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The Effect of Learning on Sentence Prosody in Japanese

Joanna Baldwin Clark
Macalester College, joannabclark@gmail.com

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THE EFFECT OF LEARNING ON SENTENCE PROSODY IN JAPANESE

Joanna Baldwin Clark

Linguistics B.A. Honors Thesis
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Advisor: Christina Esposito, Linguistics

Committee Members:
John Haiman, Linguistics
Satoko Suzuki, Asian Languages and Cultures

List of Figures

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1. Abstract

This study investigates the effect of learning on prosodic production competence in native English L2 speakers of Japanese. Intonation contour and speech rate as indicators of competency were examined. It was hypothesized that more experience with Japanese would lead to more native-like prosody. The study tested the production of fourteen L2 learners, ten non-learners and six native speakers. Participants recorded twenty-three sentences of Japanese. Acoustic data was analyzed for speech rate and fundamental frequency (F0). Results showed that experience is positively correlated with speech rate and not correlated with deviation from the Japanese mean intonation contour.

2. Introduction

2.1 Overview of the Present Study

The primary focus of the current study is to examine the ability of native English-speaking learners of Japanese to assimilate prosody. Although there is no single accepted definition of prosody (see §2.2), for the purpose of this study, it encompasses those things relevant to fluent-like speech that are easily measured with basic acoustic analysis equipment: intonation contour and speech rate. "While fundamental frequency involves acoustic measurement of what is produced physiologically by speakers, pitch usually refers to how fundamental frequency is perceived by listeners, i.e., …whether the voice is going 'up' or 'down'" (Chun 2002). Intonation contour, the pattern of pitch change across the sentence, is of primary concern and speech rate will be examined as secondary measure of prosodic competence in Japanese. These features are easily perceptible in speech and readily calculable with basic computer software and therefore garnered special attention as the foci of this study. As

1

necessary, this study will use the terms "pitch," "fundamental frequency (F0)" and "intonation" interchangeably. Further, this study includes a measure to test for L1 transfer, the transfer of English prosodic features, as the cause of difficulty with Japanese prosody.

The study is also concerned with the effect of amount and type of learning on prosodic competence. It focuses on the effect of learning, measured in years of classroom experience, and time spent abroad in Japanese-speaking communities. The study employs two experimental groups: native English speakers with various levels of experience learning Japanese (1-10 years) and native English speakers who are not learning and have not previously learned Japanese. The speech of these two groups is analyzed in comparison to a control group of native Japanese speakers to determine the effects, if any, of type and duration of learning on prosodic production.

2.1.1 Hypotheses

If increased exposure to and experience with a language lead to assimilation of prosody, the results of this study will show that (1) experience is negatively correlated with deviation from the contour of Japanese speakers; (2) experience is positively correlated with speech rate and (3) if learning does not have an effect on the assimilation of prosody, English speakers show a strong negative correlation between the contour of the Japanese sentences and the English translations of those sentences. Japanese intonation will be strongly similar to English intonation contour only if L1 transfer had a greater effect on participants than learning. Although this study is not intended as a test of L1 transfer, this hypothesis is intended to explain a systematic variation from the expected results that is likely to occur, based on previous studies of L1 transfer (Ringbom, 1992; Isabelli, 2008).

The hypothesis that more exposure to Japanese will lead to more native-like prosody is couched in the widespread understanding that exposure leads to increased opportunities for learning and therefore improved production of segmental features. In searching for linguistic confirmation of this laymen's hypothesis, no direct evidence, or contra-evidence, was found. This hypothesis may require further scrutiny only if experience and deviation from the native contour are positively correlated in the results of this study.

2.2 Background for the Present Study

Fluent-sounding speech is made up not only of correct segments, words and grammatical structures, but also includes suprasegmental markers such as rhythm, stress and intonation. Suprasegmentals refer generally to the characteristics of speech that extend beyond a single phoneme (or sound). The length of syllables, words or sentences, in addition to intra-sentential pausation, comprises the rhythmic pattern of a language. Changes in pitch across syllables, words or sentences comprise the intonation contour.

Studies indicate that speakers who would be considered fluent on the basis of their diction and grammatical accuracy alone are judged to be less skilled speakers if they lack the characteristic suprasegmentals, such as appropriate stress or pitch, of the target language (Dowhower, 1991; Trofimovich & Baker, 2006). It is clear that in order to be considered a skilled speaker of a language, suprasegmentals play a key role, but the extent to which non-native speakers assimilate the suprasegmental features of the target language is largely unknown for languages other than English. Therefore, the effect of linguistic experience (exposure and practice) in non-native speakers' assimilation of these features has also been neglected. Further, there is no consensus among linguists on which suprasegmentals are most

important to native-like production of L2. This study examines a subgroup of suprasegmentals, the characteristics of prosody.

Prosody is "continuum of functions and effects, ranging from the nonlinguistic or extralinguistic at one end, through the paralinguistic, to the essentially linguistic. At the nonlinguistic end, for example, are features of voice quality that reflect the nature of the speaker's larynx and the vocal tract; at this linguistic end are features such as stress and tone, which are functional within specific linguistic systems" (Clark & Yallop, 1990). Conceptions of prosody, especially in the study of Japanese language, are often based on the measurement of these features of speech at the level of sub-sentential units such as *bunsetsu* (phrases) or words (Tohkura, et. al, 1992). This study, however, will focus on features from both ends of the spectrum at the sentential level in order to gain a better understanding of what prosodic factors are at work in natural speech. Specifically, F0, the measure of vibration of the vocal folds, and speech rate, will be examined. Pitch accent, a common focus in linguistic studies of Japanese, is not considered in the present study. Although the lexicalized pitch accent of Japanese is an important element of its prosody, this feature is subsumed under sentence-level intonation, which relies on additional input, such as: sentence type (e.g., declarative, command or inquisitive), emotional state (e.g., surprise, excitement or neutrality) and sentence structure.

The focus on sentence-level F0 contour and speech rate in this study is practical because it lends itself to an understanding of prosody in Japanese that is broad and also necessary to the future study discourse-level prosody. This motivation is significantly different from previous studies of Japanese prosody, which have focused on native speakers' ratings of learners' speech or on narrow analyses, such as the prosodic features of single-word intonation, moraic

4

length and branching intonation for short ambiguous phrases (Shibata & Hurtig, 2008). While both approaches have their distinct benefits, especially when the production and perception tasks overlap, the previous approaches cannot give a wholly accurate picture of learners' production ability for Japanese as it might be spoken in real life situations. Studies that have used single words or textbook phrases to test for prosodic production and perception ability have misunderstood what it means to speak a language natively (or near-natively). Therefore, the present study aims to move beyond the consideration of short textbook phrases such as "Where is the book? The book is over there." and instead consider the prosody of more complex phrases in the natural speech of speakers of widely varying ability.

3. Methods

The aim of the experimental procedure was to quantify and compare the intonation contour and speech rate of speakers in three groups: native Japanese speakers, Japanese learners of various levels and non-learners of Japanese.

3.1 Speakers

3.1.1 Japanese (J)

Six native speakers of Japanese participated in this study. All of the participants were female. Three of the participants were students at Macalester College, two were full-time faculty at Macalester and one was a Japanese Lab Instructor at Macalester. All of the speakers were raised in the Kanto or Chubu regions of Japan and one had lived in the Kinki region. This group was self-identified as being native, rather than just highly competent, speakers. All

were fluent in Standard Japanese, the version used in this study. The participants were not familiar with the purpose of the study. Participant numbers and regions lived are listed in Table 1. The information is reported from an exit survey (see Appendix 6 for survey questions and Appendix 7 for participant responses), which all participants took after completing the experimental portion of the study.

Table 1. Native Japanese speakers' demographic information

Participant	Region(s) Lived
J1	Kanto
J2	Chubu
J3	Chubu
J4	Kanto
J5	Kanto, Kinki
J6	Kanto, Chubu

3.1.2 English

Twenty-four native speakers of English participated in this study. Twelve were male and twelve were female. All were students at Macalester College. The English speakers were further broken into groups for the purpose of the study: English-speaking Japanese learners (Japanese Learners) and English-speaking Japanese non-learners (Non-Learners).

3.1.2.1 English-speaking Japanese Learners (Japanese Learners)

Fourteen of the native English speakers participated as Japanese Learners. This group was defined as native English speakers who learned Japanese as a non-primary language. Most participants had taken at least one Japanese class at Macalester (86%), except for two faculty members. One of the participants had lived in Japan between 5-10 years but indicated that he was not a native speaker. Based on this preference, he remained in the Japanese Learner category. The participants were not familiar with the purpose of the study.

Participants are listed in Table 2 with the number of classes taken at Macalester; their Macalester proficiency, defined as the level of Japanese classes they have completed, where level 1 is "beginner" and level 4 is "fourth-year," the most advanced level offered; time spent abroad, if applicable and regions lived while abroad. The Macalester Proficiency rating does not correspond directly with the number of classes taken at Macalester, as some participants tested into upper levels of Japanese and had therefore taken fewer classes while maintaining comparable proficiency.

Table 2. Japanese Learners' demographic information and Japanese study history. WK = week, SEM = semester, YR = year

Participant	# Classes Taken at Macalester	Macalester Proficiency	Time Abroad	Regions Lived
JL1	2	1	1-2 WK	Kanto, Kinki
JL2	4	2	N/A	N/A
JL3	3	2	N/A	N/A
JL4	5	3	N/A	N/A
JL5	7	4	1 SEM	Kinki
JL6	6	4	1 SEM	Kanto
JL7	6	4	1 SEM	Kanto
JL8	2	4	1 YR	Chubu, Kinki
JL9	5	4	2 SEM	Kanto, Chubu
JL10	5	4	2 SEM	Chubu, Kyushu
JL11	5	4	1-2 MO	Kanto
JL12	0	N/A	5-10 YR	Tohoku, Kanto
JL13	1	4	2 SEM	Tohoku
JL14	0	N/A	5-10 YR	Chubu, Kinki

3.1.2.2 English-speaking Japanese Non-Learners (Non-Learners)

Ten of the native English speakers participated as Japanese Non-Learners. This group was defined as native English speakers who had never studied Japanese in a classroom or spent more than two weeks abroad in Japanese-speaking communities. With the exception of one participant who had Japanese family members and one participant who had been introduced to Japanese through pre-Kindergarten Montessori classes, none of the speakers were acquainted with Japanese pronunciation or intonation before the study. All participated in a

Japanese tutorial session, discussed in section 3.1.2.2.1 below. The participants were not familiar with the purpose of the study.

3.1.2.2.1 Background Knowledge Assessment

Before participating in the study, all participants were asked to confirm their status as members of the Japanese, Japanese Learner or Non-Learner group. Members of the Japanese and Japanese Learner groups were allowed to participate without any additional training. Non-Learner participants were all required to participate in a 30-minute tutorial on Japanese pronunciation, which was taught by a native speaker of Japanese. The aim of the tutorial session was to familiarize the participants with the sounds and rhythm of Japanese as spoken by a native speaker.

Participants learned basic phrases and practiced the sounds of Japanese by reading aloud from Romanized texts. No formal instruction on intonation was given during the tutorial. The tutorial was designed to familiarize Non-Learners with the segments—consonants and vowels—of Japanese so that they would be able to read the Romanized texts of the study. This helped to ensure that participants' utterances were approximately the same phonemically and could be accurately compared to the Japanese and Japanese Learner utterances.

Participants also listened to the native speaker tell a narrative about her impressions of life at Macalester College and in the United States. The tutorial did not specifically teach suprasegmentals to the participants. The tutorial was given to two different groups of participants and was taught by the same speaker for both sessions. Participants were able to ask questions during the tutorial period.

3.2 Speech Material

All participants were presented with the same 23 Japanese sentences. All of the sentences were given with conversational context intended to cue the participants. The sentences were crafted to exemplify three sentence varieties: declarative, inquisitive and command. Some sentences contained embedded clauses. The material was crafted to include as many sonorants as possible to create a better pitch track; lexical and semantic content were secondary to the phonetic requirements of the tokens. The transcribed tokens are presented in Appendix 2.

For the Japanese and Japanese Learner groups, the tokens were presented in Japanese script with Japanese *kana* glosses for potentially unfamiliar words. For the Non-Learner participants, the tokens were Romanized. The Modified Hepburn system of Romanization was adapted for use in this study. This system maintained the maximum number of similarities to English orthography, which was anticipated to aid in Non-learner participants' ability to speak the tokens in a more fluent-like manner. One minor modification from the official Modified Hepburn system was made; the *Waapuro* Romanization for /o:/ was adopted, as this version is most faithful to the original Japanese while maintaining ease of reading. A chart of the Romanization used in this study is given Appendix 5.

The data were recorded in a sound-dampening booth to minimize noise interference.

3.3 Procedure

3.3.1 Recording Procedure

The Japanese and Japanese Learner groups were instructed to enter the sound-dampening booth where a computer with the speech tokens was set up next to a microphone. The tokens were presented in a PowerPoint presentation; participants were instructed to scroll through the presentation, which included instructions, at their own pace. The instructions are given in their entirety in Appendix 1. Participants recorded the 23 tokens, presented in the same order for all participants and groups, at their own pace and were asked to complete a short survey before concluding with the experiment. The survey consisted of general demographic information, including detailed sections about their experience with Japanese and Japanese language study. Participants were given a chance to indicate any sentences that were difficult to record and given space to leave feedback. Participants were debriefed on the purpose of the study and allowed to ask any questions or give verbal feedback about the experience.

After the tutorial period, Non-Learner participants followed the same recording procedure as the Japanese and Japanese Learner groups.

