

L1 Interference in L2 Prosody: Contrastive Focus in Japanese and Persian

Ayat Hosseini

Abstract

本稿の目的は、日本語とペルシア語の対比焦点を形成する機構を比較し、その外国語学習への影響を明らかにすることである。まず、実験1では、ペルシア語における焦点の音響的特徴を検討し、日本語のそれと比較した。結果、両言語は基本的に類似した機構を利用するが、日本語では焦点を当てるのに句末境界音調 (boundary pitch movements) を利用するのに対して、ペルシア語にはそのようなものが存在しないということがわかった。実験2では、実験1で見られた相違点が母語干渉として言語学習者の発話に現出するかどうか調査した。結果として明らかになったのは、ペルシア語を学習している日本語母語話者は、多くの場合、ペルシア語の対比焦点構造において日本語と同様に句末境界音調を利用し、日本語を学習しているペルシア語母語話者は日本語の対比焦点の際にこの機構を用いないということである。つまり、母語の対比焦点を形成する機構を外国語の場合にも適用するという母語干渉が起こっているということが示された。

Key Words: L1 interference, contrastive focus, prominence-lending rise, Japanese, Persian

1. Introduction

The current study makes a cross-linguistic comparison of the mechanisms used in marking contrastive focus in Japanese and Persian. Contrastive focus also known as corrective focus is a specific term that refers to prosodic emphasis used to explicitly contrast two actions or events in the discourse (Scarborough, 2007). Languages use similar mechanisms to mark contrastive focus (henceforth focus), which include pitch range expansion on focused element, or prosodic reduction of post-focal material. However, there are language-specific mechanisms of prominence marking that vary from one language to another. This study concentrates on one such mechanism, namely *prominence-lending rise*, which is present in Japanese, but absent in Persian. The difference between the two languages is investigated in terms of first language (L1) interference effects in second language (L2). The current work is particularly of importance to the area of language acquisition, since it contributes to the fact that some errors in production of L2 prosodic

structure are predictable as transfer errors of L1.

Section 2 introduces the mechanisms of focal prominence marking in Japanese. Section 3 details experiment 1, that evaluates acoustic correlates of focus in Persian. Section 4 presents experiment 2, which was conducted to investigate the L1 transfer errors in the speech of Japanese native speakers who are learning Persian, and Persian speakers who are learning Japanese. Section 5 provides a general discussion and conclusion of the findings and analyses presented in this paper.

2. Contrastive focus in Japanese

According to Venditti, Maekawa and Beckman (2008), Japanese uses four main mechanisms to mark focal prominence, namely local pitch range expansion, prosodic restructuring, post-focal subordination and prominence-lending boundary pitch movements.

Local pitch range expansion is observed around the high tone of the accent in lexically accented accentual phrases (APs). In unaccented APs that do not contain the sharp fall in f_0 , the pitch range expansion is most easily observed on the phrasal high tone at the beginning of the AP.

Prosodic restructuring refers to a phonological process in which the boundaries of prosodic phrases are deleted after the focused element. Kori (1997: 178) refers to this as “weakening the autonomy of post-focal words”. Pierrehumbert and Beckman (1988) indicate that in Japanese, prosodic restructuring groups the post-focal material into the same AP as the focused word.

Post-focal prosodic subordination as Venditti, Maekawa and Beckman (2008) describe it, is realized in various ways, which can be modeled in terms of more or less elaborate manipulations of the prosodic structure. In the simplest case, the only feature that is affected is the pitch range; there is an extreme pitch range reduction on all words in the post-focal region, but all tone targets are realized in the F_0 contour. Quite often, however, it is accompanied by Prosodic restructuring.

In Japanese sometimes sudden changes in F_0 occur at the end of a prosodic phrase after its low boundary tone. These events are called *boundary pitch movements*. Venditti, Maekawa and Beckman (2008) state that these movements can be a simple rise, a concave rise, a rise-fall, or some even more complicated F_0 movements. Boundary pitch movements are used to mark focal prominence in Japanese, in which case, they are placed at the right edge of the AP containing the focused element. When a boundary pitch movement is used to mark prominence, it is called *Prominence-Lending Rise* (PLR). The PLR is often used when the focused word has a particle (*kaku joshi*). In this case the pitch expansion is realized on the focused word, and the PLR occurs on the particle. Since the PLR often occurs on phrases ending with a particle, many accounts of its form and function use terms such as “prominent particles” (Venditti, Maekawa and Beckman, 2008).

