J. Indian Inst. Sci., 64 (B), Feb. 1983, Pp. 25–36.

Linguistic distribution of stuttering and stuttering types

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Received on July 16, 1981.

Abstract

An analysis of the linguistic distribution of stuttering and stuttering types was undertaken in monolingual and bilingual stutterers. The results indicated that the loci of repetitions and prolongations in a phonemic clause depended on the word position in a phonemic clause and also on the nature of words themselves. Another significant result of this study was that the distribution of stuttering in a phonemic clause was different in the two languages analyzed here—English and Kannada.

Key words : Stuttering, content and function words, phonemic clause, information, repetitions, prolongations.

1. Introduction

Both in speech and printed material, different words carry different amounts of information depending upon the frequency of their occurrence in the language, speakers familiarity of the same and context. It is also true that in a language different types of words serve different grammatical functions depending upon the context. We know that content words are more important for 'meaning' than function words. Since the sutterers have problems at the word level (syllable level) also, it is important to investigate the word related factors which may induce stuttering and whether they are independent of phonetic factors.

Several researchers have investigated the word related factors which may induce stuttering[1–9]. In general, these studies, with the exception of Soderberg[1], have considered normal hesitation and stuttering to involve content words and words in the initial position of sentences and phrases. Soderberg[1] analyzed the distribution of stuttering

and stuttering types (with respect to word class and word information value) in a phonemic clause. He did not support the findings of many investigators[6–14] that content words were more frequently stuttered than function words but, on the other hand, found that the distribution of stuttering on content and function words depended on the word position in a phonemic clause. However, 86% of the words in the initial position and 92% of the words in the final position of a phonemic clause were function and content words respectively in Soderberg's[1] material. The preponderant occurrence of function words in the initial position of a phonemic clause might have induced a biasing effect into his results in the sense that the function words which are shorter[15] and easily predictable[3, 16] than content words might have facilitated the stutterers to a smoother speech flow at the beginning of clauses.

The present study apart from removing this bias also attempts a bilingual analysis (English and Kannada) of the distribution of stuttering and stuttering types with respect to word class (content *vs.* function words), word information values (high information *vs.* low information words) and locations in phonemic clauses (initial, medial, final and total words). A bilingual analysis was undertaken to determine if there is universality of features of stuttering over the languages, that is, to find out whether stuttering is language-related.

2. Method

2.1. *Subjects*

Ten monolingual stutterers who knew only Kannada language (and who were not exposed to any other language) and ten bilingual stutterers who knew both English and Kannada (but had not been exposed to any other language), all males, served as subjects*. The monolingual stutterers ranged in age from 17 to 34 years (mean age 24·8 years) and bilingual stutterers from 19 to 32 years (mean age 25·6 years).

2·2. *Material*

The oral reading material was a 149-word passage in the English language and a 1[illegible] word passage in the Kannada language. The words in these passages were broadly classified into content words (nouns, verbs, adjectives and adverbs) and function words (articles, pronouns, prepositions, conjunctions and auxiliaries). Personal pronouns were also included under function words as they have little lexical meaning of their own[17].

* The monolingual and the bilingual stutterers give us three different groups—(i) monolingual stutterers—Kannada group (MSK), (ii) bilingual stutterers—Kannada group (BSK) and (iii) bilingual stutterers—English group (BSE). Note that BSK and BSE were only language groups but not the same subjects.

The English passage was the translation of the Kannada passage. All the words in these passages occurred in a list of 1000 most familiar words in the respective languages[18] The percentage breakdown of content and function words in the two passages was English—content 55%, function words 45% : Kannada—content 71%, function words 29%. Function words can be easily added as suffixes to content words in the Kannada language and hence there were less number of function words in the Kannada passage. More than 95% of the words in both the passages started with voiced sounds.

2·3. *Procedure*

The amount of information carried by each word in these passages was estimated following Schlesinger *et al*[8]. The method (a modification of Shannon's[19] letter guessing technique) consisted of determining the extent to which each word in the passage could be predicted by a group of 30 subjects. The information value of each word is the percentage of subjects who incorrectly predicted the word. As it has been shown that there is no significant difference in the word predictability scores between stutterers and normals[1], no attempt was made in the present study to obtain word predictability scores from stutterers.

The phonemic clause was used as the unit of encoding of speech in the present study. It is a phonologically marked macrosegment which contains only one primary stress and ends in one of the three terminal junctures/ |, ||, # /[20]. A linguist listening to the recordings of each subject and following a transcript of the passage marked the boundaries of the phonemic clauses by locating the terminal junctures. The linguist was instructed to make the judgement of phonemic clauses independent of stuttering.