3.3.3 Data Collection and Analysis

3.3.3.1 F0 Data

Data were viewed in and collected from Praat using the Pitch listing feature. The pitch track was the only track viewed during collection and analysis. Each pitch-pulse extracted was selected from the onset of articulation of the utterance to the visible end of the utterance. The pitch-by-time data were exported to Microsoft Excel. Data were discarded if the participated recorded the wrong sentence, i.e., the context sentence rather than the target sentence. Data

for tokens 9, 10 and 12 were discarded for all groups because the target sentence was incorrectly identified on these slides in the Non-Learner Romanized PowerPoint. When pitch data was not available—due to the presence of obstruents or pauses—these gaps were closed during the preprocessing stage, which is explain in section 3.3.3.1.1 below.

3.3.3.1.1 Manipulation of Data

The extracted pitch-pulses were preprocessed for analysis to ensure smooth curves that could be compared in a quantitatively significant manner. The preprocessing maintained a smooth curve showing the overall intonation contour of each utterance while correcting outlying data points and removing gaps in the pitch track. Data were manipulated using R, an open source language and environment for statistical computing and graphics.

Frequency of the utterances was adjusted by dividing individual speakers' F0 values each millisecond by the mean of their F0 for the entire utterance. The range of F0 depicted on the graphs represents individual speakers' deviation from their mean F0 for each utterance. Adjusting F0 removed the inherent difference between male and female F0 but preserved the relative range of each individual speaker. The actual values of the F0 were not necessary in this study because the focus of the analysis was on the range and shape of the intonation contour, not the actual values or sex differences. This procedure allowed for a direct comparison of the area between curves, the measure of similarity between the intonation contours of speakers adopted in this study.

Participants' utterances were all normalized to a length of 1 second. Each sentence (1-23) was scaled individually.

Gaps due to intentional and unintentional pausation as well as voicelessness were closed to allow direct comparison of similarity across the entire utterance. Because silence is irrelevant to the intonation contour, this procedure allowed a complete, uninterrupted comparison of similarity across each utterance.

Data were corrected for doubling or halving, irregularities added to the pitch track by Praat, to ensure smooth curves. All data 1.7 times greater or less than the individual speaker's initial adjusted F0 (at time 0) was adjusted. This procedure maintained a normal range for each speaker, barring some data that could not be corrected with the R script.

A spline function was used to smooth the curves. This procedure compared two data points matching their derivatives with the derivatives of the next set of points to create a smooth curve that connected all points. Smoothing the curves in this manner allowed for simpler visual and quantitative analysis of the similarity between curves.

3.3.3.1.2 Graphing F0

The F0 data for each token was graphed using R. Due to the manipulations, the data are represented on a graph with a unitless y axis (adjusted frequency) and a normalized x axis (1 second). Members of each of the three groups are represented in different colors to better illustrate the patterns of intonation used, and the mean of each group was graphed. In all graphs Japanese speakers are represented in red, Japanese Learners are represented in blue and Non-Learners are represented in green.

3.3.3.1.3 Quantitative Analysis

Quantitative analysis of the data was conducted with R. The area between the adjusted frequency versus time contours was used as the measure of similarity, where smaller area values indicated greater similarity between contours. All individuals were compared to the mean Japanese contour for all sentences. A group was considered to be using "native-like" contour in any sentence where that group's mean similarity measurement, compared to the Japanese group mean, yielded a p value greater than 0.05. This method, though counterintuitive, sought results that were significantly *similar*, i.e., not significantly different.

3.3.3.2 Speech Rate Data

Speech rate was calculated in morae per second (me/sec) by dividing the total length of each utterance by the number of morae in the utterance. Speech rate was calculated for each speaker and every sentence. Speech rate data for each group was averaged across sentences and between-group comparisons were made with one-way ANOVAs.

3.3.3.3 L1 Transfer Test

In order to test for L1 English transfer, one male native speaker of English recorded English translations of the 20 useable token sentences (see §3.3.3.1 for further explanation of the discarded sentences) to be plotted and compared to the Japanese, Japanese Learner and Non-Learner mean graphs. If L1 transfer was a cause of difficulty with Japanese intonation, it was expected that the English contour would closely match the Japanese Learner and Non-Learner contours for the Japanese sentences. The English translations used are given in Appendix 4.

4. Results

4.1 Hypothesis 1: Intonation Contour

The results for hypothesis one clearly indicate that native English speakers in both groups (Japanese Learner and Non-Learner) are unable to regularly produce native-like Japanese intonation. Data was analyzed for 20 of the 23 sentences (see §3.3.3.1 for an explanation of the discarded data). Results of the comparison of the mean F0 for each group showed that Japanese Learner participants used native-like contour in 50% of test sentences, while Non-Learner participants used native-like contour in 40% of test sentences. The Japanese Learner and Non-Learner groups were significantly similar ($p > 0.05$) in their production of all 20 sentences, i.e., they performed in essentially the same way for all sentences. Overall, Japanese Learners performed more like the Japanese speakers than the Non-Learners did in only 10% of the test sentences. Both Japanese Learners' and Non-Learners' ability to produce native-like contour was no better than chance.

The descriptive data indicate a variety of patterns, which suggest that Japanese Learners' and Non-Learners' performance was, in fact, similar to chance. Four patterns of descriptive results emerged: (1) Japanese Learners performed better than Non-Learners, illustrated in Figure 1; (2) Japanese Learners and Non-Learners performed essentially the same, but differently than the Japanese participants, illustrated in Figure 2; (3) Non-Learners performed better than Japanese Learners, illustrated in Figure 3 and (4) all three groups performed the same, illustrated in Figure 4. A final outlying pattern is offered in Figure 5 in which an individual participant closely replicated the Japanese contour. A total of five contour graphs

are examined in this section, representing the paradigmatic patterns explained above. All mean contour graphs are given in Appendix 8.

One-way ANOVAs were performed in order to quantitatively determine the relationship between experience and deviation from the mean Japanese contour. Results of the between-group one-way ANOVAs are given in Tables 3-5. Overall, there are significant differences between intonation production for the Japanese, Japanese Learner and Non-Learner groups (see Table 3). Results further indicate, however, that there are no significant differences between those participants between participants with varying amounts of classroom experience (see Table 4) or with experience abroad and those without (see Table 5). The between-group results are examined in further detail in Table 6.

Table 3. One-way ANOVA results between mean Japanese, Japanese Learner and Non-Learner similarity measures for all sentences.

ANOVA

Average Similarity to Japanese Contour

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24971.769	2	12485.884	16.440	.000
Within Groups	20506.240	27	759.490		
Total	45478.009	29			

Table 4. One-way ANOVA results between 1, 2, 3, 4 and 5-10 years of experience similarity measures for all sentences.

ANOVA

Average Similarity to Japanese Contour

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6790.297	4	1697.574	2.043	.172
Within Groups	7479.896	9	831.100		
Total	14270.193	13			

Table 5. One-way ANOVA results between mean Experience Abroad and No Experience Abroad similarity measures for all sentences.

ANOVA

Average Similarity to Japanese Contour

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1168.931	1	1168.931	1.071	.321
Within Groups	13101.262	12	1091.772		
Total	14270.193	13			

Individual t-tests were run to determine similarities between all groups (see Table 6). The results of the t-tests indicate that there is no difference between the Japanese Learner and Non-Learner groups or between those with experience abroad and those without. The results further indicate that speakers do not vary significantly in their production from year to year of experience, expect between then 3rd and 4th years.

Table 6. Detailed intonation contour t-test results. X marks significantly similar results.

Group 1	Group 2	p value	
Japanese	Japanese Learner	0.000	
Japanese	Non-Learner	0.000	
Japanese Learner	Non-Learner	0.037	**x**
Japanese	Abroad	0.000	
Japanese	Not Abroad	0.040	
Abroad	Not Abroad	0.165	**x**
Japanese	1st Year	0.000	
Japanese	2nd Year	0.028	
Japanese	3rd Year	0.037	
Japanese	4th Year	0.000	
Japanese	4+ Years	0.000	
1st Year	2nd Year	0.427	**x**
1st Year	3rd Year	0.167	**x**
1st Year	4th Year	0.000	
1st Year	4+ Years	0.000	
2nd Year	3rd Year	0.162	**x**
2nd Year	4th Year	0.000	
2nd Year	4+ Years	0.580	**x**
3rd Year	4th Year	0.000	

3rd Year	4+ Years	0.000	
4th Year	4+ Years	0.326	x

Figure 1 illustrates an example of the first pattern, in which the Japanese Learner contour appears more similar to the Japanese contour than does the Non-Learner contour. The figure is a graph of mean F0 for each of the three experimental groups for sentence 2.
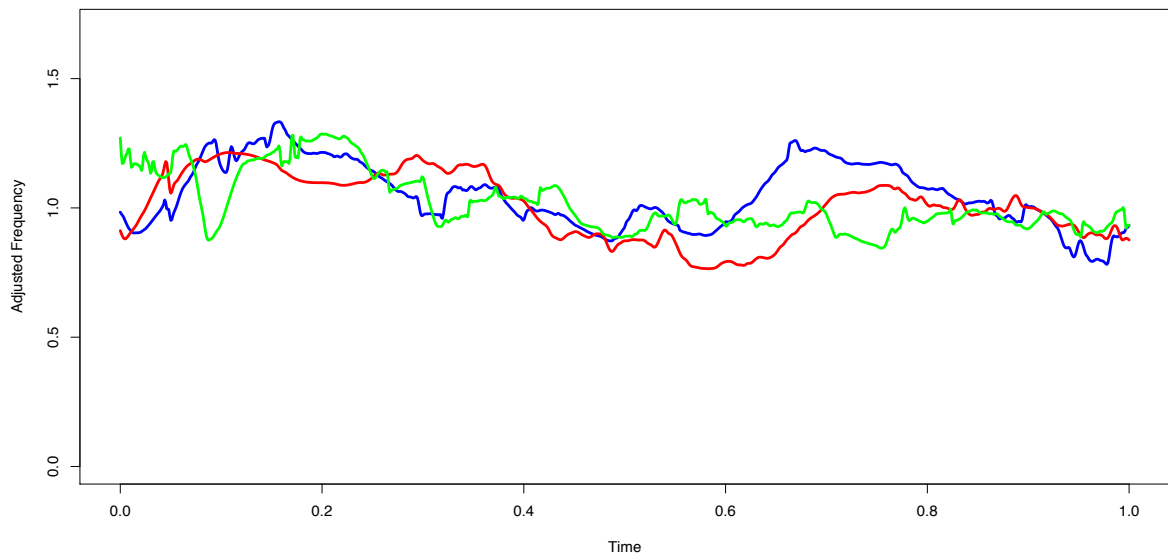

Figure 1. Mean F0 for three groups in sentence 2: "Ee! Kanojo wa mada yubiwa o hameteiru." (What?! She's still wearing her ring.) Red = Japanese, blue = Japanese Learner and green = Non-Learner.

In general, the Non-Learner contour appears relatively similar to the Japanese and Japanese Learner contours across the entire utterance but has many small variations from them. At approximately time 0.6, the Japanese and Japanese Learner contours both dip in approximately the same shape while the Non-Learner contour wavers at a higher adjusted frequency. Contrary to the image portrayed in the graph, however, statistical analysis indicated that the Non-Learner group actually used a more native-like intonation pattern ($p > 0.05$) than the Japanese Learner group ($p < 0.05$) in this sentence. Evidently, the small

variations visible in the graph had no bearing on the similarity measurement for the entire sentence. The reasons for the difference between the statistical and descriptive analyses are described in section 5.

Figure 2 illustrates a case in which the Japanese Learner and Non-Learner groups both appear to use a similar contour that was quite distinct from the Japanese contour. The figure is a graph of mean F0 for each of the three experimental groups for sentence 1.
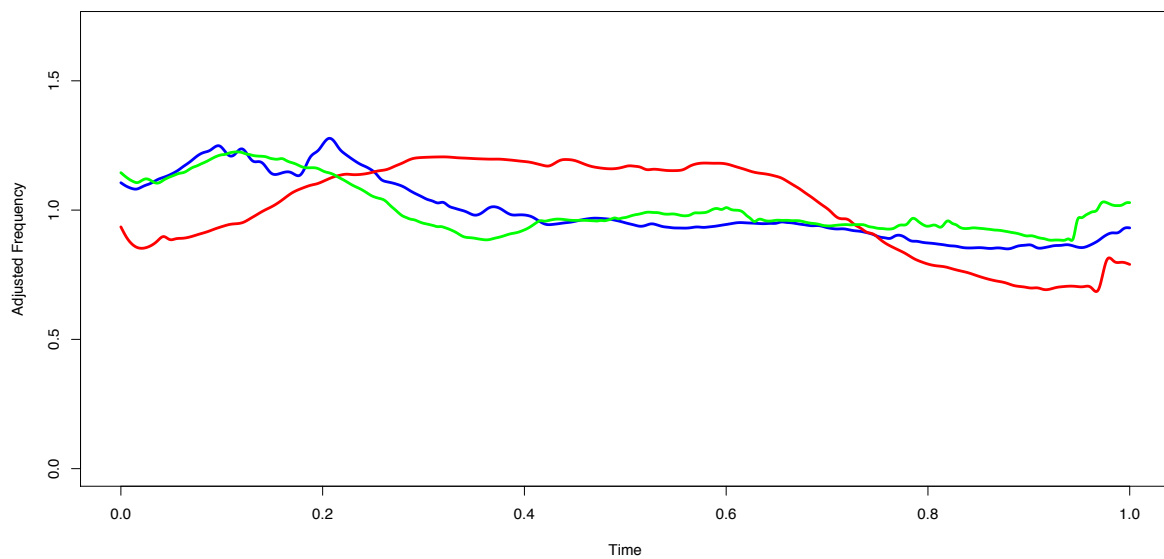

Figure 2. Mean F0 for three groups in sentence 1: "Ramune o nondeiru." (He's drinking ramune.) Red = Japanese, blue = Japanese Learner and green = Non-Learner.