3. Contrastive focus in Persian

In Persian stress is on the last syllable of lexical (content) words and a lexical word with its enclitics form an AP. Sadat-Tehrani (2007) states that a focused element in Persian forms an AP, which has the same phonological representation as an ordinary AP. However, phonetically, a focused AP is longer and has more pitch excursion than a non-focused AP. At the same time, a focused AP causes deaccentuation up to the utterance end.

Sadat-Tehrani (2007) investigates F0 and AP duration, but does not deal with other possible acoustic correlates of contrastive focus such as *s duration*, *vowel quality* and *intensity*. He states that impressionistically the focused AP seems to have a higher intensity than the default ones, but he has abandoned detailed measurements due to the problem of controlling inherent characteristics of vowels.

Therefore, an experiment was conducted to determine the acoustic correlates of focus in Persian. Section 3.1 presents a detailed overview of this experiment.

3.1 Experiment 1: acoustic correlates of focus in Persian

In this experiment four target words were embedded in carrier sentences in focused and non-focused positions and were read by the native speakers.

3.1.1 Methods

Participants

Participants were six native Persian speakers, three males and three females, with an age range from 23 to 32 and an average age of 28.1. All were born and raised in Iran. All participants were monolinguals, but had studied English and Japanese in their adulthood.

Materials and procedure

Each target word in this experiment had identical vowels and identical syllable structures (CV or CVC), to control the intrinsic characteristics of vowels. Each word used as a target word, had a non-word counterpart, segmentally and prosodically similar to it. For instance, for the word *â.lâ.bâ.mâ*, the adopted non-word was *mâmâmâmâ*. Non-words were used to eliminate the effects of different consonants on the duration of adjacent vowels. Target words were situated in the middle of the carrier sentences far from phrase boundaries and other prominent positions to avoid their effects. The syllable based distance between a target word and the right and left edge of the sentence was identical in all carrier sentences, to control the effects of downtrends.

There were two identical carrier sentences for each target word, one for contrastive focus on the target word, and one for non-focused version. Carrier sentences were preceded by an

introductory sentence to make a context in which all the participants read the carrier sentences uniformly with regard to focus. The introductory sentences were designed in a way to make the participants read the target word with or without contrastive focus. In the examples in below, you can see a set containing two introductory sentences (1 and 2) and a carrier sentence (3), which embeds the target word. Using introductory sentence (1) before the carrier sentence should lead to a non-focused target word, while if (2) is used before the carrier sentence, the target word should be pronounced with contrastive focus.

(1) Introductory sentence for non-focused context:

seda-ye šomâ-ro šenid-am.

‘I heard you’

(2) Introductory sentence for focused context:

šomâ na-goft-in misisipi bâruni-ye.

‘You didn’t say Mississippi is rainy.’

(3) Carrier sentence:

<i>šomâ</i>	<i>goft-in</i>	<i><u>âlâbâmâ</u></i>	<i>bârûni-ye</i>
you	sayP-2PL	Alabama	rainy-3SG

‘You said Alabama is rainy.’

Participants read the focused version of sentences before the non-focused ones, and after each reading, the target word was replaced by a non-word. Subjects were asked to treat the non-words as naturally as possible, as if they are pronouncing the true word. Training data were presented before recording, and subjects exercised reading focused words and treating non-words like ordinary words sufficiently. Both non-words and ordinary words were analyzed for this paper.

Recordings and measurements

Data were recorded and analyzed with the software Praat, at a sampling frequency of 44,100Hz. Measurement intervals in this experiment were defined as the sonorous parts of the coda in all syllables of target words and these intervals were annotated into Praat TextGrid files.

In order to measure pitch, F0 values were considered in the temporal center of the final and penultimate intervals. Intensity was also compared in the temporal center of final and penultimate intervals. As for duration, the length of final and penultimate intervals, and also the length of the

whole target word were measured. Finally for vowel quality, mean vowel formant values of final and penultimate intervals were measured and compared.

