

# **Analysis of temporal variables in modified speeches: How native speakers of English slow down their speeches?**

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It is quite natural that native speakers of English slow down their speech when they try to communicate with linguistically deficient individuals such as children, foreigners, and learners of English. Also, it is commonly said that slow speech is slow mainly by the frequent and longer silent pauses. The purpose of this paper is to investigate whether or not there are actually frequent and longer silent pauses in modified speeches. Two passages from a news program of the satellite broadcasting in Japan were selected and analyzed in terms of (a) speech rate, (b) articulation rate, (c) length of pause unit, (d) individual pause length, (e) pause frequency, and (f) percentage of pauses to overall speech time.

## **1. Introduction**

This study aims to investigate how native speakers of English slow down their speeches. When the native speakers consciously adjust their speeches to promote listeners' comprehension, they are called *modified speeches*. Although the speakers are conscious of the fact that they modify their speeches, it is impossible for them to control temporal variables (e.g., speech rate, articulation rate, length and frequency of silent pauses) consciously and completely. This study, therefore, intends to clarify the native speakers' *unconscious* attempts to modify their speeches.

Modified speeches are the input simplified phonetically, lexically, and syntactically for a better comprehension of linguistically deficient individuals. *Caretaker talk* is the speech directed toward young children, *teacher talk* is the speech that teachers use in classroom with learners, *foreigner talk* is the speech directed toward nonnative speakers who are less proficient in using the language, and *interlanguage talk* are the speech that learners address to each other.

One of the purposes served by modified speeches is to aid listeners' comprehension. That is to say, the speakers modify their speeches in order to facilitate the exchange of meanings. Commonly observed features in modified speeches are slower rate of delivery and longer silent pauses. In addition to the

temporal aspects, simple vocabulary and grammar is used in modified speeches.

Speech rate and pause phenomena are closely related to each other. It is widely acknowledged and has received general empirical support that speech rate is largely determined by pausing (e.g., Derwing, 1990; Ellis, 1994; Goldman-Eisler, 1956; Griffiths, 1991b; Zellner, 1994). In other words, slow speech is slow mainly due to the frequency and length of pauses. (Ellis, 1994; Gass & Selikner, 2001; O'Grady & Archibald, 2000). The common-sense belief that slowed speech aids listening comprehension is generally supported by the results of a whole body of research that looks at the relationship between speech rate and comprehension (Buck, 2001).

However, only a few attempts have been made so far at analyzing the frequency and length of silent pauses in modified speeches. For that reason, we require to investigate pause phenomena of modified speeches in order to ascertain whether or not there are actually frequent and longer pauses in modified speeches. Then we will be able to confirm that frequent and longer silent pauses are one of the major contributing factors to promote listeners' comprehension.

## **2. Method**

### **2.1. Research question**

With the background mentioned above, the present study focuses on the research question "Are there actually frequent and longer silent pauses in modified speeches?" In order to analyze how native speakers modify their speeches, the following materials and methodology were employed.

### **2.2. Materials**

Concerning the materials to analyze, two passages were selected from a news program of the satellite broadcasting in Japan. This program is originally targeted at students preparing for an entrance examination of universities, especially for the students who prepare the test of listening comprehension. In order to get used to listening to English, the passages of three different speech rates (approximately 100 wpm, 150 wpm, and 180wpm) are prepared. In the program, therefore, a native speaker of English reads a piece of news at three different speed of delivery. The two passages we analyzed were Passage A (498 words long) and Passage B (500 words long).

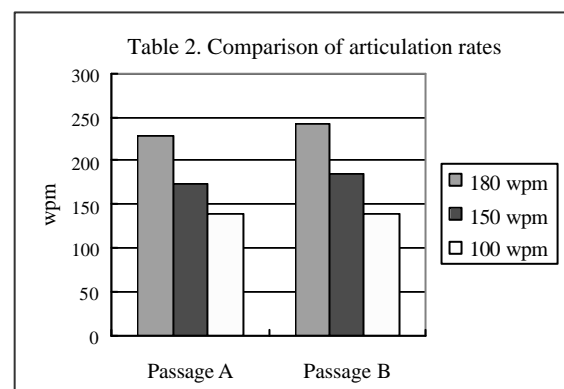
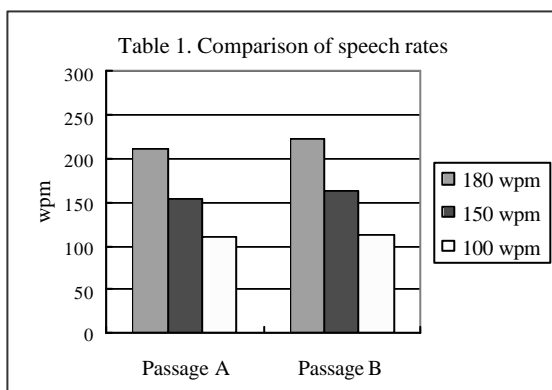
### 2.3. Analysis of temporal variables

