it should turn out this way.

Perhaps the putative level where TTs are operative in speech encoding might again be involved in explanation. If this is low enough, then possible malfunction will tend to be physiological in nature, perhaps caused by inertia of speech organs, hence — perseveration.

There is independent argument in favour of this hypothesis. One surprising result of tongue twister error induction is the number of phonotactically deviant segments produced. Blends of s/š, r/l, and even g/d occur, which never happens in spontaneous slips. In fact, slips are notorious for obeying phonotactic constraints of the language. This has usually been explained as due to their operation prior to the application of allophonic rules. It seems reasonable, then, to assume that TTs are (sometimes) operative at a level yet closer to the surface than those phonetic detail rules (which may also be conceived of as a filter) and thus avoid their corrective action when an offending ill-formed segment is generated. Schourup (1973:594), for example, mentions /šl, šn, šk/ as results of TT-induced slips. The level would, then, have to be similar to that where classical blends may occur, as these appear to exhibit similar, phonotactically unorthodox, behaviour (cp. Sobkowiak, forthcoming).

In his 1973 paper, Schourup sets aside cases of TTs based on "transitions between similar nonadjacent segments" like s/š (592) on the grounds that: (1) the slip elicited is always /s/ — — — → //š/, regardless of the actual order of the segments in the string, (2) it reflects regular fast-speech processes of English, (3) it is often found in the speech of children, (4) it may generate phonotactically anomalous strings (as mentioned above), and (5) it is virtually obligatory at high speeds.

While I will not argue with (3) and (4), it is fair to point out that: (1) this kind of slip is far from being obligatory, as shown by TT counts for 8, 9, 14, 15; (2) the s/š contrast is not always neutralized in favour of /š/ (in fact, out of 27 slips in TT17, eighteen were like this: Shall /si:/...), (3) fast speech /s/ — — — → /š/ is a regressive process always phonetically motivated by the immediate context, as in 'mi/š/you' (palatalization) or 'thi/š/ship' (assimilation), and hence can have nothing to do with the putative /šaša/ or /šošo/ slips.

Thus, my claim is that there is not enough evidence to hold that "difficulties involving transitions between similar nonadjacent segments do not produce slips of the tongue but instead depend on the application of processes that also apply in acceptable speech" (Schourup 1973:592-3).

IV. CONCLUSIONS

As I hope to have shown in this article, the originators of TTs appear to be well aware of certain phonological properties of their respective languages. It takes a fair amount of metalinguistic sophistication, for example, to discover which sounds, and in which configurations, are prone to cause tongue slips. The alternating pattern of velar and alveolar stops proves to be very successful in eliciting errors in 'critical cricket critic'. The alternation of /s/ and /š/ hardly ever fails to bring about speakers' confusion. The 'tongue twisterers' somehow know that the drive to symmetry will force some speakers to insert an /s/ at the end of the middle word in 'six sick sheiks'. They also know that long words, even devoid of difficult consonant clusters, will cause problems in articulation, like Polish *Konstantynopolitańczykiewiczówna*. They are aware of the fact that adding syntactic obscurity to phonetic cacophony will strengthen the confusion effect. Such is apparently the case of English TT 11.

Discussing laboratory techniques for inducing errors, Baars (1980:308) states: "Subjects can be induced to make predictable, involuntary speech errors if 1. they are given two alternative plans for one production; and if 2. they are denied the time needed to "sort out" these plans". As has been shown, the creators of TTs apply both principles.

On the whole, it seems to me, the so-called 'naive' language users know much more about language than linguists are normally ready to admit. Tongue twisters furnish interesting evidence to support this claim.

The errors elicited by TTs are quite similar to those occurring spontaneously, with the exception of the apparent predominance of perseveration among the former, which observation may be explained by the putatively low level of speech encoding, and phonetic derivation (?), at which TTs are operative. Incidence of phonotactically deviant segments may be explained along similar lines.

Poles reading English TTs tend to approximate native speakers in error

rate, speed of reading and types of errors made. There are differences, however, between the performance of Poles for English and Polish TTs. The speed of delivery is significantly higher for Polish TTs and more errors are made, although it is not the case that those speakers who slip more often than others in one language will tend to do so in the other. This leaves one with a feeling that perhaps the error mechanisms involved are different in the two languages, or the strategies of speakers differ between their native and the foreign language. To what extent this is a viable hypothesis remains to be seen.

APPENDIX

1. She sells sea-shells on the sea shore.
2. How much wood would a wood-pecker peck, if a wood-pecker would peck wood?
3. Round and round the rugged rock the ragged rascal ran.
4. Critical cricket critic.
5. A cup of coffee from a copper coffee pot.
6. A big blue bucket of blue blueberries.
7. Mrs Smith's fish sauce shop seldom sells shell-fish
8. Shoes and socks shock Susie.
9. She sewed shirts seriously.
10. How much wood would a wood-chuck chuck if a wood-chuck would chuck wood?
11. Of all the saws I ever saw I never saw a saw saw as this saw saws.
12. Good blood, bad blood.
13. The Leith police dismisseth us.
14. Six sick sheiks.
15. Six thick thistle sticks.
16. Twin-screw steel cruiser.
17. Shall she sell sea-shells?
18. Rubber baby buggy bumpers.
19. Betty Botta bough a bit of bitter butter.
20. Where rolled the round roll Robert Rowley rolled round?
21. Peter Piper picked a peck of pickled peppers.
22. A big black bug bit a big black bear; a big black bear bit a big black bug.
23. Swan swam over the sea; swim, swan, swim; Swan swam back again, well swum, swan!

1. W Szczepreszynie chrząszcz brzmi w trzcinie.
2. Stół z powyłamowanymi nogami.
3. Konstantynopolitańczykiewiczówna.
4. Sucha szosa po suszy.
5. Król Karol kupił królowej Karolinie korale koloru koralowego.
6. Szedł Sasza szosą suchą.
7. Ząb, zupa, dąb; dąb, zupa, ząb.
8. Ząb — zupa zębowa, dąb — zupa dębowa.

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