Adults Still Have Direct Access to UG: Evidence from the Perception of a Non-Native Feature Contrast

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1. Introduction

The concept of a critical period in the field of phonology has traditionally been associated with the fact that most adults who have learned a second language (L2) after puberty remain with a noticeable "foreign" accent. As far as *perception* of the language is concerned, however, there is still scarce evidence in favor of or against such a critical period. In order to address this issue, an experiment was conducted to investigate whether it is possible for adult (post–puberty) learners to perceive a phonological contrast that does not exist in their L1. The results obtained by 36 native Japanese speakers on a task evaluating their perception of the English phonological contrast [distributed] ([s-θ] and [z-ð]) suggest that this hitherto novel feature was learnable by these L2 learners as nearly half of them performed like the English controls on this contrast.

To the extent that the Japanese participants did not, however, perform equally on the novel contrast, we also conducted exploratory analyses to see if there may be factors related to the Japanese speakers' performance on the feature [distributed]. Four factors were evaluated: 1) age of arrival, 2) time spent in the L2-speaking country, 3) gender and 4) whether the participants were enrolled in an ESL class at the time of testing. While we did not find evidence of a relation between the two former factors and the score obtained on the task, the two latter factors were found to be correlated with the test results at a significant level.

The remainder of this article is structured as follows: The next section (2) presents a brief overview of studies that have investigated the critical period hypothesis for the acquisition of an L2 in production (2.1) as well as in perception (2.2). Section 3 describes the methodology used for the experiment conducted to evaluate the perception of the feature [distributed] by native Japanese adult learners of English. The results of this experiment are reported in section 4, along with a discussion of the overall and individual results obtained by the 36 Japanese participants, as compared to the 16 English controls. Section 5 reports on further analyses that were conducted to evaluate the role of different factors suspected to be related to performance on the perceptual task. Our conclusion is presented in section 6.

2. Review of the Critical Period Hypothesis (CPH)

2.1 CPH in Production

The idea of a critical period for language acquisition—which is generally presumed to occur somewhere around or before puberty—implies that after that period or age, it should be impossible for L2 learners to achieve a native-like performance in the L2. While there are a few documented cases of individuals who, apparently, have succeeded against all odds to master an L2 with a native-like or near native-like accuracy past this period (Bongaerts, Planken & Schils, 1995; Ioup, Boustagui, El Tigi & Moselle, 1994), most previous studies have shown that the earlier one starts to learn a second

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language, the more likely one will reach a native-like pronunciation (Asher & Garcia, 1969; Oyama, 1976; Seliger, Krashen & Ladefoged, 1975, interalia). These latter studies are generally taken as providing support for the CPH.

Studies conducted by Flege, Munro and Mackay (1995) and Flege, Yeni-Komshian and Liu (1999), however, do not totally support the CPH, suggesting instead that the degree of foreign accent decreases gradually, principally as a function of the age at which the L2 learners arrived in the L2-speaking country. The 240 native Korean speakers evaluated in Flege, Yeni-Komshian and Liu's study (1999) arrived in the United States between 1 and 23 years of age, and had lived in the US at the time of testing for 15 years on average. The accent ratings for these subjects, based on a scale of 1 (strong accent) to 9 (native-like accent), fail to show the expected sharp decrease in pronunciation accuracy around a given critical age. Instead, the degree of foreign accent of these subjects appears to increase progressively both before and after the hypothetical critical period (whether posited at 12 or 15).

The study conducted by Flege et al. (1995) with 240 native Italian speakers who arrived in Canada between 2 and 23 years old and had lived in Canada for an average of 32 years shows a similar pattern, indicating that an important factor related to pronunciation accuracy is the age of arrival in the country where the language is spoken. The earlier the L2 learners arrived in the country, the more native-like their performance was. All the L2 learners evaluated in those studies (whether Italian or Korean) who arrived after puberty, however, spoke with a strong foreign accent. This suggests that even if there is not a critical age *per se* for the acquisition of an L2 in production (but a gradual decrease in production ability), most adult learners are still expected to be unable to master the L2 with a native-like accuracy.

Another interesting finding of Flege et al. (1995) is that the degree of foreign accent of their native Italian speakers appears to be correlated with gender. Female Italian subjects performed generally better (more native-like accent) than their male counterparts if they arrived before the age of 12, whereas the inverse was true for Italian speakers who arrived in Canada after 16 years old. No intervening factors (such as motivation, frequency of use of English and Italian or attitudes towards pronunciation) were found to explain this gender discrepancy.