With regard to the methodology, analysis of the materials were made in terms of the following features of temporal variables: (a) speech rate, (b) articulation rate, (c) length of pause unit, (d) individual pause length, (e) pause frequency, and (f) percentage of pauses to overall speech time. The audio data were analyzed using the software programmed for acoustic analysis and editing (*DigionSound Light*). For the measurement of the duration and location of speech sound and silent pause, the data were measured directly on the digitized speech waveform in order to identify the beginnings and endings of the speech sound and silent pause. Audio data were all manually analyzed.

### 2.4. Results

As a result of the analysis, the followings were confirmed. First, in terms of (a) speech rate, the speech rates decreased as intended (Passage A-180: 211wpm, A-150: 153wpm, A-100: 111wpm, Passage B-180: 224wpm, B-150: 164wpm, and B-100: 112wpm), although it seemed that the speaker had difficulty in adjusting her speech around 180wpm.

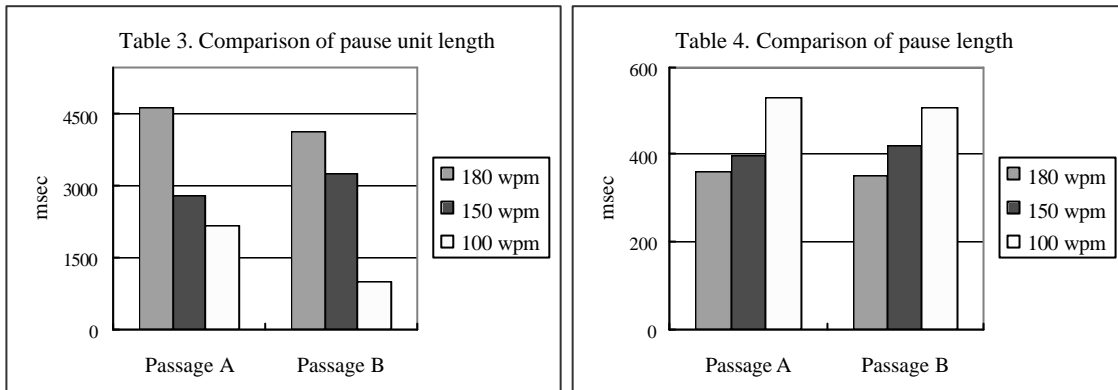
Second, in terms of (b) articulation rate, which is calculated by the total speech time (excluding pause time) divided by the number of words, it was confirmed that the speaker clearly differentiated the three versions (Passage A-180: 228wpm, A-150: 174wpm, A-100: 139wpm, Passage B-180: 242wpm, B-150: 184wpm, and B-100: 140wpm).



Third, in terms of (c) length of pause unit, which is the length of speech section between pauses, it was revealed that the average pause unit length in A-180 and B-180 were considerably long compared with the other versions (Passage A-180: 4639msec, A-150: 2813msec, A-100: 2162msec, Passage B-180: 4125msec,