Statistical analyses

For statistical analyses first the mean differences between each correlate in final and penultimate syllables and related standard deviation values were calculated for focused and non-focused positions separately. In order to determine the significance of differences of mean values between focused and non-focused positions, a paired Student's t-test was conducted. This one-tailed t-test was performed to test the hypothesis that the mean differences between correlate values of final and penultimate syllables in focused positions are significantly larger than the same difference in non-focused positions. The significance threshold of the t-test was 0.05, and the p-values and t-values were calculated using Microsoft Excel 2012.

3.1.2 Results

There was a significant difference between the pitch rise in focused and non-focused target words, as shown in table 1 below. The mean F0 difference between the final and penultimate intervals in non-focused words is 21.47 Hz, which means that, in non-focused positions, the pitch on the last syllable rises 21.47 Hz in average. This value is 53.31 Hz for focused positions, and according to the t-test results ($t(5) = 5.25$, $p < 0.05$), this difference is indeed significant.

The intensity also rises on stressed syllables in both non-focused and focused positions, however the t-test results ($t(5) = 0.31$, $p > 0.05$) suggest that the difference between the two positions is not significant.

Although duration increases in the last syllables, contrary to the common expectation, the increase in non-focused position is more than the increase in focused positions. However considering the t-test results ($t(5) = 0.26$, $p > 0.05$), this difference cannot be regarded as significant either, but what can be concluded for certain, is that Persian does not use increase in duration of the stressed syllable as a cue to contrastive focus.

The results showed that vowel quality (F1, F2, F3 and F4) do not change significantly in the stressed syllable of focused words. The mean differences of all formants between the final and penultimate syllables were insignificant, and the results were similar for focused and non-focused position. Since all formants behaved similarly in focused and non-focused positions, only the results for F1 are presented in table 1. First formant value for in this experiment (vowel /â/) ranged over around 600-1100 Hz. Thus, differences between mean F1 in final and penultimate intervals are inconsiderable ($t(5) = 0.30$, $p > 0.05$).

Table 1. Mean Correlate values and standard deviations in focused and non-focused positions and related t-test results.

		Non-focused	Focused
Pitch	$F0_{\text{final}} - F0_{\text{penult}}$ (Hz)	21.47	53.31
	Standard deviation	9.91	18.93
	t-test results	$t(5) = 5.25, p = 0.01$	
Intensity	$\text{Intensity}_{\text{final}} - \text{Intensity}_{\text{penult}}$ (dB)	1.15	1.23
	Standard deviation	1.05	0.93
	t-test results	$t(5) = 0.31, p = 0.282$	
Duration	$\text{Duration}_{\text{final}} - \text{Duration}_{\text{penult}}$ (ms)	24.59	12.18
	Standard deviation	8.96	12.37
	t-test results	$t(5) = 0.26, p = 0.452$	
First formant	$F1_{\text{final}} - F1_{\text{penult}}$ (Hz)	-5.54	60.01
	Standard deviation	9.39	28.94
	t-test results	$t(5) = 0.30, p = 0.387$	

The results for target word duration were particularly interesting. The length of each target word in focused position was compared to that of the same word in non-focused position for each participant separately. Among six participants, two female and one male participants, produced the focused target words longer than non-focused ones on average. In fact the two females produced the words in focused positions on average 15% longer than the same words in non-focused positions. On the other hand, no similar significant increase in length was found in the data of the other participants.

Finally, after a focused word there was a complete deaccentation, that is, no significant peak or valley was observable in the pitch contour.

3.1.3 Discussion

The results of this experiment reveal that the main acoustic correlate of focus in Persian is pitch. Contrastive focus is consistently associated with an abrupt rise on the stressed syllable of the word, a rise which is substantially steeper and greater than the rise on stressed syllables of non-focused words.

Sadat-Tehrani (2007) claims that a focused AP is phonetically longer than its non-focused counterpart. Ardali and Yi (2012) also report that focused words are generally longer than

non-focused ones. However, in contrary to their claim, current findings may suggest that although AP lengthening does occur in some focused utterances, it is more an idiolectal phenomenon and cannot be regarded as a consistent mechanism in the language. A possible reason why previous studies report a duration increase in focused words is because they consider the mean values of duration, neglecting the significant individual differences between speakers.