2.2 CPH in Perception

Despite evidence (mostly from production studies) pointing towards the failure of adult L2 learners to reach a native-like accuracy in an L2, it has been argued that ability in *perception* better represents one's real language competence, as performance in production may be affected by factors not directly related to the underlying linguistic ability (referred to as Universal Grammar or UG) (Martohardjono & Flynn, 1995; Brown, 1998, 2000, etc.) By analogy, it is like your knowledge of a topic versus your score on an exam evaluating this knowledge. While you might know the topic in depth, you may still fail to provide the right answers or explain them properly on the exam. Hence, your score on the exam does not necessarily reflect your real knowledge, but only your ability to express this knowledge under stress, time pressure, and so on. Understandably, both ability in production and perception are like an "exam" and still do not provide a direct look into the underlying knowledge a person has of the language. However, as perception does not involve the control of articulatory mechanisms, it is argued to provide a more translucent window into a person's linguistic competence (or potential) than does production.

Taking for granted that perception better represents one's real language competence, the question that follows is: What are the components of the innate linguistic device that are required for the accurate perception of an L2 and how can we evaluate if these components are still active for L2 learning during adulthood? The mechanisms necessary for constructing new underlying representations (i.e. features such as [voice] or [distributed]) may arguably be posited as being components of UG (Brown, 2000). If this is the case, a generative approach to the critical period hypothesis can logically take two stands as far as the acquisition of new phonological contrasts is concerned: 1) either UG is not accessible to adult learners for biologically-related factors (e.g., brain lateralization), or 2) UG is still accessible, but the L1 phonology blocks access to the features necessary to construct new segmental representations. For the case discussed in this article, both standpoints would yield the same results; that is, if there is a critical period for phonological

acquisition, the L2 learners should be unable to acquire the non-native feature contrast evaluated in our experiment (for a discussion of the difference between those views, see Brown, 2000).

Brown's studies (1998, 2000) suggested that adult L2 learners are unable to reach a native-like performance in the *perception* of phonological contrasts that are not active in their L1. She argues that the L1 phonology prevents L2 learners from constructing new segmental representations using features absent from their L1. On the other hand, it does not prevent them from constructing segmental representations that are not present in the L1, insofar as the features necessary to construct them are already used in their L1 for other segmental contrasts. To take an example, compare the phonemic consonant inventory of North American English (NAE) to that of standard Japanese, presented in Figure 1.

NAE consonant inventory
(adapted from Celce-Murcia, Brinton & Goodwin, 1996, p.47)

p		t		k		
b		d		g		
			tʃ			
			dʒ			
f	θ	s	ʃ		h	
v	ð	z	ʒ			
m		n		ŋ		
		l	r			
w			j			

Japanese consonant inventory [1]
(adapted from Akamatsu, 1997, Vance,1987)

p	t			k		
b	d			g		
			tʃ			
	dz		dʒ			
	s		ʃ		h	
m	n					
	ɾ					
w			j			

Figure 1. Phonemic inventory of North American English versus Standard Japanese

The sound /v/ does not exist phonemically in Japanese, and therefore, is presumably not represented in this language at an abstract level. However, as the feature [continuant] necessary to distinguish /v/ from /b/ is active in Japanese to distinguish the sound /s/ from /t/, Japanese learners of English should be able to use this features to construct the representation of the sound /v/ at an abstract level. In one of her studies, Brown (2000) has shown that Japanese speakers were able to perceive the English contrast /v-b/. This is particularly interesting as these sounds are well known to be problematic for Japanese speakers in production since the fricative [β]—which is phonetically very close to [v]—is an allophone of the phoneme /b/ in Japanese (Akamatsu 1997, Vance 1987).

On the other hand, while English needs a feature under the coronal node to distinguish interdental (i.e. /θ/, /ð/) from alveolar sounds (i.e. /s/, /z/), traditionally referred to as the feature [distributed], Japanese does not need this feature since there are no interdental sounds in this language. Hence, if UG is not accessible to adult learners—either because the L1 blocks access to non-native features or because access to UG is not accessible past a certain age—then adult Japanese learners of English should not be able to distinguish English sounds contrasted by the feature [distributed]. In other words, they should be unable to distinguish /s/ from /θ/ or /z/ from /ð/.