This graph plainly shows the differences between the Japanese contour and the contours of the Learner groups. Whereas Japanese speakers peak in the middle of the sentence, both Japanese Learner and Non-Learner participants peak earlier, at approximately time 0.1, and continue to drop across the remainder of the sentence. All groups rose slightly at the end of the sentence. The graph indicates a clear difference between the non-native groups and the Japanese group and suggests that the Japanese Learner and Non-Learner groups used essentially the same contour in this sentence.

Statistical analysis reveals, surprisingly, that the Non-Learner group contour is more similar to the Japanese contour (p > 0.05) than is the Japanese Learner contour (p < 0.01).

Figure 3, below, illustrates the third pattern, in which the Non-Learners appeared to out-perform the Japanese Learners. The figure is a graph of mean F0 for each of the three experimental groups for sentence 20.
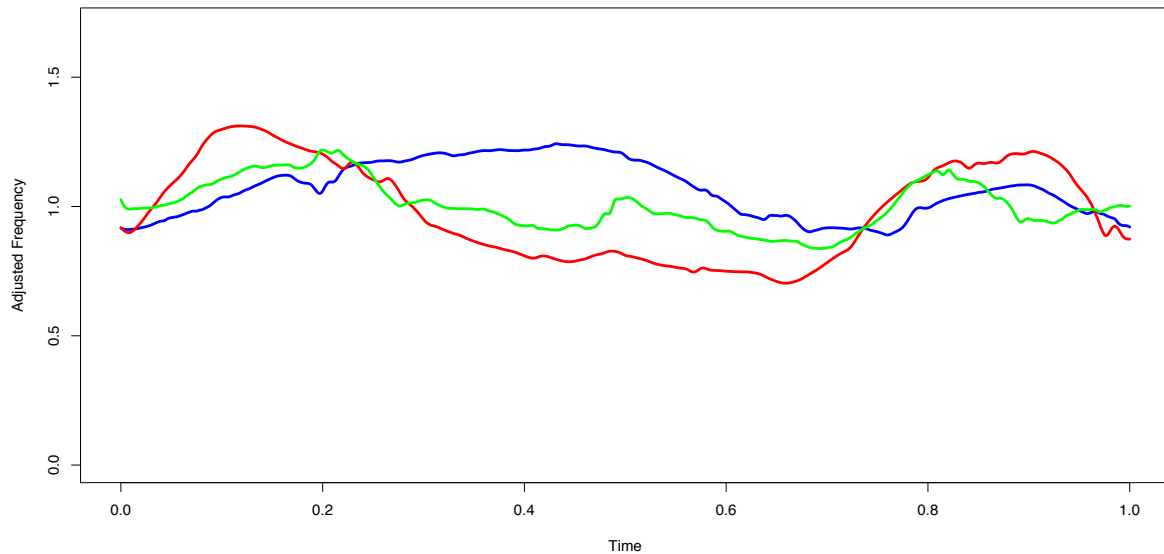

Figure 3. Mean F0 for three groups in sentence 20: "Minami-san no heya, kirei!" (Your room is gorgeous!) Red = Japanese, blue = Japanese Learner and green = Non-Learner.

In this sentence, the Japanese and Non-Learner contours follow a very similar path while the Japanese Learner contour diverges significantly between time 0.2 and 0.6. There are no clear indicators or extraordinary features of the sentence that should have made the Non-Learner speakers better at production.

Statistical analysis indicated that despite the appearance of major divergence of the Japanese Learner group, all groups use essentially the same contour in the sentence (p > 0.05 for both Japanese Learner and Non-Learner groups).

19

Figure 4 illustrates the fourth pattern, in which the overall contour for the three groups appears essentially the same. The figure is a graph of mean F0 for each of the three experimental groups for sentence 17.
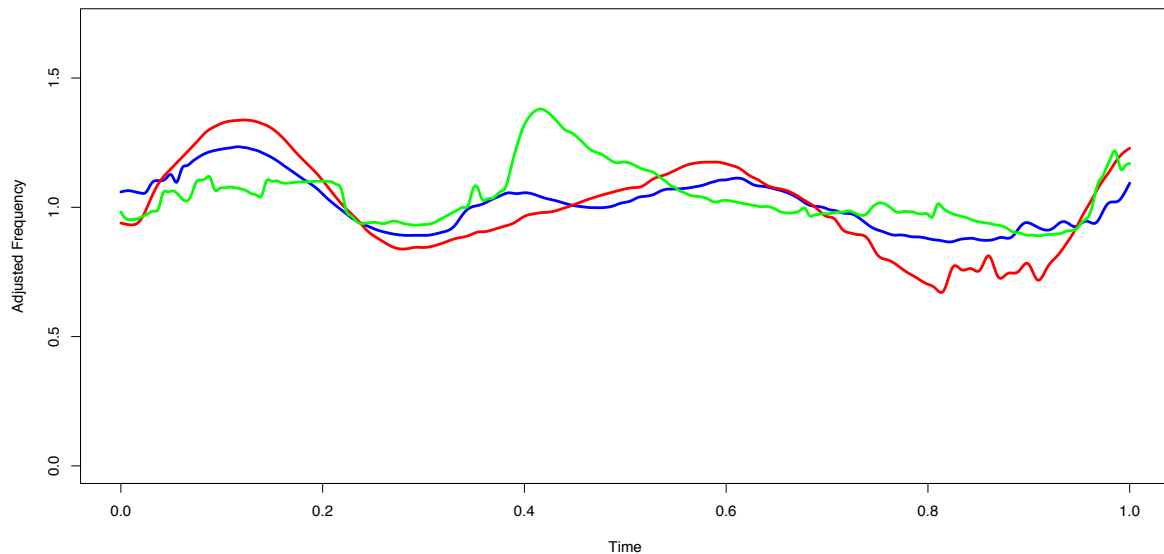

Figure 4. Mean F0 for three groups in sentence 17: "Rei wo kangaeta no?" (Have you thought of an example?) Red = Japanese, blue = Japanese Learner and green = Non-Learner.

Although the Non-Learner group has a somewhat anomalous peak around time 0.4, the overall contour for all groups is still strikingly similar, especially when compared to the contours in other sentences, such as those illustrated in Figures 2 and 3. Sentence 17, illustrated here, does not have any seemingly extraordinary features to explain the convergence between groups. Statistical analysis confirms that all groups use essentially the same contour in this sentence ($p > 0.05$ for Japanese Learner and Non-Learner groups).

The fifth pattern emerged in sentence 1, where a single Japanese Learner participant was able to closely replicate the Japanese contour. The same participant did not replicate native-like contour intonation to this extent in any other sentence. Figure 5 is a graph of F0 for all Japanese Learner participants and the mean Japanese contour for sentence 1.
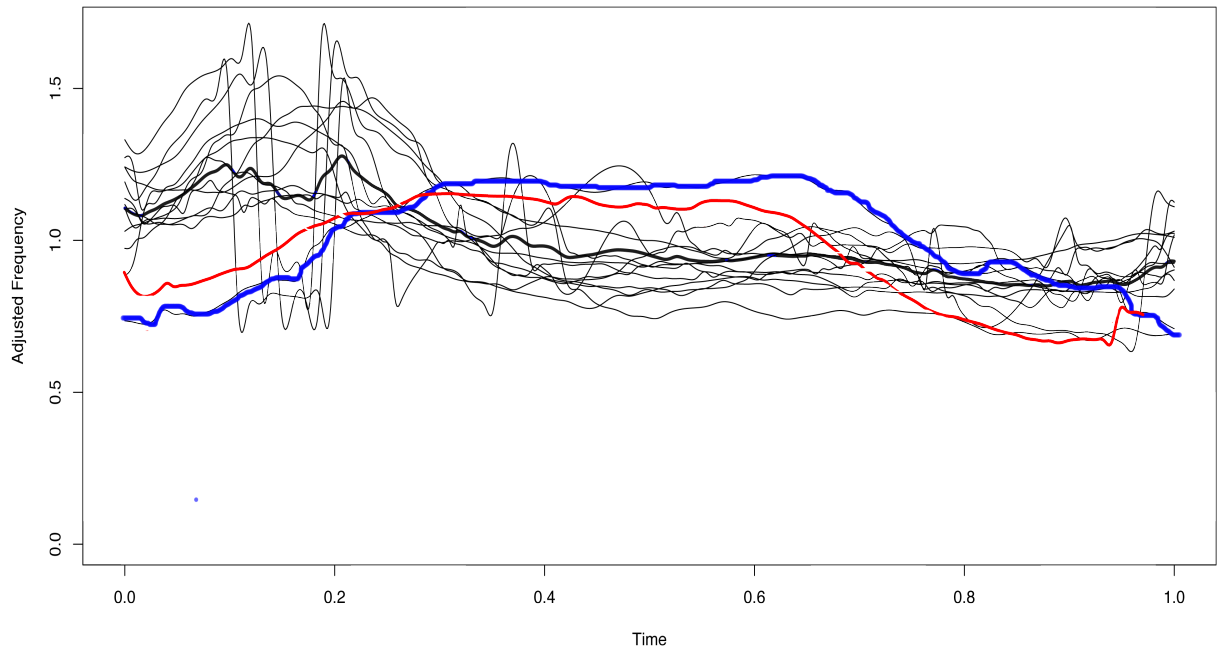
Figure 5. Japanese Learner F0 for sentence 1: "Ramune o nondeiru." (He's drinking ramune.). Blue = notable Japanese Learner participant, bold black = Japanese Learner mean , red = Japanese mean.

In this sentence the speaker, participant JL8, utilizes a contour that is undeniably similar to the Japanese contour and also quite different from the other Japanese Learner participants. The same speaker did not demonstrate this proficiency with intonation production in any other sentences, and there are no indicators to explain the speaker's proficiency in this single case.

Overall, the data indicated that non-native speakers of Japanese, regardless of experience, are unable to replicate native-like intonation. Based on the scope of this study, there are two possible explanations: (1) speakers were influenced by their knowledge of English phonology and were unable to leave that knowledge behind when speaking Japanese, or (2) the Japanese contours recorded in this study were not actually speaking contours, but reading contours. These possible explanations will be examined in section 5.

Between-group comparisons for different levels of Japanese study as well as experience abroad showed that there is no significant difference between those who have studied abroad

21

versus those who have not (see Tables 3-5). Additionally, participants with one, two or three years of learning experience had essentially the same ability to replicate Japanese intonation, while those with four years of learning experience were significantly similar to the participants with more than four years' experience. These results were significantly different from the average Japanese contour, showing that even five to ten years of study is insufficient to assimilate native-like Japanese intonation. The p values for all comparisons are given in Table 6.

4.2 Hypothesis 2: Speech Rate

The results for hypothesis 2 indicate that Japanese Learner participants have improved their speech rate to within significance of the native average. The mean Japanese speech rate was 7.18 me/sec. The mean Japanese Learner speech rate was 6.35me/sec. The Japanese Learner participants' speech rate is significantly similar with the Japanese participants ($p > 0.05$). Non-Learner participants, on the other hand, were significantly different than the native average ($p < 0.01$). Speech rate is given in for each group across all sentences in Figure 6.
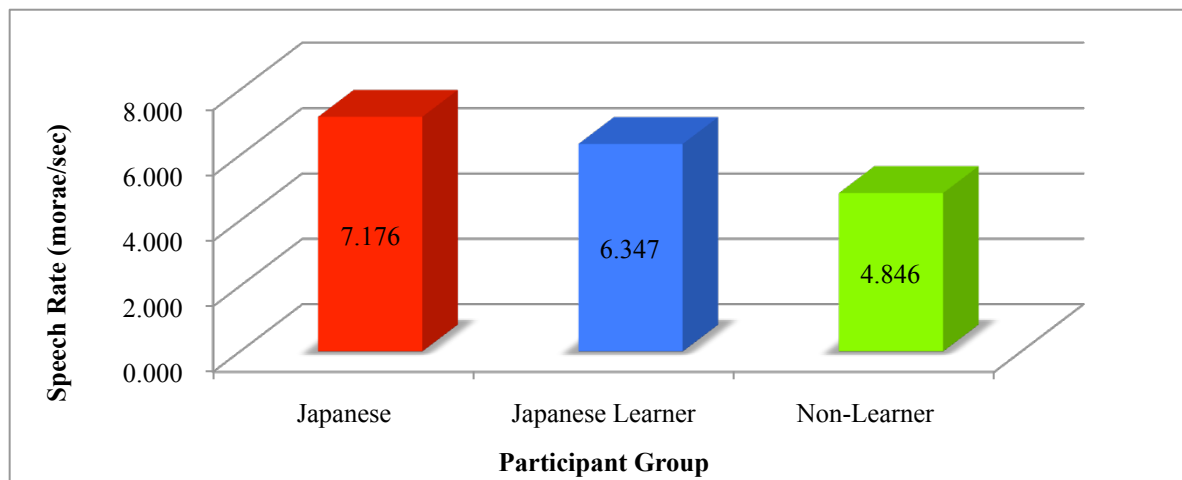

Figure 6. Average speech rate for three groups. Red = Japanese, blue = Japanese Learner and green = Non-Learner.

In some individual cases, Japanese Learner or Non-Learner participants had faster speech rates than Japanese participants, but the mean data and ANOVA results show that these outlying cases are not significant with the overall trend of speech rate among the experimental groups. The results of the between-group one-way ANOVAs are given in Tables 7-9.

These results indicate that although Japanese Learner participants do not have any advantage distinct over Non-Learner participants for the production of native-like intonation contour, they do have a significant advantage over the Non-Learner participants for speech rate. Japanese Learner and Non-Learner participants' speech rate differ significantly ($p < 0.01$).

Between-group data for different levels of Japanese study as well as experience abroad show that all groups are significantly different in their speech rate except fourth year learners and those with 5-10 years experience ($p > 0.05$).

Table 7.One-way ANOVA results between mean Japanese, Japanese Learner and Non-Learner speech rate for all sentences.