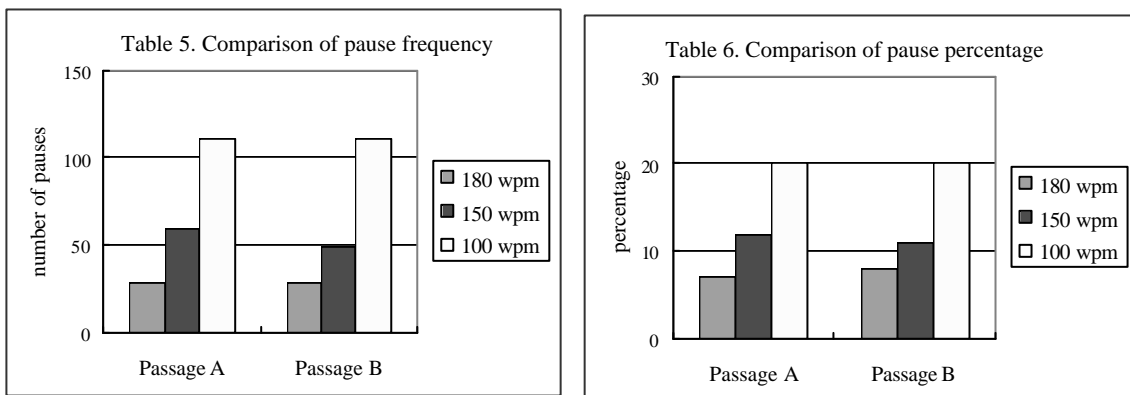
B-150: 3259msec, and B-100: 1997msec).

Fourth, and fifth, in terms of (d) individual length and (e) frequency of silent pauses, there was little difference in average pause length among them (Passage A-180: 360msec, A-150: 398msec, A-100: 532msec, Passage B-180: 350msec, B-150: 418msec, and B-100: 509msec). However, there was a remarkable difference in the number of pauses in each passage (Passage A-180: 29, A-150: 60, A-100: 111, Passage B-180: 29, B-150: 49, and B-100: 111).



Sixth and last, in terms of (e) percentage of pauses to overall speech time, it was revealed that the fastest versions contained the amount of pauses only one third of the slowest versions (Passage A-180: 7%, A-150: 12%, A-100: 20%, Passage B-180: 8%, B-150: 11%, and B-100: 20%).

It follows from what has been said that the speaker slowed down her speech not by lengthening each pause but by increasing the number of pauses. That is to say, the speaker unconsciously attempted to aid listener's comprehension not by means of enunciating every word clearly but by means of inserting pauses between chunks.



### 3. Conclusion

To conclude, it is of value that we confirmed the distinguishing feature of pause in modified speeches, which is taken for granted and less attention has been paid to investigate. Modified speeches are commonly believed to be comprehensible input for the learners, and thus it encourages them to acquire the target language (e.g., Krashen, 1985; Krashen & Terrell, 1983). Having recognized that modified speeches actually include longer and frequent silent pauses, we suggest that teachers should use modified speeches as listening materials.

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## Appendix

### Detailed information on Passages A-180, A-150, A-100, B-180, B-150, and B-100

	Passage A-180	speech time (msec)	pause time (msec)
1	The former Virginia high school football coach portrayed by Denzel Washington in the new movie "Remember the Titans" recalled on Wednesday the challenge he faced almost 30 years ago	7760	344
2	in building a team amid deep racial divisions at a newly integrated school.	3571	560
3	"Titans," which opens nationwide on Friday, and it's expected to be a huge hit,	3645	270
4	recounts the tension, drama and the defining triumph of the 1971 state championship football season at T.C. Williams High School	6456	331
5	in Alexandria, Virginia.	1315	373
6	It features the roles of two coaches, one white, one black, who worked together to build a winner.	3901	523
7	At the time, the Washington-area community had merged two mostly black high schools and one mostly white high school into a single campus	6061	285
8	as part of a redistricting plan that also affected other schools in the city and angered both whites and blacks.	4976	352
9	Former coach Herman Boone, 64 signed T-shirts and posters for hundreds of students at T.C. Williams on Wednesday.	5232	368
10	He said white and black pride among students in the early 1970s simmered dangerously	4101	315
11	and fostered racial distrust.	1632	347
12	Other racial strains in the community, including the city-wide redistricting controversy,	3885	339
13	compounded the potentially explosive climate at the school.	2621	376
14	Boone, who is black, was named football coach that year and immediately found his team caught in the racial and cultural crosscurrents.	5557	323
15	Boone says he was "too white for the black players and too black for the white players."	3347	469
16	Most of his black players threatened not to play for him, Boone said.	2627	325
17	The relationship between his players was very "standoffish" because he said they lived in two worlds. He said white and black players tolerated each other,	6803	270
18	but did not mix.	915	536
19	Boone said the players also were wary of each other because they had been gridiron foes at different schools	5051	277
20	and now they were on the same field as teammates. But stereotypes eventually broke down as the players got to know each other.	5179	320
21	Assistant coach Bill Yoast – a white former head coach at one of the other Alexandria high schools passed over in favor of the younger Boone	5848	283
22	for the top job at T.C. Williams –	1555	328
23	told the Washington Post that the two men disagreed at first, but learned to listen to each other.	3683	416
24	The coaches stressed character and talent, not race or culture in their effort to build a cohesive atmosphere.	4813	461
25	Three decades later, Boone said he sees a different picture at T.C. Williams from when he became head coach, and feels a different atmosphere.	6129	323
26	The students have their differences, but they like each other and respect each other, he said.	3363	413
27	For one thing, T.C. Williams is more diverse. In 1971, the school population was roughly 80 percent white and 20 percent black.	6163	304
28	School records showed last year that 46 percent of students were black, 27 percent white, 20 percent Hispanic, and 8 percent a mix of Pacific Islanders with other nationalities.	9096	333
29	The school's students come from 84 countries and speak 56 languages, said Susan Stambaugh,	4787	277
30	an aide to the principal.	1011	
	Sum total (msec)	131083	10441
	Average (msec)	4369.43	360.03