Brown (2000) conducted an experiment evaluating the discrimination of the English /s-θ/ contrast by native Japanese speakers. First, she used a 4IAX discrimination task, which consists of presenting orally 2 pairs of words to the participants—one of which consisted of 2 phonologically identical words, the other was a minimal pair contrasted by /s-θ/. The participants had to choose which one of the 2 pairs was different. The score of Japanese speakers on this task was slightly over 80%. Although this score was higher than chance level (50%), according to an ANOVA, the performance of the Japanese participants on this contrast was significantly different from the score obtained by the English controls on the same contrast (nearly 100%). The results obtained on a picture identification task, where the subjects had to choose the picture to which the word they heard referred, yielded similar

[1] This inventory is based on the standard Japanese dialect, generally spoken in the Tokyo area and the Japanese media. As argued in Grenon (2005a, 2005b) we assume that /dz/ and /dʒ/ are phonemic in Japanese, rather than [z] and [ʒ]. The inventory presented here differs from Brown's (2000) in the following respects: Brown posits that Japanese /z/ (rather than /dz/) has phonemic status, and that [ʃ] is not a distinct phoneme in Japanese.

results, although the performance of the Japanese participants was lower on this task (about 70%). Again, the difference with the score of the English control group was found to be statistically significant.

From her results, Brown (2000) concluded that Japanese learners of English were not able to acquire the /s-θ/ contrast because their L1 is blocking access to UG, and consequently, to the feature [distributed] necessary to distinguish those sounds. In the following sections, it will be shown that the overall results of our study on the contrast /s-θ/ and also /z-ð/ concur with Brown's. However, we will argue that these results do not prove that UG is not accessible to L2 adult learners, but rather, only shows that these contrasts are indeed difficult for these learners, albeit still learnable.

3. Methodology

3.1 Subjects

Forty (40) native Japanese speakers who learned English as a second language participated in this experiment. As our study investigated if L2 learners could master the perception of a new phonological contrast after the so-called critical period, 3 of the participants were excluded from analyses because they had lived in an English speaking country for at least a year before 13 years old (which may be argued to be before the critical period), and another one was excluded from the results because of technical problems. The 36 remaining Japanese participants (11 males, 25 females) started to learn English between 11 and 13 years old in a classroom context in Japan (mean = 12 years old). Their age at the time of testing was between 19 and 66 years old (average = 23 years old). The time they have spent in an English-speaking country varies from 2 weeks to 16 years (mean = 4;5 years, that is 4 years and 5 months), and the age at which they arrived in that country was between 11 and 61 years old (average = 25 years old). None of the Japanese subjects could speak fluently other languages than English and Japanese. Table 1 provides a summary of the information related to the Japanese participants as compared to English participants.

L1	N	Age (in years)	Age started learning English (in years)	Age first stay in English-speaking country (in years)	Total time spent in English-speaking country (in months)
Japan.	36	19–66 ($\bar{X}$ = 30)	10–13 ($\bar{X}$ = 12)	11–61 ($\bar{X}$ = 25)	0.5–192 ($\bar{X}$ = 45)
Eng.	16	18–58 ($\bar{X}$ = 23)			

Table 1. Details of the participants

The Japanese participants were recruited from English language schools in Berkeley, California, or through advertisement on the Internet. For their participation, Japanese speakers were offered either a monetary compensation or a free English pronunciation course following their participation in the study (the choice was made by the participant). Most participants were university or college students (24) while the others were working in various areas, but generally had at least a college or university education.

Half of the Japanese participants (N = 18) were enrolled in an English as a Second Language (ESL) program at the time of testing. They were classified into intermediate to advanced level courses by their respective institution. The total time spent by these ESL subjects in a country where English is spoken varies from 2 weeks to 5 years, for an average of 1;4 year. On the other hand, the non-ESL participants (N = 18) had spent on average 6;1 years in an English-speaking country (between 2 months and 16 years). Table 2 provides a summary of the details pertaining to ESL versus non-ESL participants.

ESL	N	Age (in years)	Age started learning English (in years)	Age first stay in English-speaking country (in years)	Total time spent in English-speaking country (in months)
Yes	18	19–66 ($\bar{X}$ = 30.5)	10–13 ($\bar{X}$ = 12)	11–61 ($\bar{X}$ = 27)	0.5–60 ($\bar{X}$ = 16)
No	18	20–42 ($\bar{X}$ = 30)	10–13 ($\bar{X}$ = 12)	16–35 ($\bar{X}$ = 23.5)	2–192 ($\bar{X}$ = 73)

Table 2. Details of ESL and non-ESL Japanese participants

The control group consisted of 16 native English speakers (7 males, 9 females), 15 born and raised in the USA and 1 in Canada. Two more English participants were tested but excluded from analyses because they learned another language besides English as children (at home). All the English speakers were university students in different fields of study recruited from the Psychology Subjects Pool at the University of California, Berkeley. They received a course credit for their participation. The mean age for this group was 23 years old (from 18 to 58 years old).