ANOVA

Average Speech Rate

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.300	2	11.650	14.041	.000
Within Groups	22.403	27	.830		
Total	45.703	29			

Table 8. One-way ANOVA results between 1, 2, 3, 4 and 5-10 years of experience speech rate for all sentences.

ANOVA

Average Speech Rate

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.016	4	2.504	3.164	.070
Within Groups	7.122	9	.791		
Total	17.138	13			

Table 9. One-way ANOVA results between mean Experience Abroad and No Experience Abroad speech rate for all sentences.

ANOVA

Average Speech Rate

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.105	1	6.105	6.640	.024
Within Groups	11.034	12	.919		
Total	17.138	13			

Overall, the results of this study support hypothesis 2, that experience improves speakers' speech rate. Japanese and Japanese Learner participants' speech rates are significantly similar, while Japanese Learner and Non-Learner as well as Japanese and Non-Learner speech rates are significantly different. Between-group comparisons for years of experience and time abroad show only one significant similarity between the participants with four years' experience and those with 5-10 years experience. The significantly differing results for all other years may suggest that learners' ability changes dramatically, and probably improves accordingly, with each year of experience in the Japanese language classroom.

4.3 Hypothesis 3: L1 Transfer

The results for hypothesis 3 inconclusively refute the expectation that Non-Learner and Japanese Learner participants' trouble with Japanese intonation is due to English L1 transfer. In some exceptional cases, such as sentence 14 (see Figure 7), the contours appeared to match almost exactly.
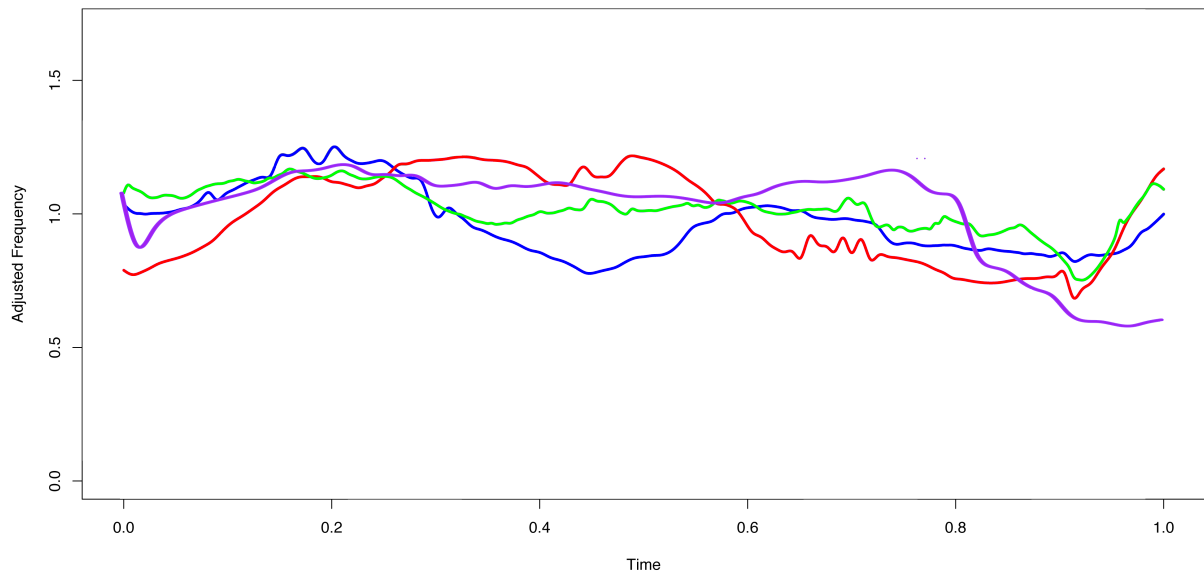

Figure 7. Average intonation contour for four groups in sentence 14: "Yoyogi wa dou desu ka?" (How's Yoyogi?) Red = Japanese, blue = Japanese Learner and green = Non-Learner, purple = English translation.

In most of the cases, however, there is no significant relationship between the English contour and the Japanese. Results of the one-way ANOVA are given in Table 10.

Table 10. One-way ANOVA results Japanese, Japanese Learner, Non-Learner and English similarity measures for all sentences.

ANOVA

Average Similarity to Japanese Contour

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28046.608	3	9348.869	12.309	.000
Within Groups	20506.240	27	759.490		
Total	48552.848	30			

25

In most cases the English contour was so radically different from the Japanese contour that it was clear that there was no similarity, even in cases such as the one illustrated in Figure 7.

Overall, the results of hypothesis 3 are inconclusive. Difficulty with the L1 transfer test will be discussed further in section 5.

5. Discussion

5.1 Speaking and Reading Intonation Contours

Participants' inability to use native-like intonation may have to do with one of many factors, likely including the inability to let go of L1 intonation, as suggested by previous studies. Another possible reason arose in this study that may prove fruitful to future research. Although there is no published literature on the topic, there is some indication that the sentence-level reading and speaking intonations in Japanese are quite distinct from one another. Japanese language classes for exchange students at Nanzan University in Nagoya, Japan focus heavily on a melodic reading style, where pitch peaks in the middle of a phrase or sentence and always drops at commas and periods. This melodic style is consistent with the contours found in this study. Professor Satoko Suzuki, Chair of Macalester College's Asian Languages and Culture department, offered insight that may corroborate the view of a distinct reading intonation in Japanese.

Suzuki posits that while discourse is an interactional activity with considerable prosodic range, reading typically has a more monotonous pattern of intonation. The range of pitch and types of patterns are more diverse in conversation than in reading, even when compared to the reading of dialogue between characters. Suzuki also asserts that reading intonation is

something learned by native speakers of the language, and although she could not describe the patterns of reading intonation, she felt certain that it does exist, distinct from conversational patterns (Suzuki, personal communication).

Though this evidence is not conclusive, these observations should lead to the study of the differences between sentence- and discourse-level reading and speaking. If the differences in reading and speaking intonation are systematic, future studies may even aim to test learners' competence in both patterns.

5.2 Similarity Measurement

This results of this study show that the measure of similarity—the area between contours— requires reconsideration. The clear differences between the descriptive and quantitative comparison results of the sentences considered in this study strongly suggest that the similarity measurement is unable to capture the entire picture of sentence-level prosody. While the area between intonation curves is a useful and straightforward measurement, the contradictory nature of the descriptive and statistical analyses reveal that it is not the *best* measure of contour similarity. Although this method offers a convenient measure to be submitted to statistical tests, it does not show illustrate *how* and *where* two contours are similar or dissimilar, i.e., it does not take into account the shape that causes the similarity or difference. For this study it proved a convenient solution to the problem of comparison, but a more robust quantitative-descriptive measure of contour similarity must be found if future studies are to continue in the vein of direct, mathematical comparison of intonation contours.

The present study may further indicate that intonation is more difficult to assimilate than segments. Even the participants with 5-10 years of study and who use Japanese on a daily

basis were no better than those learners still in Japanese classes, which points to a fundamental difficulty with intonation that is not resolved by experience alone. The results also indicate that a 30-minute tutorial is not enough to bring participants into the range of competence of Japanese Learners, let alone native Japanese speakers.

5.3 L1 Transfer

This study was unable to satisfactorily prove or disprove a theory of L1 transfer as a cause of difficult with producing native-like Japanese intonation. Due to extreme differences in the duration and structure of the English translations of the experimental tokens, the measures of similarity between these pitch contours and the Japanese average did not prove useful in an analysis.

Although previous studies have evaluated prosodic patterns in English, this study instead relied on translations of the Japanese experimental tokens to determine the effects of L1 transfer. This method was chosen so that the English data could be submitted to the same statistical tests as the data from Japanese, Japanese Learner and Non-Learner participants. Future studies should, however, turn to the previous studies of L1 transfer (Ringbom, 1992 and others) to draw stronger conclusions about the effect of L1 transfer on L2 prosodic production.

6. Conclusion

The results of this study support only hypothesis 2, that experience is positively correlated with speech rate. The results refute hypotheses 1 and 3. Hypothesis 1 anticipated that experience would be negatively correlated with deviation from the mean Japanese contour;

results indicate that experience was not systematically correlated to deviation from the mean Japanese contour. Hypothesis 3 anticipated that the English translation contour would match the Japanese Learner and Non-Learner contours if those participants were not able to replicate the Japanese contour; results for this hypothesis are inconclusive.

The results further suggest two courses of action, one for Japanese linguistics and one for Japanese language pedagogy. First, there is a clear need for studies that address the aspects of sentence- and discourse-level prosody that could not be addressed in this study, such as the role of pitch accent and regional dialects.

Of equal importance is the need to emphasize intonation in the Japanese language classroom. A takeaway from this study is the necessity of Japanese teachers to address intonation, along with possible learning strategies that may include both listening and speaking exercises. Although some teachers may currently ignore intonation lessons, deeming it less important than grammatical or lexical accuracy, previous studies have made it clear that L2 learners who are to become fully proficient must also be able to replicate accurate prosodic features. This study confirms that aural experience is an insufficient teacher for competent prosodic production.

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Appendices

Appendix 1. Experimental Instructions
- You will be recording 23 sentences of Japanese into the microphone.
- Read the sentences in your natural Japanese speaking voice.
  - ➢ Don't worry about "correct" pronunciations.
- If you would like to re-record a sentence, feel free to do so.
  - ➢ If you re-record, please start the sentence from the beginning.
- The sentences in black are given as context.
- Please record only the sentences in blue.
- The blue sentences may occur at any point in the sample conversations. Please take your time and make sure you are recording the correct sentence.
- Please record all sentences to the best of your ability, even if you don't understand what some of them mean.
  - ➢ This is not a test of your knowledge of Japanese grammar, pronunciation or kanji knowledge.
  - ➢ Your performance will not be revealed to the Japanese Department, or any other persons.
  - ➢ Take as much time as you need before recording each sentence; there is no reward for speed.
- You will record a sample sentence on the next slide.
- When you are ready, speak the following sentence aloud. It will be recorded.
  - A さん: びょういんはどこですか。
  - B さん: こうこうのとなりにあります。
- When you are done, you may continue to the next slide.
- If you have any questions or concerns about the procedure thus far, please knock on the window before proceeding. The experimenter will answer any questions for you.
- If you are comfortable with the procedure, you may continue with the experiment; you are being recorded.

- **[23 Experimental Tokens (see Appendix 2)]**

- Thank you for your participation.
- You have finished the study and may now exit the sound booth to complete a short survey about your experience.

Appendix 2. Japanese Experimental Tokens with IPA Broad Transcription

0	高校の隣にあります。	koː.koː.no.to.na.ɾi.ni.a.ɾi.ma.su̥
1	ラムネを飲んでいる。	ɾa.mu.ne.o.no.n.de.i.ɾu
2	えぇ！彼女はまだ指輪をはめている。	eː.ka.no.ʑo.wa.ma.da.ju.bi.wa.o.ha.me.te.i.ɾu
3	南さんが死んだ。	mi.na.mi.sa.n.ga.ɕi.n.da
4	わいも。	wa.i.mo
5	恵っていう女。	me.gu.mi.tːe.ju.o.n.na
6	鼻水が出て、目が腫れている。	ha.na.mi.zu.ga.de.te.me.ga.ha.ɾe.te.i.ɾu
7	へぇ！目が痛むほど光っている。	heː.me.ga.i.ta.mu.ho.do.çi.ka.tːe.i.ɾu
8	ううん、湖で泳ぐ。	uː.n.mi.zu.u.mi.de.o.jo.gu
9	何を読んでいるの？	na.ni.o.jo.n.de.i.ɾu.no
10	バイリンガル？	ba.i.ɾi.n.ga.ɾu
11	グアムのビール、飲んだことある。	gu.a.mu.no.biː.ɾu.no.n.da.ko.to.a.ɾu
12	鍋ある？	na.be.a.ɾu
13	山田は鼻が長い女だよ。	ja.ma.da.wa.ha.na.ga.na.ga.i.o.n.na.da.jo
14	代々木はどうですか。	jo.jo.gi.wa.doː.de.su̥.ka
15	事務員はるの？	zi.mu.i.n.wa.i.ɾu.no
16	桃の？	mo.mo.no
17	例を考えたの？	ɾeː.o.ka.n.ga.e.ta.no
18	お金を貸してあげる。	o.ka.ne.o.ka.ɕi̥.te.a.ge.ɾu
19	指がいてぇ！	ju.bi.ga.i.teː
20	南さんの部屋、きれい！	mi.na.mi.sa.n.no.he.ja.ki.ɾeː
21	ラインに並べ。	ɾa.i.n.ni.na.ɾa.be
22	ゴミを箱に投げろ。	go.mi.o.ha.ko.ni.na.ge.ɾo
23	俺の名前を呼ぶな。	oɾe.no.na.ma.e.o.jo.bu.na

  0 Koukou no tonari ni arimasu.
  1 Ramune o nondeiru.
  2 Ee! Kanojo wa mada yubiwa o hameteiru.
  3 Minami-san ga shinda.
  4 Wai mo.
  5 Megumi tte iu onna.
  6 Hanamizu ga dete, me ga hareteiru.
  7 Hee! Me ga itamu hodo hikatteiru.
  8 Uun. Mizuumi de oyogu.
  9 Nani o yondeiru no?
10 Bairingaru?
11 Guamu no biiru, nonda koto aru.
12 Un, migi no hou ni aru.
13 Yamada wa hana ga nagai onna da yo.
14 Yoyogi wa dou desu ka.
15 Jimuin wa iru no?
16 Momo no?
17 Rei o kangaeta no?
18 Okane o kashiteageru.
19 Yubi ga itee!
20 Minami-san no heya, kirei!
21 Rain ni narabe.
22 Gomi o hako ni nagero.
23 Ore no namae o yobuna.