	Passage A-150 (partial)	speech time (msec)	pause time (msec)
1	The former Virginia high school football coach portrayed by Denzel Washington	4776	339
2	in the new movie "Remember the Titans"	2411	360
3	recalled on Wednesday	1499	312
4	the challenge he faced almost 30 years ago	2960	437
5	in building a team amid deep racial divisions at a newly integrated school.	5659	757
6	"Titans," which opens nationwide on Friday, and it's expected to be a huge hit,	5003	352
7	recounts the tension drama	2299	283
8	and the defining triumph	1547	315
9	of the 1971 state championship football season	3872	273

10	at T.C. Williams High School	1899	357
11	in Alexandria, Virginia.	1483	491
12	It features the roles of two coaches,	2240	320
13	one white,	624	331
14	one black,	741	347
15	who worked together to build a winner.	1984	571
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61	an aide to the principal.	1301	
	Sum total (msec)	171571	23856
	Average (msec)	2812.64	397.60

	Passage A-100 (partial)	speech time (msec)	pause time (msec)
1	The former Virginia high school football coach	3712	421
2	portrayed by Denzel Washington	2848	533
3	in the new movie	1387	363
4	“Remember the Titans”	1952	549
5	recalled on Wednesday	1888	576
6	the challenge he faced	2256	437
7	almost 30 years ago	2363	576
8	in building a team	1781	528
9	amid deep racial divisions	2800	405
10	at a newly integrated school.	2405	1088
11	“Titans,” which opens nationwide on Friday,	3797	379
12	and it’s expected to be a huge hit,	3152	672
13	recounts the tension	1643	363
14	drama	661	501
15	and the defining triumph	1995	496
16	of the 1971	2181	373
17	state championship	933	283
18	football season	1077	501
19	at T.C. Williams High School	2475	512
20	in Alexandria, Virginia.	1808	715
21	It features the roles of two coaches,	3024	512
22	one white,	800	320
23	one black,	816	539
24	who worked together to build a winner.	2901	832
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112	an aide to the principal.	1701	
	Sum total (msec)	214917	53188
	Average (msec)	2161.66	531.92

	Passage B-180	speech time (msec)	pause time (msec)
1	Norway won the women’s Olympic soccer title when they beat the reigning Olympic and World Champions the United States 3-2 with a dramatic golden goal winner on Thursday.	7629	373
2	Substitute Dagny Mellgren scored the decisive goal after 102 minutes of a pulsating match	4499	341
3	which saw the U.S. force extra time with an equaliser 20 seconds from the end.	3499	272
4	There was a hint of handball about Mellgren’s winner although it was more a case of ball to arm -- which is legal --	4443	288
5	after it bounced off American defender Joy Fawcett.	2264	272
6	American goalkeeper Siri Mulnix, at fault for Norway’s second goal, was slow to get down to Mellgren’s shot which slid under her arm and into the net to give Norway its first gold medal of the Games.	8624	451
7	The match represents an end of an era for the American women’s team. Not only have they lost the Olympic title	4328	280
8	they won in 1996, but Mia Hamm, Brandi Chastain and July Fouady	3621	451
9	who have all done so much to popularize women’s football in the U.S., are all set to retire.	4136	419
10	They thought they were going out winners -- but they have to be content with the silver medal.	3141	304
11	The U.S. took only five minutes to take the lead after skipper Fouady set up Hamm wide on the left.	4421	363
12	She fought off a determined challenge from Goeril Kringen,	2451	280
13	widely regarded as one of the best defenders in the women’s game, to lay a perfect ball back to Tiffeny Milbrett.	4896	331
14	With goalkeeper Nordby having committed herself out wide, Milbrett shot left-footed	4955	325