3.2 Stimuli

Nine nonsense English minimal pairs distinguished by the feature [distributed] were used to assess the perception of this feature contrast in three different positions (word-initial, word-medial and word-final positions). The complete list of stimuli is presented in Table 3. Three of the stimuli contrasted the voiceless pair [s] versus [θ], and 6 the voiced sound pair [z-ð]. More stimuli were used to evaluate the voiced contrast because the focus of the original research was on contrasts involving the English sound [z]. In fact, the perceptual task completed by the participants included a total of 80 series of tokens assessing 6 different feature contrasts and including 17 foils. However, for the purposes of the present article, we are only going to present and discuss the 9 stimuli that were used to assess the non-native feature contrast [distributed] (for more details about the other features evaluated, the interested reader is referred to Grenon, 2005a).

Sound contrast	Word-initial	Word-medial	Word-final
/s-θ/	/sɪd-θɪd/	/nésəd-néθəd/	/dæs-dæθ/
/z-ð/	/zug-ðug/ /zæb-ðæb/	/æze-æðe/ /kúzɪŋ-kúðɪŋ/	/miz-mið/ /tez-teð/

Table 3. Stimuli used to assess the perception of the feature [distributed]

3.3 Task and Procedure

The task used for the experiment consisted of a perceptual discrimination test. Participants were asked to circle, on their answer sheet, the numbers corresponding to the words that were the same, if any, of each series of three that they heard, as exemplified in (1). The words were presented only orally through headphones.

(1) Example of question and answer for the test:

Series (presented orally):	[ho]	[ko]	[ko]	
Answer sheet:	1	②	③	none

Two (1-2, 2-3, or 1-3), three (1-2-3) or none of the words of each series could be the same, decreasing the possibility of getting the right answer through guessing to 20% (as opposed to 50% for the tasks used by Brown, 2000, discussed in the previous section). Since only the foils could consist of 3 identical or 3 different words, a good response for the target items was considered only when the participant circled the two numbers corresponding to the words that were phonologically identical. In

the example in (1), these would be number 2 and 3. Any other combination for this example (e.g., 1–3 or 1–2 or 1–2–3 or none) would be considered as a wrong answer.

The series of words were prerecorded on a DAT recorder by a native female speaker of standard American English, so the stimuli were the same for all subjects. Each series of words was pronounced twice. None of the words or series were digitally copied, so the pronunciation of each and every word was acoustically unique (i.e. different from each other) in order to force participants to ignore irrelevant phonetic variations and classify words on a phonological basis. The interval between each word of the same series was of 1000ms, between the repetitions 2500ms and between each new series 2500ms. The stimuli were entirely reversed for half of the subjects.

4. Results and Discussion

The average score obtained by the Japanese speakers on the /s-θ/ contrast, as shown in Figure 2, was 87% as compared to 98% for the English controls. The difference between the two groups on this sound contrast was slightly significant according to an independent samples *t*-test with equal variances not assumed ($t(49) = 2.625$ $p<.05$). The effect size was $r = .266$.

The average score on the /z-ð/ contrast for the Japanese participants was 74%, while the English speakers had 96% of good responses on the same contrast. Their respective score are represented in Figure 2 as well. The difference between the experimental and the control group on this contrast was highly significant ($t(49) = 5.625$ $p < .001$) and the effect size was also quite large ($r = .505$). Interestingly, discrimination of the voiced sound pair /z-ð/ was more problematic for our Japanese participants than discrimination of the voiceless sound pair /s-θ/, although both sound pairs were evaluating the same feature contrast (i.e. [distributed]). According to a paired-samples *t*-test the difference between the score of the /s-θ/ and /z-ð/ contrast by Japanese speakers is also statistically significant ($t(35) = -3.242$, $p < .01$).