Appendix 4. English Translations for L1 Transfer Test

1 He's drinking ramune.
2 What?! She's still wearing her ring.
3 Minami died.
4 Me, too.
5 Her name is Megumi.
6 My nose is running and my eyes are swollen.
7 No, I swim in the lake.
8 What! It's shining so bright it hurts my eyes.
9 What are you reading?
10 Bilingual?
11 I've had a beer from Guam.
12 Do you have a pot?
13 Yamada is the girl with the big nose.
14 How's Yoyogi?
15 Is there a desk clerk here?
16 The peach's?
17 Have you thought of an example?
18 I'll lend you some money.
19 My finger hurts!
20 Your room is gorgeous!
21 Get in line.
22 Throw away your garbage.
23 Don't say my name.

Appendix 5. Japanese Orthography, Romanization and Transcription Notes

ってッテ tte	ああアア aa	んン n	わワ wa	らラ ra	やヤ ya	まマ ma	ぱパ pa	ばバ ba	はハ ha	なナ na	だダ da	たタ ta	ざザ za	さサ sa	がガ ga	かカ ka	あア a
	いいイイ ii			りリ ri		みミ mi	ぴピ pi	びビ bi	ひヒ hi	にニ ni	ぢヂ ji	ちチ chi	じジ ji	しシ shi	ぎギ gi	きキ ki	いイ i
	ううウウ uu			るル ru		むム mu	ぷプ pu	ぶブ bu	ふフ fu	ぬヌ nu	づヅ dzu	つツ tsu	ずズ zu	すス su	ぐグ gu	くク ku	うウ u
	ええエエ ee			れレ re		めメ me	ぺペ pe	べベ be	へヘ he	ねネ ne	でデ de	てテ te	ぜゼ ze	せセ se	げゲ ge	けケ ke	えエ e
	えいエイ ei		をヲ o	ろロ ro		もモ mo	ぽポ po	ぼボ bo	ほホ ho	のノ no	どド do	とト to	ぞゾ zo	そソ so	ごゴ go	こコ ko	おオ o
	おおオオ oo																
	おうオウ ou																
				りゃリャ rya		みゃミャ mya	ぴゃピャ pya	びゃビャ bya	ひゃヒャ hya	にゃニャ nya	ぢゃヂャ ja	ちゃチャ cha	じゃジャ ja	しゃシャ sha	ぎゃギャ gya	きゃキャ kya	
				りゅリュ ryu		みゅミュ my	ぴゅピュ pyu	びゅビュ byu	ひゅヒュ hyu	にゅニュ nyu	ぢゅヂュ ju	ちゅチュ chu	じゅジュ ju	しゅシュ shu	ぎゅギュ gyu	きゅキュ kyu	
				りょリョ ryo		みょミョ myo	ぴょピョ pyo	びょビョ byo	ひょヒョ hyo	にょニョ nyo	ぢょヂョ jo	ちょチョ cho	じょジョ jo	しょショ sho	ぎょギョ gyo	きょキョ kyo	

Appendix 6. Exit Survey Questions

1. What is your participant number?
   What number was assigned to you during your recording session?
2. Year at Macalester
3. What is your gender?
4. Native Language(s)
   You may include more than one language if applicable. Please do not include languages learned in school or other languages courses (Rosetta Stone, et cetera).
5. Other Language(s) Studied
   What languages, besides your native language, have you studied?
6. Primary Language
7. Did you have any concerns or questions while participating in this study?
8. Please explain any concerns or questions you had while participating in this study.
9. Please leave any other comments you have about the study here
10. Did you have trouble recording any of the sentences?
    [If YES, participants were directed to the following questions. All others were sent directly to question 13.]
11. Did you have trouble recording any of the following sentences?
    Only mark sentences if you had a problem with recording them.
12. Why did you have trouble recording the sentences marked above?
    If you know why you had trouble, please indicate that here.
13. When did you begin studying/learning Japanese?
    Please indicate the first time you had significant exposure to Japanese language. This could be in the form of classes or speaking with/listening to other native speakers.
14. Have you ever taken a Japanese language class at Macalester?
    [If YES, participants were directed to the following questions. All others were sent directly to question 16.]
15. Which of the following Macalester Japanese classes have you taken?
16. Have you taken a Japanese class at an institution or program other than Macalester?
    [If YES, participants were directed to the following questions. All others were sent directly to question 19.]
17. Where did you take other Japanese language classes?
    Middlebury summer program, study abroad, high school, et cetera.
18. How many non-Macalester Japanese classes have you taken?
    Please include Japanese language classes and non-language classes taught primarily in Japanese.
19. Have you ever lived in Japan?
    If you have studied abroad in Japan for any amount of time, please answer "yes."
    [If YES, participants were directed to the following questions. All others were sent directly to question 24.]
20. When did you study abroad or live in Japan?
    Please check all that apply.
21. How long did you study abroad or live in Japan?
    Please indicate the total time you lived in Japan if you have lived or studied there more than once.

22. In what region(s) of Japan have you studied/lived?
23. When you studied/lived abroad, did you live with a Japanese-speaking family?
    This may include your own family or a homestay family.
24. Does anyone in your family speak Japanese natively?
    Please only answer "yes" if it is a family member with whom you have or had semi-regular contact.
    [If YES, participants were directed to the following questions. All others were sent directly to question 28.]
25. How often do you have contact with the native speaker of Japanese in your family?
    Only indicate the times that you are hearing Japanese spoken or using Japanese with this family member.
26. How old were you when you heard Japanese or communicated with this family member in Japanese?
    Please check all that apply.
27. How did/do you communicate this the family member?
28. Do you speak Japanese natively?
    [If YES, participants were directed to the following questions. All others were sent directly to question 31.]
29. In what region(s) of Japan have you lived?
    Only include regions that you would consider "home."
30. When did you begin learning English?
31. Debrief

Appendix 7. Exit Survey Results

1	2	3	4	5	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
5819	3	Female	English	German, Japanese	College	Yes	JAPA 101, JAPA102, JAPA 203, JAPA 204, JAPA 305	No			No					No				No		
68410	4	Male	English	Japanese, French, Portuguese	High school	Yes	JAPA 407, JAPA 408	Yes	Middlebury, KCJS in Kyoto	2	Yes	High school, College	1 calendar year	Chubu, Kinki	Yes	No				No		
E0203M1	2	Male	English	Latin	High school	Yes	JAPA 101, JAPA102, JAPA 203, JAPA 204	Yes	University of Chicago	1	No					No				No		
E0203M2	2	Male	English	Spanish	High school	Yes	JAPA 101, JAPA102, JAPA 203	Yes	Concordia Language Camp	2	No					No				No		
E0212F1	2	Female	Korean	English, Japanese, Chinese, Latin	High school	No		Yes	high school	4	Yes	Middle school	2-4 week	Kinki	Yes	Yes	Once a year	1-4 years old	They speak Japanese and I respond in English	No		
E0212F2	3	Female	English	Spanish, German, Portuguese	Never studied Japanese	No		No			No					No				No		

E0212F4	2	Female	English	Arabic, Spanish	Never studied Japanese	No		No			No					No				No	
E0212M1	4	Male	English	Japanese, French, Spanish, Chinese	High school	Yes	JAPA 407	Yes	High school	1	Yes	College	2 semesters	Tohoku	Yes	No				No	
E0212M2	4	Male	English	Spanish	Never studied Japanese	No		No			No					No				No	
E0212M3	4	Male	English	Hebrew, Latin, Greek, French, Italian, German	Never studied Japanese	No		No			No					No				No	
E0212M4	4	Male	English	French	Never studied Japanese	No		No			No					No				No	
E0215F1	4	Female	English	Russian, German	Never studied Japanese	No		No			No					No				No	
E0215F2	4	Female	English	French, Italian	Never studied Japanese	No		No			No					No				No	

ID	Year	Gender	Native	Other languages	Where studied	Formal?	Courses	Abroad?	Study abroad details	Length		Program	Duration	Region						
E0215F3	2	Female	English	Spanish, Greek	Never studied Japanese	No		No			No				No				No	
E0215F4	4	Female	English	French, Spanish	Never studied Japanese	No		No			No				No				No	
E0222M1	Non	Male	English	Spanish, French, German, Italian, Chinese, Japanese	College	No		Yes	Middlebury College, study abroad, and at a 2-week seminar in Otsu	5-10	Yes	College	5-10 calendar years	Chubu, Kinki	Yes	No			No	
E1207F	4	Female	English	Czech, French, Spanish	College	Yes	JAPA 101, JAPA102	No			Yes	College	1-2 weeks	Kanto, Kinki	Yes	No			No	
E1208F1	4	Female	English	Japanese, Spanish, Italian	College	Yes	JAPA 101, JAPA102, JAPA 203, JAPA 204, JAPA 305, JAPA 306, JAPA 407	Yes	Study abroad	1	Yes	College	1 semester	Kanto	Yes	No			No	
E1208F2	4	Female	English	Japanese, Spanish	College	Yes	JAPA 101, JAPA102, JAPA 203, JAPA 204, JAPA 305, JAPA 407	Yes	Study abroad	1	Yes	College	1 semester	Kanto	Yes	No			No	
E1208F3	4	Female	English	Japanese, French, Spanish, Arabic	Elementary school	Yes	JAPA102, JAPA 203, JAPA 204, JAPA 305, JAPA 306	Yes	Bernard Language School	5-10	Yes	High school, College	2 semesters	Kanto, Chubu	Yes	No			No	

E1208F4	4	Female	English	Japanese, Spanish	Middle school	Yes	JAPA 203, JAPA 204, JAPA 305, JAPA 306, JAPA 408	Yes	UC Berkeley, Study Abroad in HS, HS, Study abroad in College	5-10	Yes	High school, College	2 semesters	Chubu, Kyushu	Yes	No				No		
E1208M1	3	Male	English	Japanese	High school	Yes	JAPA 203, JAPA 204, JAPA 305, JAPA 306, JAPA 407	Yes	High School	5-10	Yes	High school	1-2 months	Kanto	Yes	No				No		
E1209M1	Non	Male	English	Japanese, Chinese (Mandarin), French	High school	No		Yes	High school (in Tokyo) and Princeton University	5-10	Yes	High school, College	5-10 calendar years	Tohoku, Kanto	Yes	No				No		
E1215M1	4	Male	English	Spanish, Japanese	College	Yes	JAPA 101, JAPA102, JAPA 203, JAPA 204, JAPA 305, JAPA 407	No			Yes	College	1 semester	Kanto	Yes	No				No		
J0203F1	Non	Female	Japanese	English, French, Chinese	Never studied Japanese	No		No			Yes	Pre-elementary, Elementary school, Middle school, High school, College	Longer than 10 calendar years	Chubu	Yes	Yes	Every 7-11months	1-4 years old	Primarily in Japanese	Yes	Chubu	Middle school
J0209F1	Non	Female	Japanese	Korean, Chinese, French, German, Dutch, Spanish	Never studied Japanese	No		No			No					Yes	Once a year	1-4 years old	Primarily in Japanese	Yes	Chubu	Middle school
J0212F1	Non	Female	Japanese	English, French, Italian, Chinese	Never studied Japanese	No		No			Yes	Pre-elementary, Elementary school, Middle school, High school, College	Longer than 10 calendar years	Kanto	Yes	Yes	6-7 times a week	1-19+ years	Primarily in Japanese	Yes	Kanto	Pre-elementary