Only repetitions and prolongations of sounds and syllables were considered for analysis, following Wingate[21]. The assessment of the instances of stuttering was done solely by the experimenter. Later, a speech pathologist assessed the reading material and marked the instances of stuttering. A product-moment correlation of 0·96 was obtained between the judgements of the experimenter and those of the speech pathologist. Only those instances of stuttering marked by the experimenter were considered for analysis.

The passages in each language were typed as a single paragraph and given to the subjects to be orally read by them. The subjects were instructed to read these passages in their habitual reading rate and style. The subjects read these passages in the presence of two listeners—the experimenter and another listener accompanying the subject. All readings were recorded for further analysis.

3. Results and discussion

3.1. *Linguistic distribution of stuttering*

The difference between the content and the function words with respect to stuttering was analyzed over selected word positions and total words in a phonemic clause. Chi

square scores were computed by using a chance estimate based on the per cent occurrence of the word class in each of the three positions of a phonemic clause and the entire sample of words. The results are shown in Table I.

The table shows that

(i) the difference between the content and the function words with respect to stuttering was significant for initial and total words, but not for medial and final words of a phonemic clause in the Kannada stuttering groups. There was more stuttering on content than on function words.

(ii) for stutterers in the English language group, the difference between the content and the function words with respect to stuttering was significant for words in all the three positions of a phonemic clause as well as total words. There was more stuttering on content than on function words.

Table II gives the frequency of stuttering on clauses with respect to word information values. Again, Chi square scores were computed by using a chance estimate based on the per cent occurrence of word information values in each of the three positions of a phonemic clause as well as total words.

Table I

Distribution of stuttering and per cent occurrence of word class by content and function words over selected word positions and total words in phonemic clauses

	Word Ptn.	Content words			Function words			Chi^2
		Stuttering		%	Stuttering		%	
		f_o	f_e		f_o	f_e		
MSK	IW	57	39	58	11	29	42	0·001
	MW	104	100	71	37	41	29	NS
	FW	82	75	85	6	13	15	0·05
	TW	243	212	71	54	85	29	0·001
BSK	IW	55	39	60	10	26	40	0·001
	MW	94	84	66	34	44	34	NS
	FW	80	76	84	11	15	16	NS
	TW	229	202	71	55	82	29	0·001
BSE	IW	49	30	49	13	32	51	0·001
	MW	100	76	52	47	71	48	0·001
	FW	76	62	69	14	28	31	0·001
	TW	225	164	55	74	135	45	0·001

Medial words (MW) refer to all words exclusive of initial words (IW) and final words (FW). Total words (TW) include all words contained in all clauses. % refers to percentage occurrence of the word class in the respective positions. f_o and f_e refer to observed and expected frequencies of stuttering, respectively.

Table II

Distribution of stuttering and per cent occurrence of word information value by high and low-information words over selected word positions and total words in clauses

	Word Ptn.	High information words			Low information words			Chi^2
		Stuttering f_o	f_e	%	Stuttering f_o	f_e	%	
MSK	IW	51	48	70	17	20	30	NS
	MW	78	82	58	63	59	42	NS
	FW	24	28	32	64	68	68	NS
	TW	153	160	54	144	137	46	NS
BSK	IW	55	46	70	10	19	30	0·02
	MW	78	73	58	50	55	42	NS
	FW	30	32	32	61	59	68	NS
	TW	163	153	54	121	131	46	NS
BSE	IW	57	43	69	5	19	31	0·001
	MW	90	72	49	57	75	51	0·005
	FW	35	34	38	55	56	62	NS
	TW	182	152	51	117	147	49	0·001

% refers to percentage of occurrence of high and low-information words in the respective positions.

The table shows that

(i) in the Kannada stuttering groups, none of the differences between high and low-information words with respect to stuttering was significant for the initial, medial, final and total words.

(ii) stutterers in the English language group showed a significant difference in stuttering between high and low-information words for initial, medial and total words but not for final words. There was more stuttering on high information than on low information words.

Table I shows that content words were stuttered more often than function words. This is in agreement with earlier research findings on the grammatical effect on stuttering[6–14]. However, our results from the English lnguage stuttering group on the linguistic distribution of stuttering differ with those of Soderberg[1]. We found that the difference in stuttering between content words and function words was significant for words in all the three positions of a phonemic clause and total words whereas Soderberg[1] found this difference significant for only medial and total words. The reason for the higher stuttering on content words than on function words could be the higher number of content words starting with consonants[9], the longer length of content words

compared to function words[15], the relatively greater importance of content words than function words for 'meaning' and could also be explained on the basis of Wishner's[22] 'specific word anxiety'. But the greater information carried by content words compared to function words[3, 16] may not be one of the reasons for the higher incidence of stuttering on content words than on function words, at least in the Kannada language as is evident from out results in Table II. The Kannada language stutterers (MSK and BSK) did not exhibit difference in stuttering between high and low-information words whereas the stutterers in the English language group did. Here again, our results on the difference in stuttering between high and low-information words from the English language stuttering groups are in disagreement with those of Soderberg[1]. Soderberg[1] found a difference between high and low-information words with respect to stuttering for medial and total words of a phonemic clause whereas we found a difference for initial and total words. Our observation of a difference in stuttering between high and low-information words for initial words of a phonemic clause suggests that the stutterers in the English language group may have a difficulty at the beginning of clauses and that it might be a problem in selecting the appropriate grammatical structure in addition to the problems encountered in the selection of words.