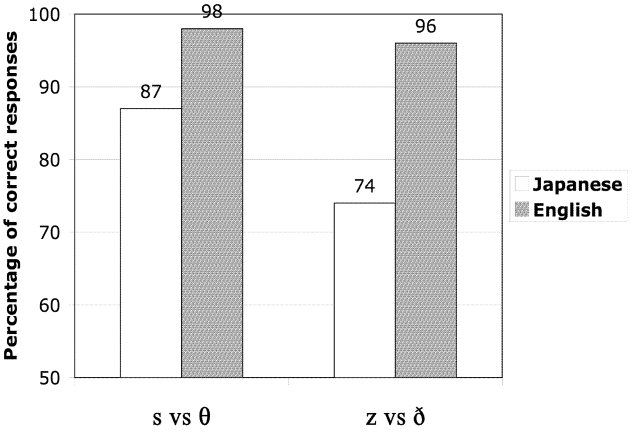

Figure 2. Results on the /s-θ/ and /z-ð/ contrasts

The overall results on the feature [distributed] when combining the 9 sound pairs evaluating the /s-θ/ and /z-ð/ contrasts show a significant difference between the Japanese (78%) and the English (97%) group ($t(46) = 5.722$, $p < .001$ $r = .501$). Their respective score is illustrated in Figure 3.

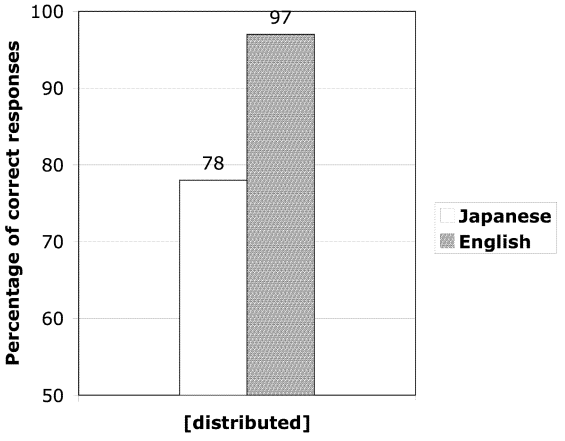

Figure 3. Results on the feature [distributed]

Thus far, the results obtained on our experiment concur with those reported by Brown (1998; 2000), discussed in the previous section, although the significant difference found between the perception of the voiceless /s-θ/ and the voiced /z-ð/ contrast is unexpected, and suggest that perception of sound contrasts is not solely constrained by the perception of phonological features. While Brown (2000) concluded that her results provide support for the fact that the non-native English contrast is unlearnable by native Japanese participants, we argue instead that her results as well as the results reported here do not prove that these learners cannot acquire those sounds, but only shows that these sounds are significantly difficult for them. To support this claim, we have reported in Table 4 the individual results of the 36 Japanese participants.

Score (out of 9)	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
# Participants	2	1	1	8	9	9	6	36
% Participants	5%	3%	3%	22%	25%	25%	17%	100%

Table 4. Distribution of Japanese individual scores on the feature [distributed]

On the first row of Table 4 are the possible numbers of correct responses out of 9 tokens used to assess the feature [distributed]. The second row of the table presents the number of participants who obtained the score reported on the above line, and on the third row this number is simply presented in percentage. Thus, out of 36 Japanese speakers, 6 of them got a perfect score (9/9), which represents 17% of the Japanese speakers who participated in this study, and 9 of them (25%) got almost a perfect score (8/9). Considering that a score of 8 or 9 out of 9 corresponds to a native-like performance[2] that means that 42% of our Japanese participants performed like the English control group on this contrast.

It is also worth mentioning that provided that the chance level on our task was only 20%–as opposed to 50% for Brown's tasks–all our participants performed, technically, above chance level (2/9). And because the chance level was quite low in this task, it is very unlikely that a score of 8 or 9 out of 9 may have resulted from guessing. These results, therefore, strongly suggest that the non-native feature contrast had indeed been acquired by a considerable number of adult L2 learners (nearly half of them), which challenges the idea that there is a critical period for phonological acquisition, as far as perception of phonological contrasts is concerned.

In section 2.1, we discussed studies by Flege et al. (1995) and Flege et al. (1999), which suggested that in production as well there does not seem to be a clearly identifiable critical period or critical age for pronunciation accuracy. Nonetheless, it was found that performance in pronunciation (in terms of

[2] The criterion for native-like performance was calculated by taking the mean of the English control group on that contrast minus one standard deviation (mean (8.86879) – 1 std. dev. (0.4787) = 8.2 ~8/9).

native-like accent) appears to decline considerably with the age at which L2 learners arrived in the L2-speaking country, provided that they have stayed in that country for a considerable number of years. Given that some of our Japanese participants performed like the control group on the sound contrasts evaluated while others did not, we investigated if their performance in perception also declined as a function of some factors, and looked at whether those factors may be biologically related (e.g., related to age).