J0212F2	3	Female	Japanese	English, Spanish	Elementary school	No		No			Yes	Pre-elementary, Elementary school, Middle school, High school, College	Longer than 10 calendar years	Kanto, Kinki	Yes	Yes	Once a week	1-19+ years	Primarily in Japanese	Yes	Kanto, Kinki	Elementary school
J0224F1	2	Female	Japanese	Indonesian, English, Spanish, German, French, Arabic	Never studied Japanese	No		No			No					Yes	3-5 times a week	1-19+ years	Primarily in Japanese	Yes	Kanto, Chubu	Pre-elementary
J1207F1	3	Female	Japanese	English, French	Elementary school	No		Yes	Public Japanese elementary school	5-10	Yes	Pre-elementary, Elementary school, Middle school	Longer than 10 calendar years	Kanto	Yes	Yes	Every 1-3 months	1-19+ years	Primarily in Japanese	Yes	Kanto	Elementary school
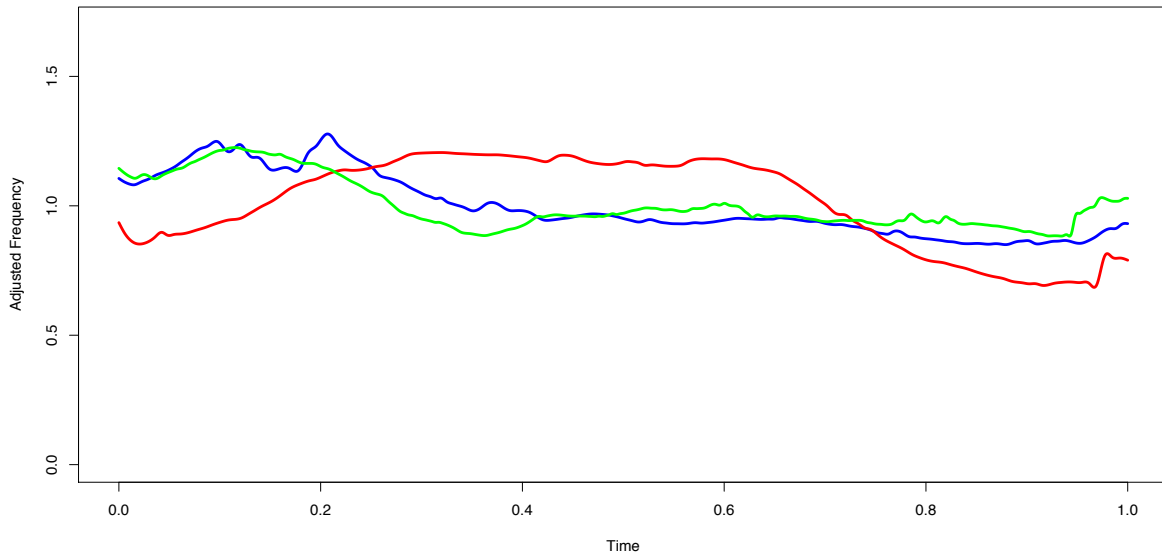
Sentence 1: "Ramune o nondeiru." (He's drinking a soda.)
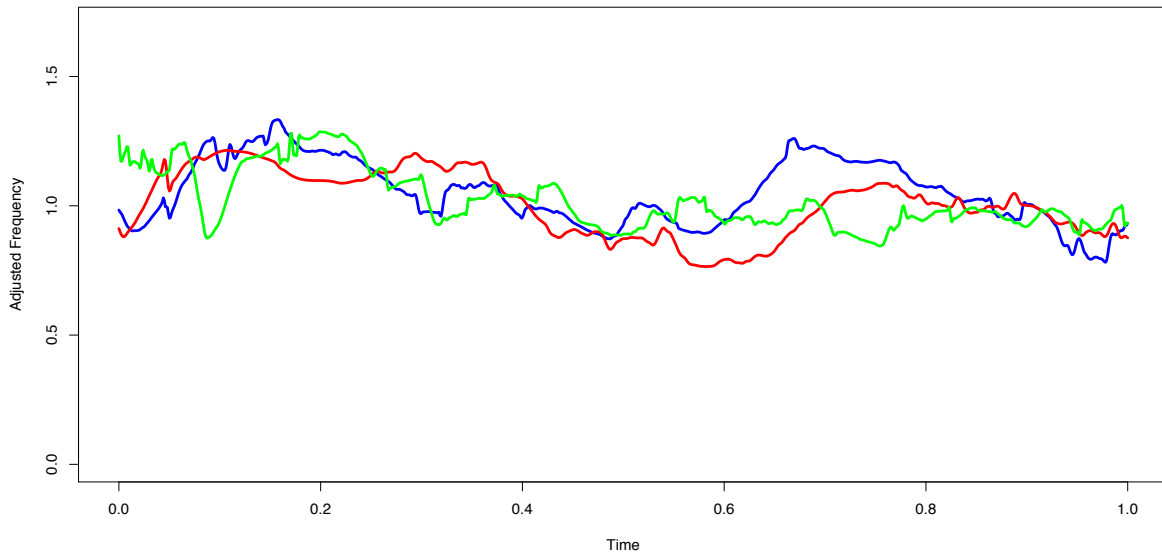
Sentence 2: "Ee! Kanojo wa mada yubiwa o hameteiru." (What?! She's still wearing her ring.)