We find from Tables I and II that the difference in stuttering between the content and function words is more consistent than the difference in stuttering between high and low-information words. This suggests that the lexical uncertianty is more potent a factor than grammatical uncertainty in its influence on stuttering in Kannada. Stutterers in the English language groups exhibited a difference in stuttering between the content and function words as well as high and low-information words, The difference in stuttering between the content and function words was more predominant in the sense that this difference was significant over words in all the three positions of a phonemic clause and total words. This implies that lexical uncertainty is a more potent variable than grammatical uncertainty in its influence on stuttering. This is contrary to the findings of Soderberg[1] who found grammatical uncertainty a more potent factor than lexical uncertainty in its influence on stuttering.

There was a difference between the two languages of a bilingual stutterer in the distribution of stuttering with respect to word information value. The English language group stutterers exhibited more stuttering on words of high than on low information for initial, medial and total words while the bilingual Kannada stutterers (even the monolingual stutterers) did not exhibit such a difference. It appears that lexical uncertainty plays a more dominant role in influencing stuttering in the Kannada language (the native language of the subjects of this study) while occurrence of stuttering in English seems to be influenced by factors related to grammatical structures in addition to lexical selection. This was particularly evident at the beginning of clauses. The first language of the subjects of this study being Kannada, it is quite possible that they would be less plagued by grammatical uncertainty. But, even native speakers will have problems in finding the suitable words. On the other hand, our subjects being

Table III

Summary of the Chi square analysis for the difference in stuttering between high-information content words (H-C), high information function words (HF), low-information content words (LC), and low-information function words (LF)

Word Class	MSK Total Stg.			BSK Total Stg.			BSE Total Stg.		
	f_o	f_e	%	f_o	f_e	%	f_o	f_e	%
HC	121	101	34	108	96	34	143	108	36
HF	32	59	20	45	57	20	39	45	15
LC	122	110	37	111	105	37	83	60	20
LF	22	27	9	20	26	9	34	86	29
Chi^2	0·001			0·02			0·001		

% refers to per cent occurrences of the combinations of word class and word information values.

foreign speakers of the English language, it is possible that they experience both types of uncertainties to the same extent, particularly in the beginning of clause constructions.

Table III shows the distribution of stuttering on combinations of word information values and word class. Chi square tests were computed by using a chance estimate based on the per cent occurrence of word class and word information values. It can be seen from Table III that in all the three stuttering groups there was a significant difference between combinations of word class and word information values with respect to stuttering. By and large, there was always greater stuttering on high and low-information content words (common factor–content words) than on high and low-information function words (common factor–function words). This means that, irrespective of word information values, the content words attracted more stuttering than function words. These results again indicate that lexical uncertainty is a more powerful factor in determining the loci of stuttering instances than word information.

3.2. *Linguistic distribution of repetitions and prolongations*

Table IV gives the frequency of repetitions and prolongations over selected word positions and total words with respect to word class and word information values. All Chi square scores were based on the per cent occurrence of word classes and word information values are listed in Tables I and II.

Table IV

Distribution of repetitions (R) and prolongations (P) by content words (CW) and function words (FW) over selected word positions and total words (TW) in clauses

Group	Word Ptn.	Stg.	CW f_o	CW f_e	FW f_o	FW f_e	HIW f_o	HIW f_e	LIW f_o	LIW f_e	Chi square CW FW	Chi square HIW LIW
MSK	IP	R	40	27	6	19	32	32	14	14	0·001	0·001
		P	17	13	5	9	19	15	3	7	NS	NS
	MP	R	34	41	24	17	20	34	38	24	0·05	0·001
		P	70	59	13	24	58	48	25	35	0·001	0·05
	FP	R	44	41	4	7	15	15	33	33	NS	—
		P	38	34	2	6	9	13	31	27	NS	NS
	TW	R	118	108	34	44	67	82	85	70	NS	0·05
		P	125	103	20	42	86	78	59	67	0·001	NS
BSK	IP	R	33	24	7	16	25	28	15	12	0·001	NS
		P	22	15	3	10	20	18	5	7	0·01	NS
	MP	R	30	33	20	17	15	29	35	21	NS	0·001
		P	64	51	14	27	63	44	15	34	0·01	0·001
	FP	R	40	39	7	8	17	16	30	31	NS	NS
		P	40	37	4	7	13	15	31	29	NS	NS
	TW	R	113	104	34	43	57	74	80	63	NS	0·005
		P	116	97	21	40	96	79	51	68	0·001	0·005
BSE	IP	R	30	19	8	19	34	26	4	12	0·001	0·01
		P	19	12	5	12	23	17	1	7	0·005	0·01
	MP	R	51	45	35	41	35	42	51	44	NS	NS
		P	49	32	12	29	55	30	6	31	0·001	0·001
	FP	R	31	28	5	8	18	14	18	22	NS	NS
		P	45	40	9	14	18	21	36	33	NS	NS
	TW	R	112	110	48	50	88	82	72	78	NS	NS
		P	113	96	26	43	94	71	45	68	0·001	0·001