5. Evaluation of Possible Factors Related to Performance in Perception

5.1 Age of Arrival in L2-speaking Country

Since all the Japanese subjects in this study started to learn English in a classroom context in Japan at about the same age (12 years old), the age at which they started to learn English cannot explain the variations obtained in our results (though we are aware that the teaching techniques used in the classroom may have affected their degree of learning). On the other hand, as all our subjects had lived in an English speaking country, it is worth evaluating if the age at which they arrived in that country may have had an impact on their results.

Figure 4 shows the distribution of our Japanese participants' scores (*y*-axis) as a function of their age of arrival in the L2-speaking country (*x*-axis). A regression analysis conducted on these data did not report any significant relationship between age of arrival and score on the non-native contrast ($F(1,34) = .482$ $p > .05$). However, unlike the studies done in production by Flege et al. (1995) and Flege et al. (1999) where all the subjects had been living in the country for many years, some of our Japanese subjects had been in the L2-speaking country for a very short time, such as 2 weeks, which could conceal a relationship between age of arrival and perceptual ability. Further analyses conducted on the results of participants who had been in the country for at least 1 year (N = 21), and at least 2 years (N = 19) still failed to show a significant relationship between the scores on the task and age of arrival ($p > .05$ for both analyses). Therefore, we did not find evidence of a relationship between these two variables in our experiment. Given that our participants had lived in the L2-speaking country for a wide range of periods, however, it was worth investigating if the length of immersion in the country may have impacted their ability to master the target non-native feature contrast. These results are presented and discussed in the following section.

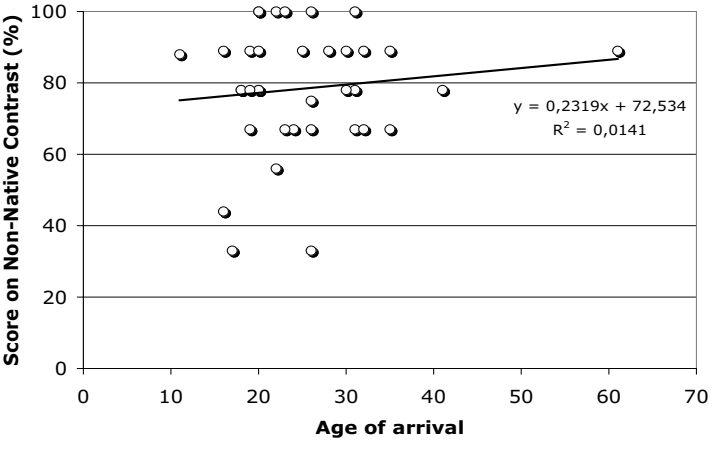

Figure 4. Results according to age of arrival in the English–speaking country

5.2 Total Time Spent in L2-speaking Country

It is generally assumed that spending time in the country where the target language is spoken should enhance the acquisition of the L2, especially in the case of pronunciation and perception. The Japanese speakers who participated in our study had lived in an English speaking country for various

amounts of time. Some had been there only for 2 weeks at the time of testing, others for up to 16 years. We conducted a regression analysis to verify if "the longer the better" applies for the case evaluated here.

The regression analysis showed a significant relationship between the time spent in the L2 country (*x*-axis) and score on the non-native contrast (*y*-axis) ($F(1,34) = 4.924$ $p < .05$). However, this relation was negative (B= -.356), which inconveniently suggests that the more time the subjects had spent in the country, the worse they were at distinguishing /s/ from /θ/ and /z/ from /ð/. This quite unusual and unexpected finding, though, appears to be the result of other intervening elements. The apparent significant relationship appears to be due to a single result–the one presented with a triangle shape at the right lower end side of Figure 5–which attracts the regression line to itself. When this result is excluded from the analysis, the regression line becomes non-significant (F (1,33) = 1.385 $p > .05$), although it remains negative (B = -.201). This means that in our data, the time spent in the L2 speaking country is a poor and unreliable predictor of the scores on the perceptual task. The negative tendency related to the length of stay in the English country, on the other hand, is likely to be a simple side effect of another factor, which was found to be a better predictor in our data set. This factor (effect of ESL class) is discussed in section 5.4.