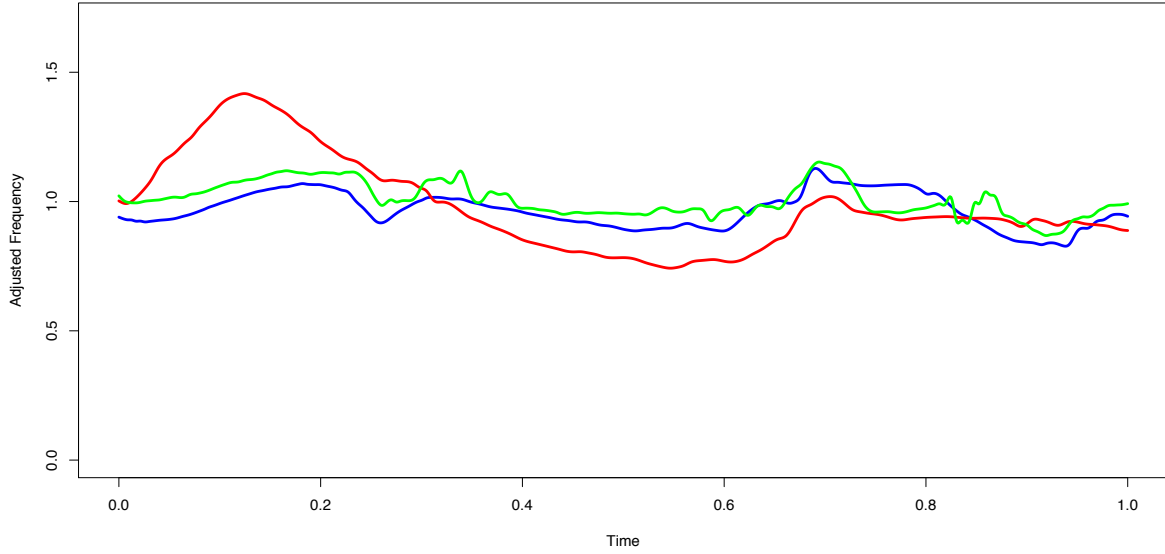
Sentence 3: "Minami-san ga shinda." (Minami died.)
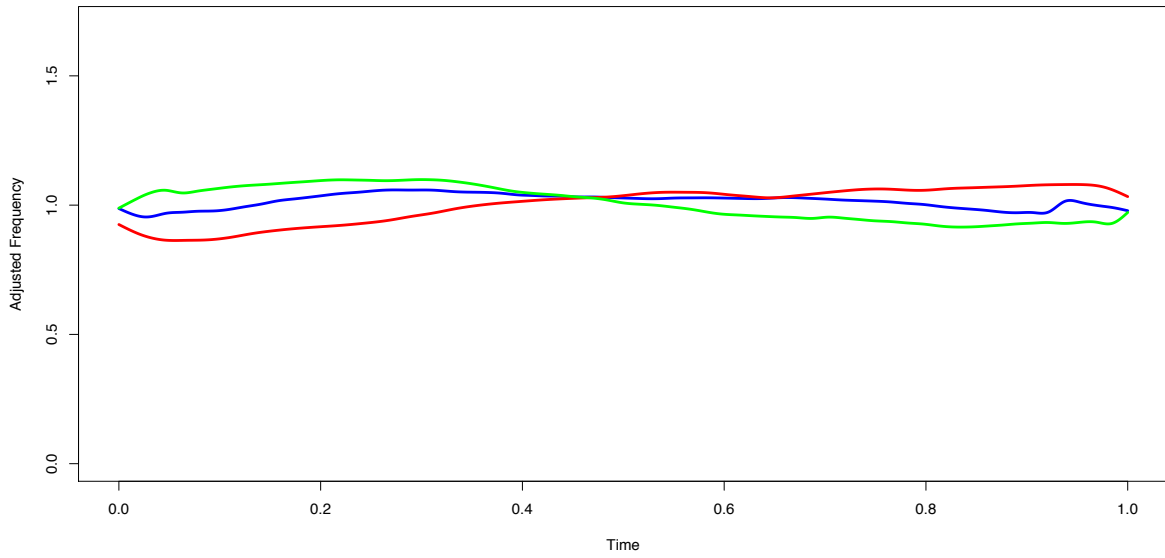
Sentence 4: "Wai mo." (Me, too.)
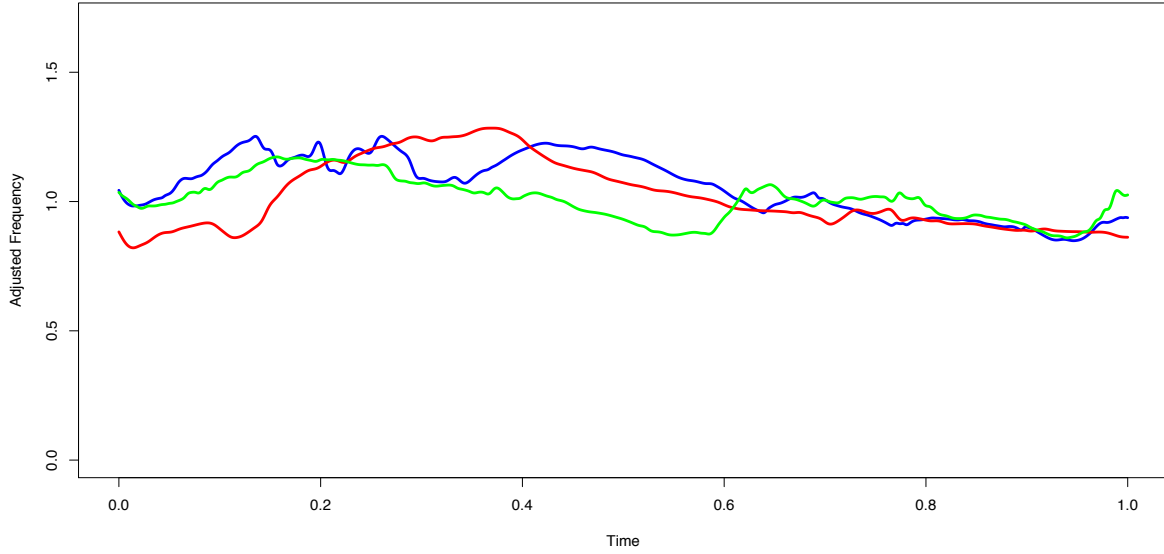
Sentence 5: "Megumi tte iu onna." (Her name is Megumi.)
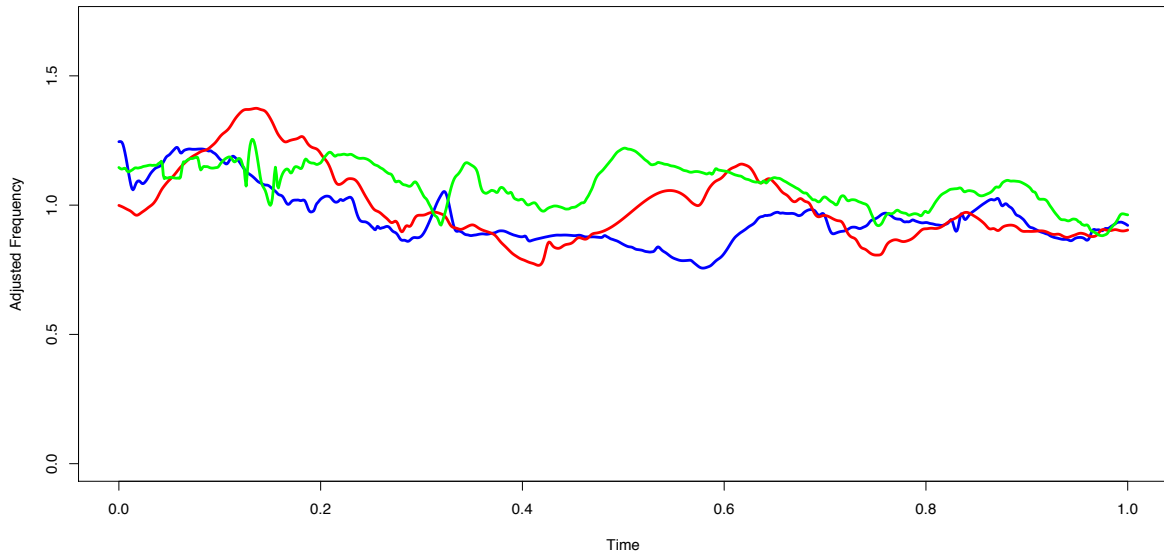
Sentence 6: "Hanamizu ga dete, me ga hareteiru." (My nose is running and my eyes are swollen.)
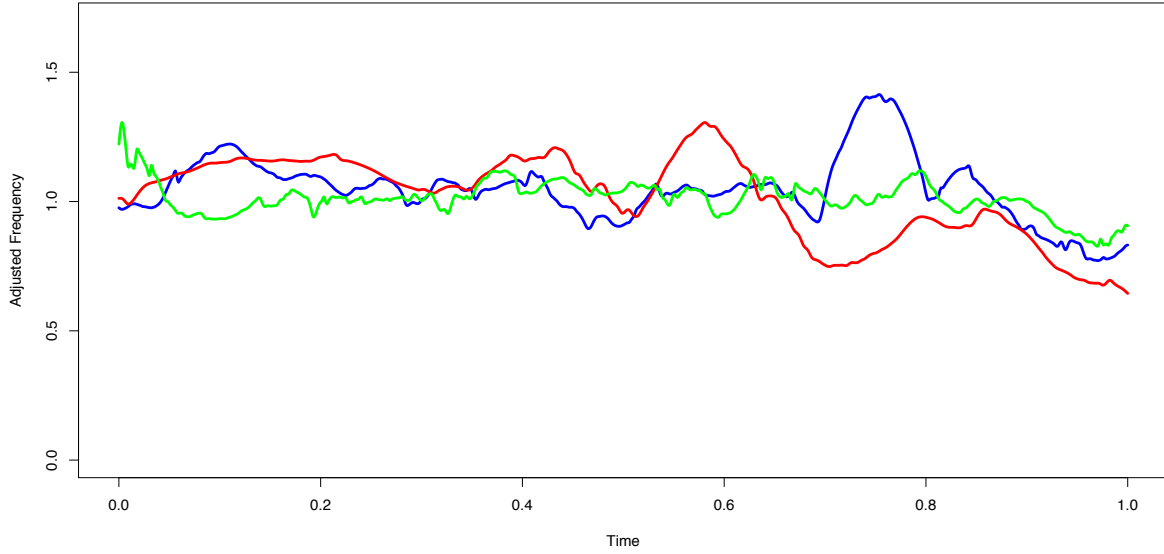
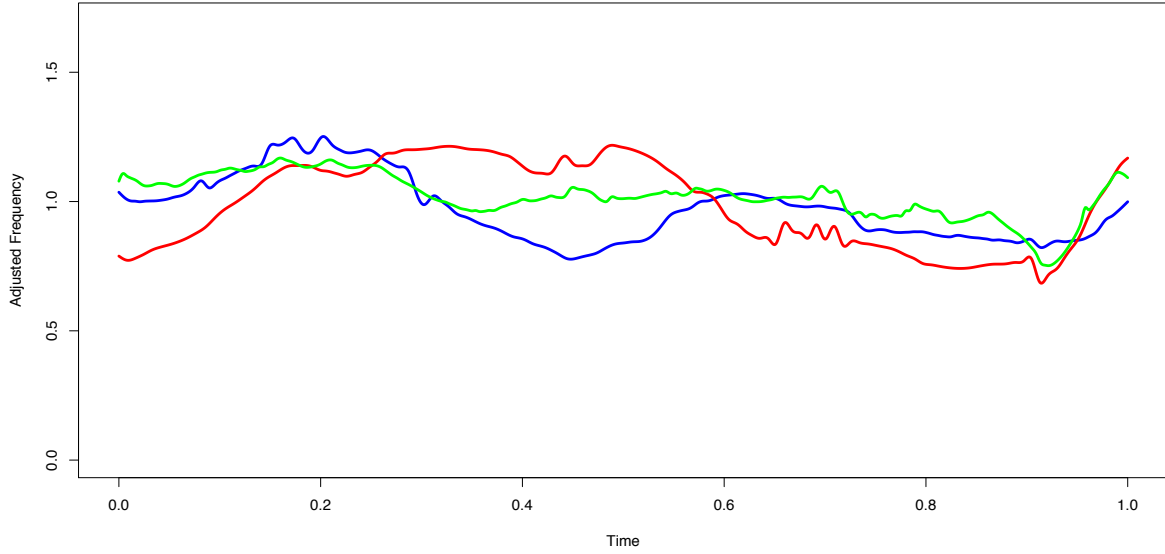Sentence 7: "Hee! me ga itamu hodo hikatteiru." (What! It's shining to bright it hurts my eyes.)
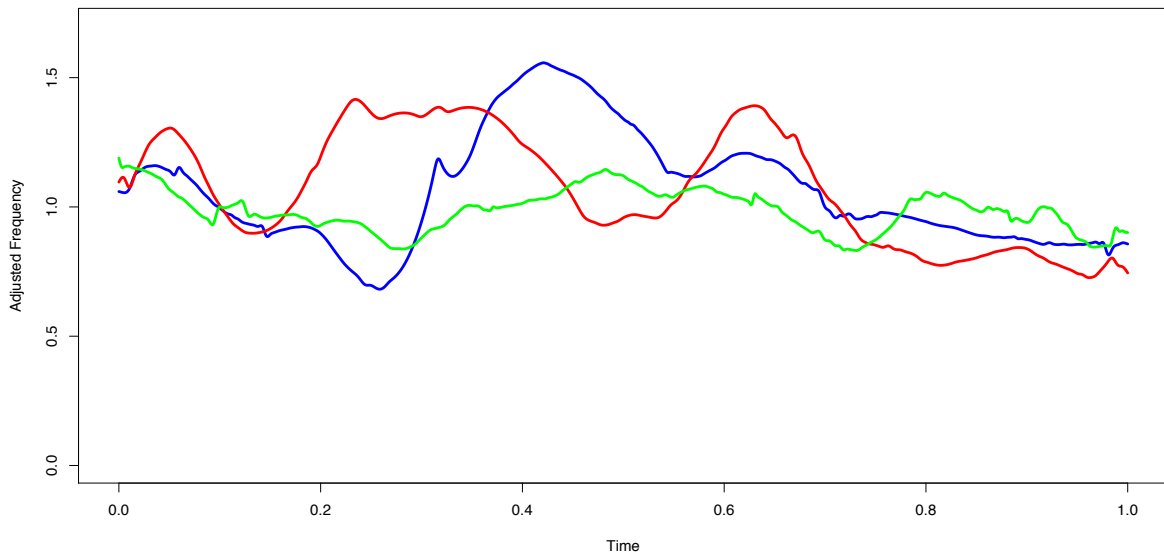
Sentence 8: "Uun. Mizuumi de oyogu." (No, I swim in the lake.)
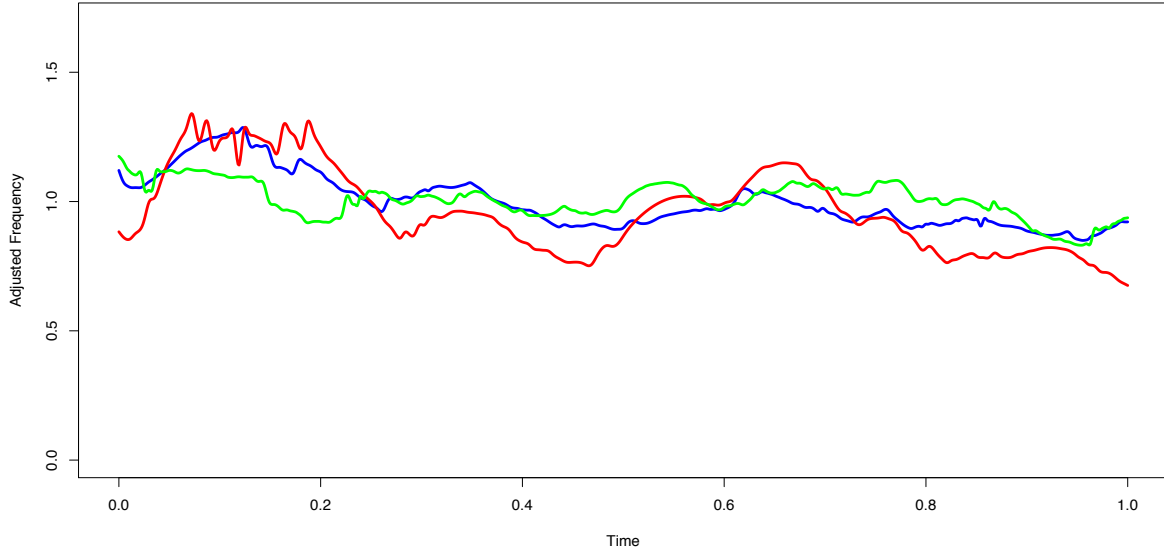
Sentence 11: "Guamu no biiru, nonda koto aru." (I've had a beer from Guam.)
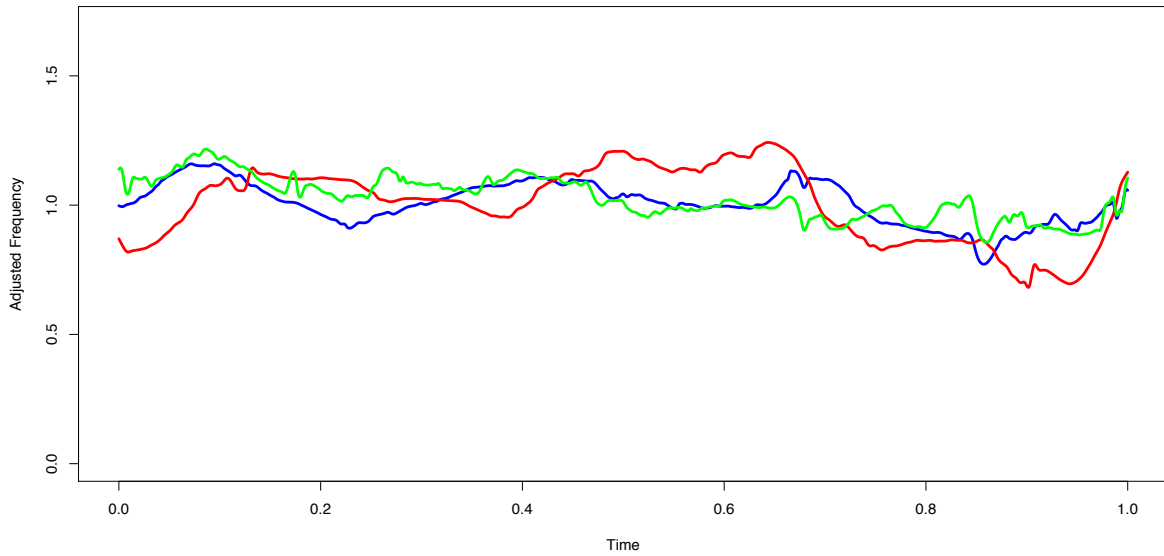
Sentence 13: "Yamada wa hana ga nagai onna da yo." (Yamada is the girl with the big nose.)