	first time into the empty net		
15	to put the Americans ahead.	1229	544
16	Foudy went close to doubling the lead after 29 minutes when she headed against the top of the Norwegian bar, but Norway gradually played their way back	6677	275
17	into contention and finally scored	1872	357
18	a deserved equaliser a minute before the break.	2371	680
19	Hege Rise's corner came to defender Gro Espeseth and she powered home a header with Shannon Macmillan's leg helping it into the net.	6216	331
20	Nordby made a series of good saves as the Americans dominated for most of the second half -- but a mistake at the other end	5336	296
21	allowed Norway to take the lead against the run of play after 78 minutes.	3560	413
22	American keeper Siri Mullinix came for, but missed, a high cross from Margunn Haugen and Ragnhild Gulbrandsen	5064	270
23	sent a looping header into the net to put Norway 2-1 up.	2739	301
24	With the Norwegian bench and their fans ready to celebrate the U. S. pulled level with less than 20 seconds to play.	5051	453
25	Hamm launched one last attack with another high cross deep into the Norwegian box.	3923	270
26	For once Nordby stayed back, allowing her defenders to clear, but Milbrett rose above them and scored with the late dramatic equaliser	5843	296
27	that sent the game into extra time.	1677	317
28	Just before the end a fan broke through the security cordon and climbed onto the crossbar of the goal the Americans were defending	4923	277
29	before police and security officers escorted the person away.	2971	325
30	The match was not disrupted.	1403	
	Sum total (msec)	123762	10155
	Average (msec)	4125.40	350.17

	Passage B-150 (partial)	speech time (msec)	pause time (msec)
1	Norway won the women's Olympic soccer title when they beat the reigning Olympic and World Champions the United States	6333	411
2	3-2 with a dramatic golden goal winner on Thursday.	3501	539
3	Substitute Dagny Mellgren scored the decisive goal after 102 minutes of a pulsating match	6072	333
4	which saw the U.S. force extra time with an equaliser 20 seconds from the end.	4797	600
5	There was a hint of handball about Mellgren's winner	2515	272
6	although it was more a case of ball to arm -- which is legal --	3035	373
7	after it bounced off American defender Joy Fawcett.	2685	397
8	American goalkeeper Siri Mulinix,	1907	280
9	at fault for Norway's second goal,	1896	283
10	was slow to get down to Mellgren's shot which slid under her arm and into the net	4544	280
11	to give Norway its first gold medal of the Games.	2981	467
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50	The match was not disrupted.	1811	
	Sum total (msec)	162962	20484
	Average (msec)	3259.24	418.04

	Passage B-100 (partial)	speech time (msec)	pause time (msec)
1	Norway won the women's Olympic soccer title	3397	363
2	when they beat the reigning Olympic and World Champions	4016	331
3	the United States	1245	416
4	3-2	931	357
5	with a dramatic golden winner	2675	280
6	on Thursday.	1019	821
7	Substitute Dagny Mellgren	1848	341
8	scored the decisive goal	1856	301
9	after 102 minutes	2117	328
10	of a pulsating match	1845	395
11	which saw the U.S.	1685	285
12	force extra time	1712	408
13	with an equaliser 20 seconds from the end.	3549	731
14	There was a hint of handball	1979	325
15	about Mellgren's winner	1571	461
16	although it was more a case of ball to arm --	3435	403
17	which is legal --	976	507
18	after it bounced off American defender Joy Fawcett.	4027	800
19	American goalkeeper Siri Mulinix,	3307	581
20	at fault for Norway's second goal,	2752	528



21	was slow to get down to Mellgren's shot	3411	373
22	which slid under her arm	2059	461
23	and into the net	1429	387
24	to give Norway its first gold medal	3320	333
25	of the Games.	1037	955
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112	The match was not disrupted.	2299	
	Sum total (msec)	213686	53926
	Average (msec)	1997.07	508.74