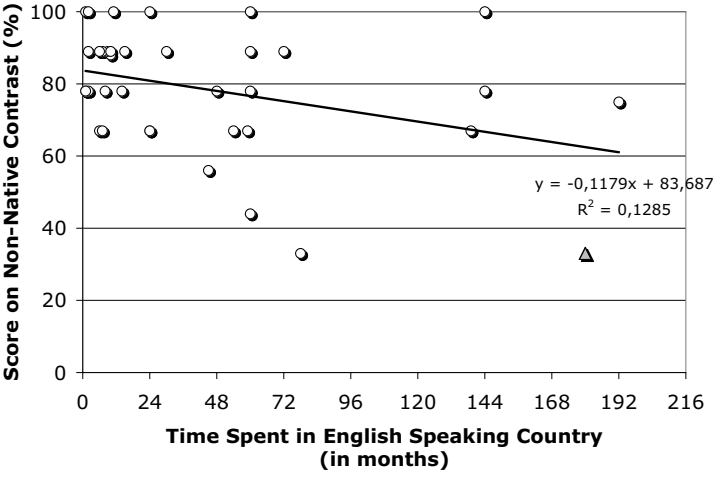

Figure 5. Results according to time spent in the English-speaking country

5.3 Gender

Like the study of Flege et al. (1995), we found a gender difference in the case of L2 perception accuracy of the novel phonological contrast. Our female Japanese participants performed better on the feature [distributed] (83%) than their male counterparts (67%) as shown in Figure 6. An independent samples *t*-test indicates that this difference is significant at a level of $p < .01$ ($t(34) = -2.93$, $r = .449$). It is true that there were more female than male participants in the present study and whether this difference is simply due to our particular sampling may need further investigation.

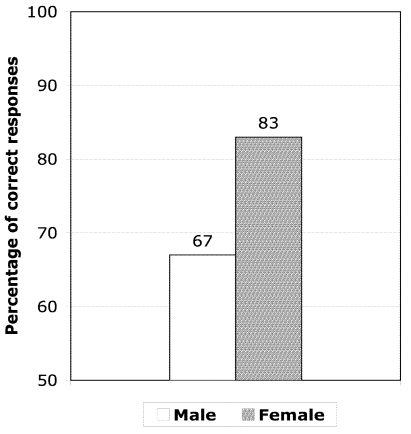

Figure 6. Results according to gender (Japanese speakers only)

5.4 Taking an ESL Class

One of the most unexpected findings of our exploratory analyses is the results of a *t*-test that indicates that the participants who were enrolled in an ESL program at the time of testing performed significantly better than those who were not ($t(34) = -3.422$, $p < .01$). And again, the effect size is also considerably large ($r = .506$). As illustrated in Figure 7, the ESL participants had an average score of 87% compared to 70% for the non-ESL group. This is particularly surprising given that the ESL participants had spent, on average, far less time in the L2-speaking country (1 year and 4 months) than the non-ESL participants (6 years and 1 month). And this likely explains the negative relationship found earlier (section 5.2) between score on the task and the time spent in the L2 speaking country.

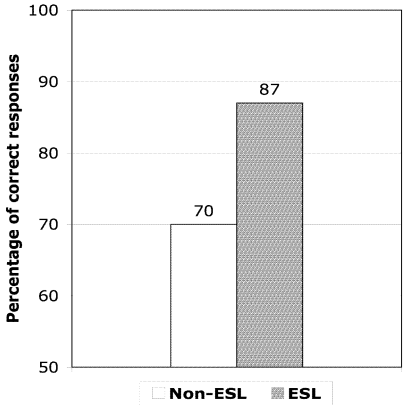

Figure 7. Results for ESL versus non-ESL Japanese participants

Provided that there were more females (N=25) than males (N=11) in our experiment, the ESL effect could be argued to be an effect of gender (or vice versa). There were, indeed, more female participants in the ESL group (15 females versus 3 males) than in the non-ESL group (10 females and 8 males). Nonetheless, even when controlling for gender, the regression analysis reveals that the effect of ESL remains significant at a level of $p < .01$, although the effect of gender, when controlling for ESL is reduced to a significant level of $p < .05$ (as opposed to $p < .01$ as discussed in 5.3). Hence, the fact that participants were currently enrolled in an ESL program at the time of testing is the stronger predictor that we found to account for the variability in our data set.

6. Conclusion

The results obtained from 36 native Japanese speakers on a task assessing their ability to perceive an English phonological contrast that does not exist in Japanese (i.e. [distributed]) suggest that there is no critical period for the perception of non-native feature contrasts. Assuming that features are mechanisms used to construct segmental representations at an abstract level, and that these mechanisms are part of an innate linguistic device (i.e., UG), L2 learners presumably still have direct access to UG after childhood.