Medial (MP) refers to all words exclusive of initial words (IP) and final words (FP). The table also shows the distribution of repetitions and prolongations by high information (HIW) and low information words (LIW) over selected word positions and total words. The expected frequencies of (f_o) of repetitions and prolongations were calculated with reference to the per cent occurrence of word class and word information values listed in Tables I and II.

(*a*) *Frequency of repetitions and prolougations on content and fudction words.*

(i) In all the three stuttering groups, the frequency of repetitions and prolongations on initial words was significantly different between content and function words. There were more repetitions and prolongations on content words than on function words.

Table V

Summary of the Chi square analysis for the difference in repetitions and prolongations between high-information content words (HC), high-information function words (HF), low-information content words (LC) and low-information function words (LF)

Group	Word Group	Repetitions f_o	Repetitions f_e	Prolongations f_o	Prolongations f_e	%	Chi^2 Rep.	Chi^2 Prol.
MSK	HC	48	52	73	49	34	0·05	0·001
	HF	19	30	13	29	20		
	LC	70	56	52	54	37	0·05	0·001
	LF	15	14	7	13	9		
BSK	HC	41	47	67	50	34		
	HF	16	27	29	29	20	0·002	0·001
	LC	62	51	49	55	37		
	LF	18	12	2	13	9		
BSE	HC	56	58	85	50	36		
	HF	30	24	9	21	15	0·001	0·001
	LC	54	32	28	28	20		
	LF	18	46	17	40	29		

(ii) Only the frequency of prolongations was different between content and function words, for medial and total words of a phonemic clause. There were more prolongations on content than on function words whereas repetitions were equally distributed over content and function words.

(*b*) *Frequency of stuttering ou high and low-information words*

(i) Kannada stutterers showed no difference between high and low-information words in the frequency of repetitions and prolongations for initial words. In the English language, both repetitions and prolongations were significantly more associated with words of high information than with words of low information.

(ii) In all the three stuttering groups (MSK, BSK and BSE), there were more prolongations on high information words and more repetitions on low information words for medial and total words.

(iii) None of the Chi square scores was significant for final words.

Table V gives the distribution of repetitions and prolongations over combinations of word class and word information values. The table shows that in all the three stuttering groups, repetitions occurred significantly more on low-information content

words while prolongations occurred on high-information content words. In essence, these results from the English language stuttering group on the linguistic distribution of stuttering types are in agreement with those of Soderberg[1].

The results in the main seem to indicate that when total words are considered, prolongations occurred on words which are more important for 'meaning' or for the idea to be conveyed. However, when total words were considered, there was no difference in the frequency of repetitions either between the content and function words or between the high and low-information words. The results on the occurrence of prolongations are partly in agreement with those of Soderberg[1] (however, we have not carried out a bivariate contingency analysis and hence, we cannot say whether prolongations tended to involve content and high information words and repetitions function and low-information words).

In both the languages, both repetitions and prolongations occurred significantly more on content words than on function words on the initial words of a phonemic clause. Though both repetitions and prolongations occurred significantly more on words of high than low information for initial words, the difference was not significant in the Kannada language. We can say that both the grammatical effect (content *vs.* function words) and familiarity (high information *vs.* low information, that is, less familiar *vs.* more familiar) influence the occurrence of repetitions and prolongations in the English language while word information may not be a significant factor in the Kannada language.

In general, the results support Bloodstein's[23] Anticipatory Struggle Hypothesis on the occurrence of stuttering. Stuttering is influenced by the nature of the words as well as the position in a phonemic clause in which they occur. Even the distribution of repetitions and prolongations is influenced by the position of the words in a phonemic clause and the nature of the words themselves. Some words act as cue to stuttering and this anticipation may lead to fragmentation of speech.

The preceding interpretations may well be oversimplifications and speculative too. Further research is needed not only to verify the findings of this study, but also similar investigation should be attempted in spontaneous speech to understand the role of decision-making in stuttering. Another area of interest for future research is the observed difference between the English and Kannada languages in the effect of word information on stuttering.

Acknowledgements

The author is thankful to the CSIR, New Delhi and the IISc, Bangalore for financial assistance.

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