As Sadat-Tehrani (2007) points out, everything (all pitch accents and boundary tones) are deleted after a focused element up to the end of the IP, which leads to a prosodic restructuring. Complete post-focal deaccentation observed in this study is consistent with these conclusions.

Based on the results of this experiment we can draw the conclusion that Persian uses three main mechanisms to mark focal prominence: abrupt pitch rise on the stressed syllable, prosodic restructuring and post focal subordination. The two final mechanisms are realized as a complete post-focal deaccentation.

4. Experiment 2: L1 interference in L2 production

As mentioned previously, Japanese and Persian basically use similar mechanisms to mark focal prominence. The main mechanism that both languages use (probably a universal one) is pitch range expansion. F0 rises on the focused word in both languages. This rise realizes on the high tone of the lexical accent in accented words, and on the phrasal high tone in unaccented words in Japanese. In Persian, focal prominence marker pitch rise is always realized on the last (stressed) syllable of the word. Despite this difference between the F0 rise realizations, pitch range expansion is a common mechanism in both languages.

As we saw in previous sections, in both languages there is a post-focal subordination which in Persian leads to a complete deaccentation and dephrasing, and in Japanese realizes as a post-focal F0 lowering, which may accompany prosodic restructuring. Here again, there are some differences in the details of the mechanisms, but what happens in both languages can be regarded as post-focal prosodic weakening.

Nevertheless, there is one mechanism that Japanese uses to mark focal prominence which is absent in Persian. Japanese uses PLR at the right edge of APs containing focused words, however there is nothing equivalent to that in Persian. In Persian the pitch range expansion occurs on the stressed syllable of the word, and when the word is followed by an enclitic such as the nominal suffixes, the pitch rises on the last syllable of the word and falls on the enclitic. In contrary, in most cases in Japanese, when the focused word is followed by a particle such as the accusative case marker *wo* or the nominative case marker *ga*, the pitch range on the focused word expands, and in addition, the pitch on the particle rises as an effect of PLR.

If this is a crucial difference between the prosody of the two languages, it may manifest as an

L1 transfer effect in the speech of language learners. This fact is presented in the form of a hypothesis and two predictions.

4.1 Hypothesis and predictions

Hypothesis:

L1 transfer effect can be observed with respect to prosody and focus prominence marking mechanisms in the speech of L2 learners.

Predictions:

- a. L1 Japanese/L2 Persian speakers will use PLR at the end of a focused AP. Thus, when Persian cliticized words are focused, they will raise the pitch at the end of the AP (on the enclitic) as in Japanese.
- b. L1 Persian/L2 Japanese speakers will raise the pitch on one syllable of the focused word, and will lower it on the particle if the word is followed by a particle.

To test the above predictions, an experiment was conducted with read-aloud tasks by learners of the two languages.

4.2 Method

4.2.1 Participants

Twelve participants (six Japanese speakers and six Persian speakers) took part in this experiment. The native Persian speakers were learners of Japanese language in Iran, and had studied the language for two years at the university. Their age ranged from 20 to 22, with an average of 20.6 years. They were all classmates, and none of them had ever been to Japan. The native Japanese speakers had been studying Persian for at least two, and at most three years at Japanese universities. Their age ranged from 21 to 30 with an average of 24.5 years. They all had a 1-3 month experience in Iran.

4.2.2 Materials and Procedure

The procedure of preparing reading materials was very similar to that of the previous experiment, and thus will not be addressed here to avoid repetition. For each language, ten target words were embedded in carrier sentences. Persian target words were all cliticized words, and Japanese target words were all followed by particles. All participants read both focused and non-focused versions of sentences in both languages. They read the L2 material before the L1 ones, and the focused versions before unfocused ones. Each sentence was read twice and altogether 960 tokens were recorded where half (480 tokens) were utterances containing focused elements.

Among 480 tokens containing focused elements, there were cases in which, according to auditory judgments of the author and a native Japanese speaker, the target words seemed to be uttered without contrastive focus. Such cases were more frequent in L2 tokens. Moreover, in some tokens, F0 was not available due to creaky voice. All such cases (in sum 22 tokens) were eliminated from the analysis.