Exploratory analyses conducted on our data failed to reveal any significant relationship between perception of the new feature contrast and age of arrival in the L2-speaking country. These results challenge the idea that perception of novel segmental contrasts may be constrained by biological factors, whether drastically (i.e. critical period) or gradually (as appears to be the case in production studies conducted by Flege et al. (1995) and Flege et al. (1999), discussed in Section 2.1). The time spent in the L2-speaking country was also found to be a poor predictor of the scores obtained on the perceptual task.

On the other hand, we found a significant relation between gender and ability to perceive the evaluated sound contrasts: Female L2 learners performed better on average than their male counterparts. We also found that learners who were enrolled in an ESL class at the time of testing performed with significantly higher accuracy than those who were not, even if the ESL subjects had spent far less time in the U.S. than the non-ESL subjects. It is not clear at this point if enrolment in a regular ESL class without specific pronunciation instruction has only a short-term effect or whether it also has a long-term effect. It is also important to note that even though we did not find an effect of length of stay in the US on the perception of the non-native feature contrast, this variable may still have an effect provided that all subjects are enrolled in an English Language program.

In a future study, we plan to evaluate if participants recruited at an English school in Japan would perform with similar accuracy on problematic English sound contrasts as participants recruited at an English school in an English-speaking country (Canada). We also want to investigate if specific pronunciation instruction may have a greater impact on perceptual ability than regular language instruction, in both immersion (Canada) and non-immersion (Japan) contexts. The larger issue at stake here is whether language instruction enables adult L2 learners to construct novel abstract phonological representations, and whether immersion in the L2-speaking country contributes significantly to this end.

References

Akamatsu, T.(1997). *Japanese phonetics: Theory and practice*. Newcastle: Lincom Europa.

Asher, J. & Garcia, R. (1969). The optimal age to learn a foreign language. *Modern Language Journal, 53*, 334–341.

Bongaerts, T., Planken, B., & Schils, E. (1995). Can late learners attain a native accent in a foreign language? A test of the critical period hypothesis. In D. Singleton & Z. Lengyel (Eds.), *The age factor in second language acquisition* (pp. 30–50). Clevedon: Multilingual Matters.

Brown, C. A. (2000). The interrelation between speech perception and phonological acquisition from infant to adult. In J. Archibald (Ed.), *Second language acquisition and linguistic theory* (pp. 4–63). Malden, MA & Oxford: Blackwell Publishers.

Brown, C. A. (1998). The role of the L1 grammar in the L2 acquisition of segmental structure. *Second Language Research, 14*(2), 136–193.

Celce-Murcia, M. , Brinton, D. M. & Goodwin, J. M. (1996). *Teaching pronunciation: A reference for teachers of English to speakers of other languages.* Cambridge: Cambridge University Press.

Flege, J. E., Yeni-Komshian, G.H., & Liu, S. (1999). Age constraints on second-language acquisition. *Journal of Memory and Language, 41*(1), 78–104.

Flege, J. E.,Munro, M. J., & MacKay, I.R. A. (1995). Factors affecting strength of perceived foreign accent in a second language. *Journal of the Acoustical Society of America, 97*(5), 3125–3134.

Grenon, I.(2005a). Perception of the English phoneme /z/ by native Japanese speakers: The role of Feature Geometry. Unpublished MA thesis, Laval University, Québec city, Canada.

Grenon, I. (2005b). The status of the sound [z] in Japanese. *Revue Langues et Linguistique, 31*, 64–90.

Ioup, G., Boustagui, E. El Tigi, M., & Moselle, M.(1994). Reexamining the critical period hypothesis: A case study of successful SLA in a naturalistic environment. *Studies in Second Language Acquisition, 16*, 73–98.

Martohardjono, G. & Flynn, S. (1995). Is there an age factor for universal grammar? In D. Singleton, & Z. Lengyel (Eds.), *The age factor in second language acquisition: A critical look at the critical period hypothesis* (pp. 135–153). Clevedon, England: Multilingual Matters.

Oyama, S. (1976). The sensitive period for the acquisition of a nonnative phonological system. *Journal of Psycholinguistic Research 5*, 261–285.

Seliger, H., Krashen, S. & Ladefoged, P.(1975). Maturational constraints in the acquisition of second language accent. *Language Sciences, 36*, 20–22.

Vance, T. J. (1987). *An introduction to Japanese phonology.* Albany: State University of New York.

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