Sentence 14: "Yoyogi wa dou desu ka?" (How's Yoyogi?)
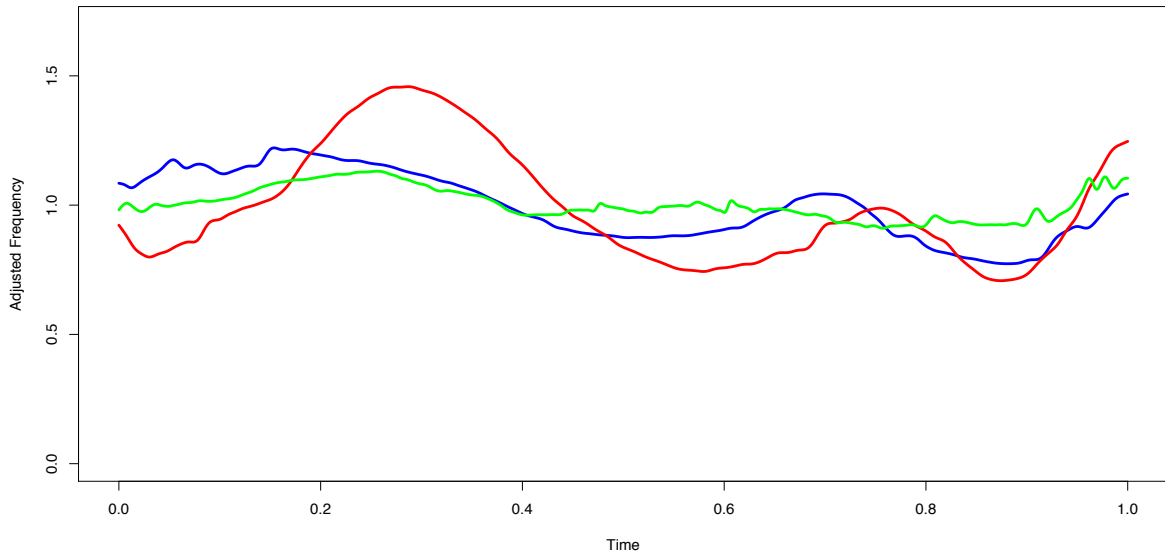
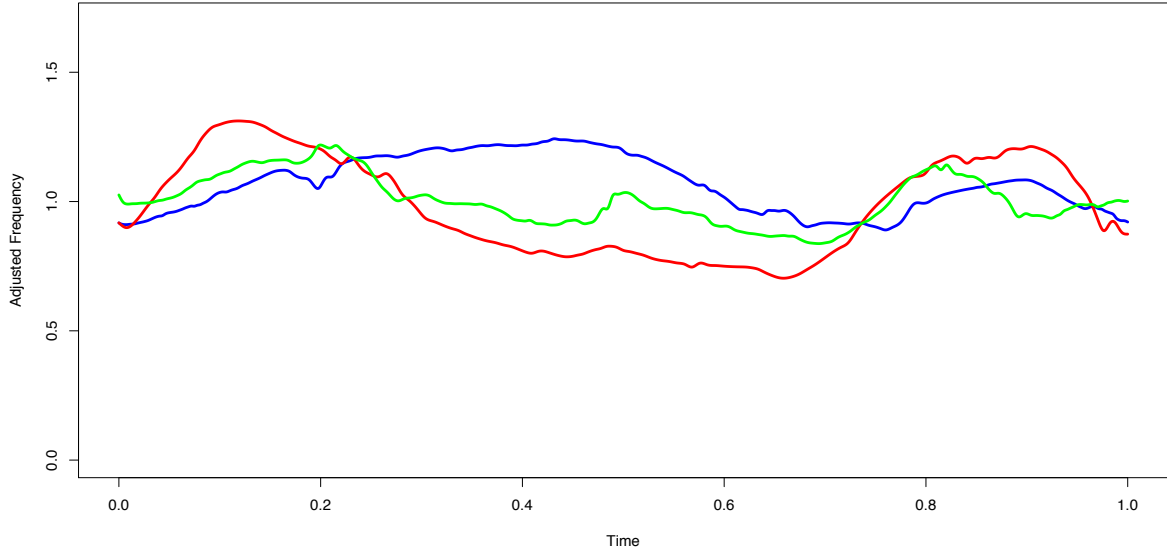Sentence 15: "Jimuin wa iru no?" (Is there a desk clerk here?)
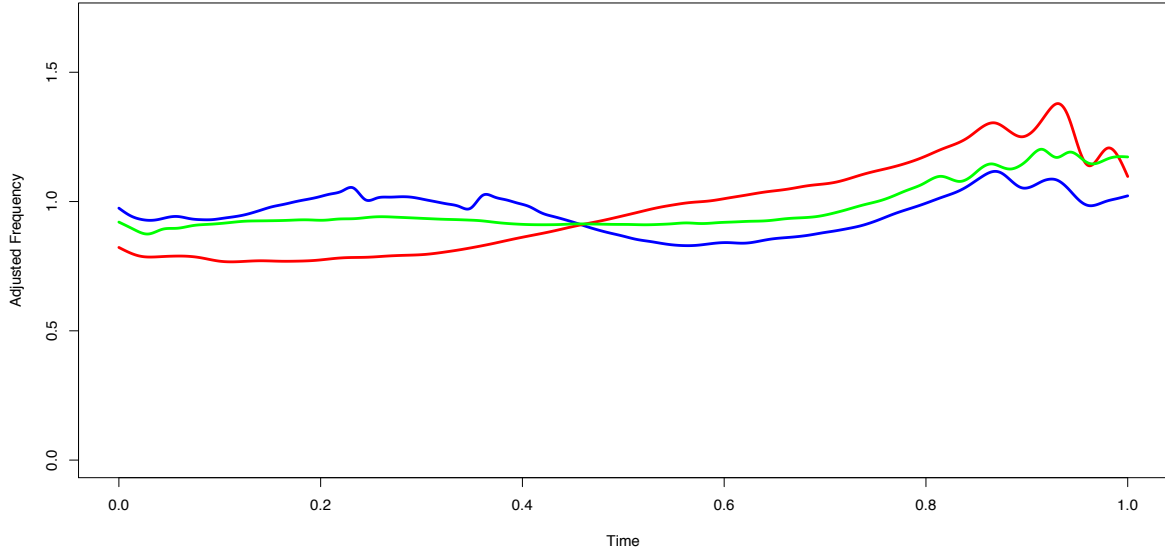
Sentence 16: "Momo no?" (The peach's?)
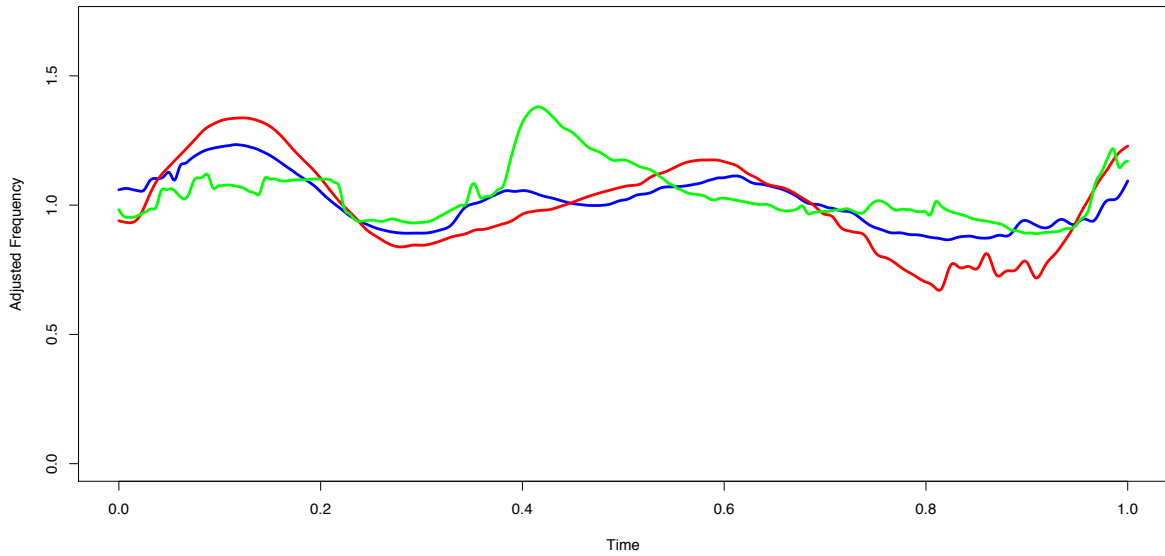
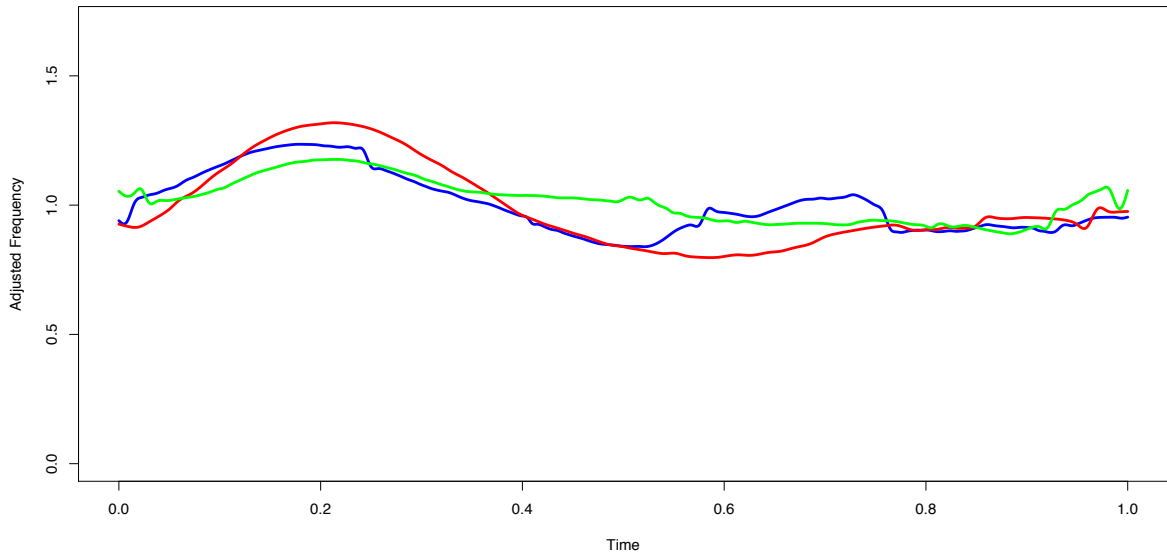Sentence 17: "Rei o kangaeta no?" (Have you thought of an example?)
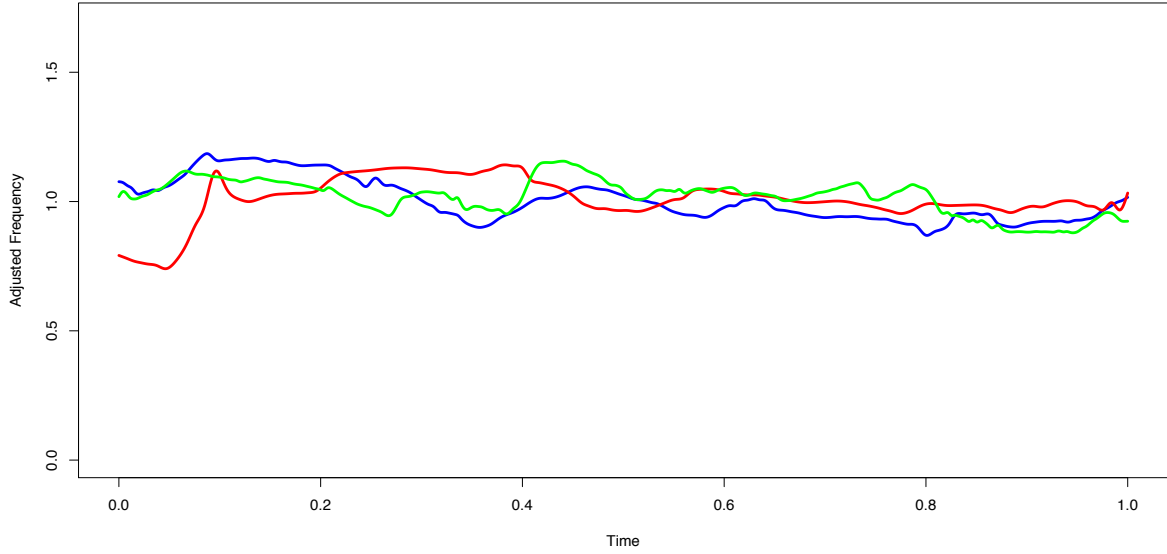
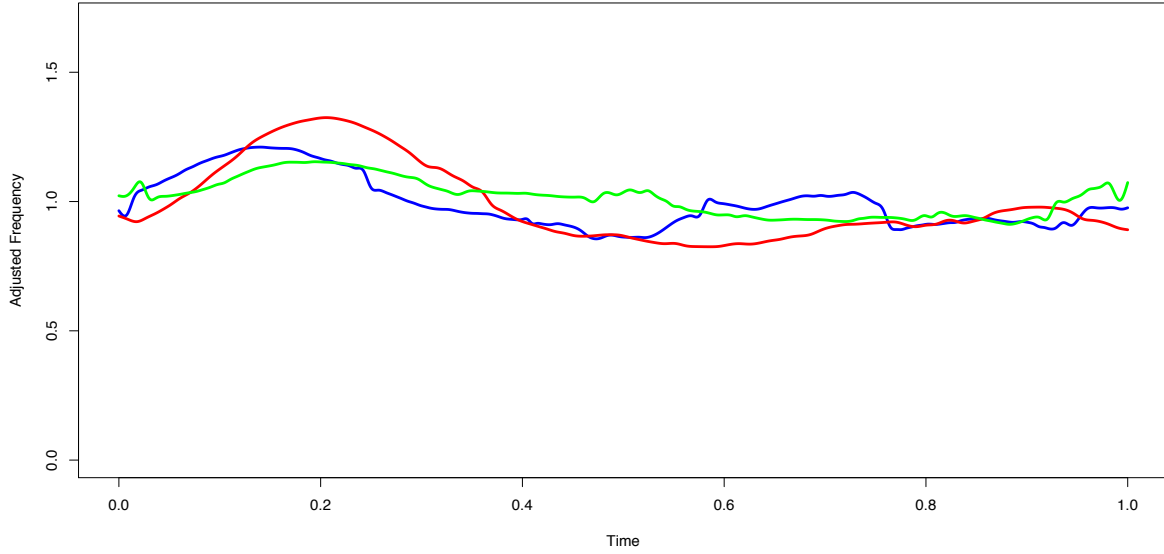Sentence 18 "Okane o kashiteageru." (I'll lend you some money.)
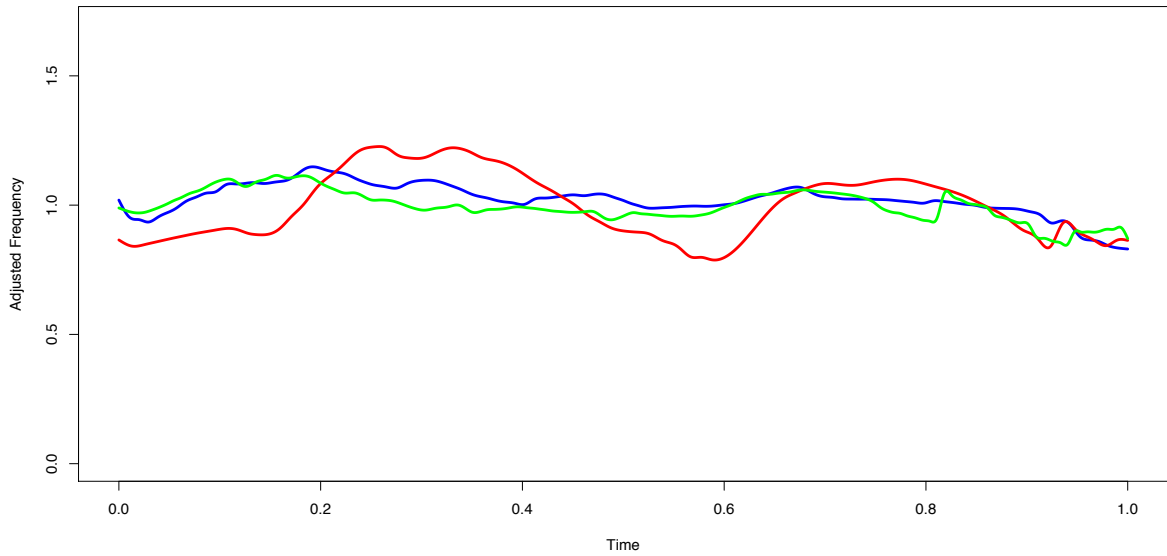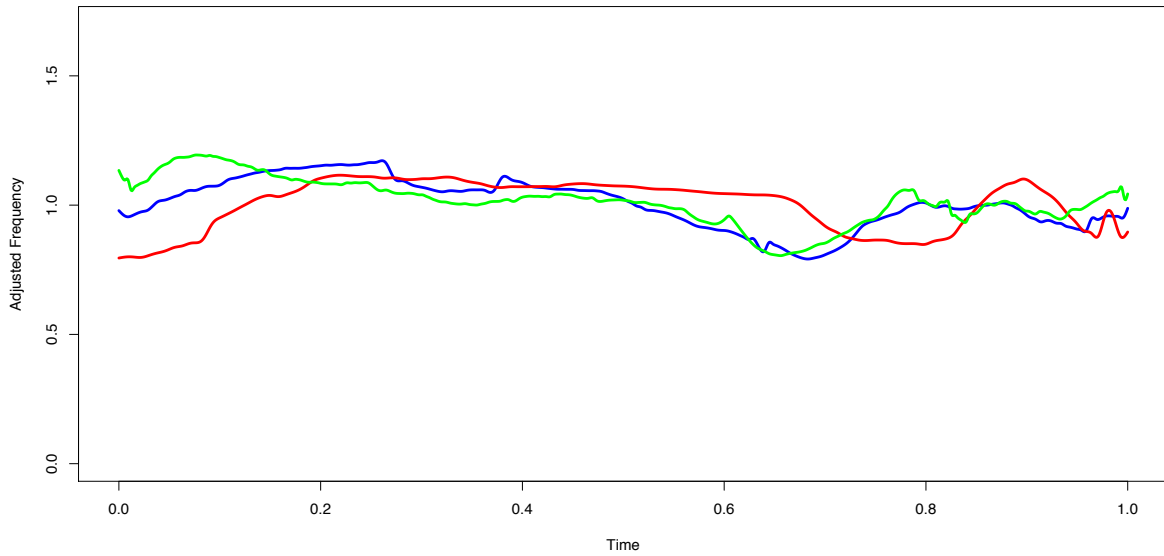

Sentence 19: "Yubi ga itee!" (My finger hurts!)

Sentence 20: "Minami-san no heya, kirei!" (Your room is gorgeous!)

Sentence 21: "Rain ni narabe." (Get in line.)

Sentence 22: "Gomi o hako ni nagero." (Throw away your garbage.)

Sentence 23: "Ore no namae o yobuna." (Don't say my name.)