4.3 Results and discussion

In L1 Japanese focused tokens, PLR was observed in about 74% of utterances. This means that PLR is not necessarily an integral part of focus in Japanese, since more than 25% of focused utterances did not use PLR at all. In L1 Persian data, as was expected, no focused utterance had a pitch rise on the enclitic.

In L2 focused data, more than 81% of Japanese tokens uttered by native Persian speakers were produced with a pitch fall on the particle, which shows a significant L1 interference effect. PLR was observed in only 21 tokens, and in fact, almost all of these tokens were produced by one female learner who systematically used PLR to mark focused words in Japanese.

Finally, in L2 Persian data, more than 59% of focused utterances were accompanied by PLR, a mechanism which was completely absent in L1 Persian data. A summary of the results is presented in table 2.

Table 2 PLR number and percentage, for focused utterances.

	Number of tokens	Tokens with PLR	PLR percentage
L1 Japanese	117	87	74.35%
L1 Persian	119	0	0%
L2 Japanese	113	21	18.58%
L2 Persian	109	65	59.63%

The results of this experiment confirmed the predictions in 4.1. The interference of L1 focus pattern was easily observable in the speech of both Japanese and Persian learners.

Let us concentrate on one example set, to see the details of L1 transfer effects. Figure 1-a shows the pitch contours for *hoN-wo* ‘book-ACC’ in the sentence *mina-ga hoN-wo karita* ‘Mina borrowed the book’, uttered by six native Japanese speakers without any focus. As can be seen, the pitch accent on *hoN* is uniformly realized as a F0 peak on the word (left part of the curve) and after that, F0 falls on the particle *wo* (right side of the curve) as a result of low boundary tone.

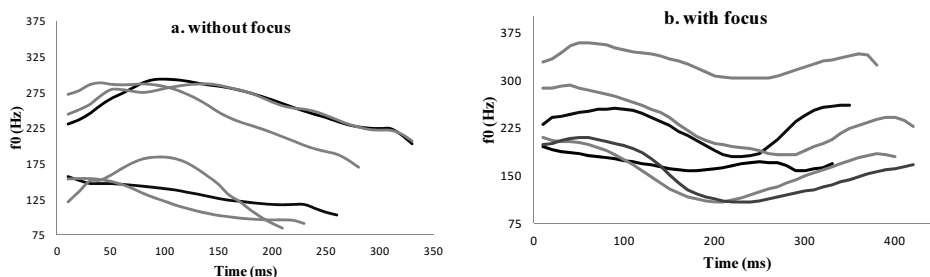


Figure 1 pitch contour for *hoN-wo*, uttered by native Japanese speakers with and without focus.

Figure 1-b shows the pitch curves of the same phrase in the same sentence, uttered with focus on the word *hoN* in a corrective context. The F0 on the word *hoN* is increased compared to the non-focused version, and there is a significant F0 rise on the particle *wo* as a result of PLR.

Now let us turn to L1 Persian examples. Figure 2-a shows the pitch curves for the phrase *ketâb-râ* ‘book-ACC’ in the sentence *mina ketâb-râ qarz gereft* ‘Mina borrowed the book’, uttered by six native Persian speakers without any focus. Here, the second syllable of *ketâb* has higher F0 than the first one, as a realization of stress. The F0 on the enclitic *râ* is also high due to high boundary tone of the AP.

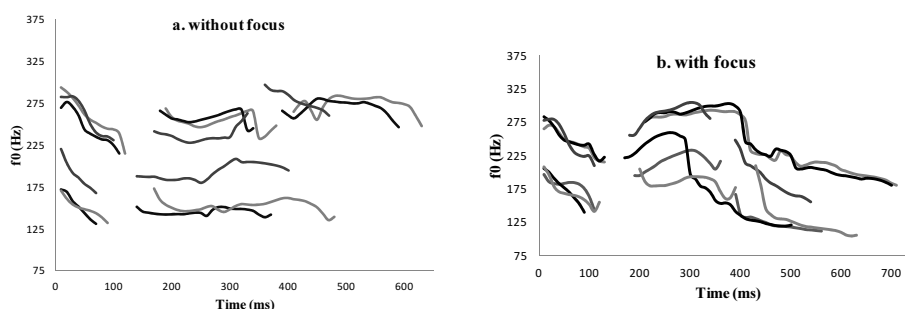


Figure 2 pitch contour for *ketâb-râ*, uttered by native Persian speakers with and without focus.

Figure 2-b shows the pitch curves of the same Persian phrase in the same sentence, uttered with focus on the word *ketâb*. As can be seen, there is an abrupt rise of F0 on the second syllable of *ketâb*, which is substantially more than the rise in non-focused version. Moreover, the pitch falls suddenly on the enclitic *râ*, as a result of low AP boundary tone.

To sum up, in Japanese focus, the pitch rises on the word and there is another rise at the right edge of AP, which occurs on the accusative case marker particle *wo*. The rise on the particle is one of the main mechanisms that make the preceding word to be perceived prominently. In Persian focus, the pitch rises on the last syllable of the word, and this rise is followed by a sharp fall to the right edge of the AP, which is realized on the accusative case marker enclitic. The pitch rise on the

last syllable, together with the sharp fall on the enclitic set off the focused word as a prominent constituent.

Now let us take L2 examples into consideration. Figure 3 demonstrates the pitch contours of the Japanese phrase *hoN-wo*, uttered by six L1 Persian/L2 Japanese speakers, with a focus on the word *hoN*. In this example, five learners (solid lines) have produced the focus with the common pattern in Persian. There is a significant pitch rise on the word *hoN* and a sharp fall on the particle *wo*.

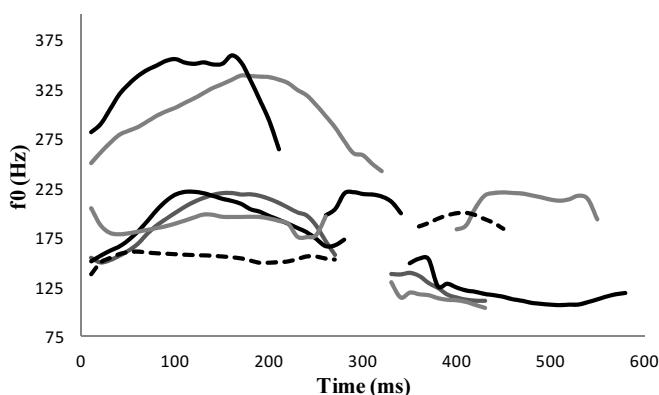


Figure 3 pitch contour for *hoN-wo* in Japanese, uttered by six native Persian speakers in focus position.

Figure 4 shows the pitch contours for the Persian phrase *ketâb-râ*, uttered by L1 Japanese/L2 Persian speakers, with a focus on *ketâb*. Here as well, most utterances demonstrate the speakers' L1 focus pattern. For four speakers (shown in solid lines), although there is a pitch rise on the last syllable of *ketâb*, this rise is followed by another rise at the right edge of the AP, right on the enclitic *râ*, a pattern which cannot be found in utterances by L1 Persian speakers. Two learners, however, have produced focus without PLR, just as L1 Persian utterances (shown in dashed lines). Nevertheless, since PLR is not mandatory in Japanese focused construction, these utterances cannot necessarily prove that the learners have acquired the Persian prosody with regard to contrastive focus.

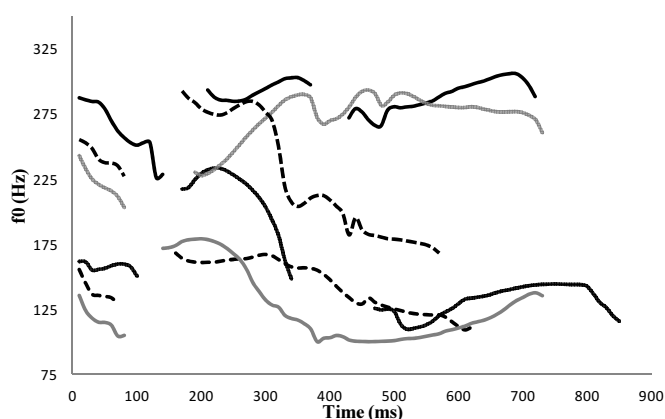


Figure 4 pitch contour for *ketâb-râ* in Persian, uttered by six native Japanese speakers in focused position.

5. Conclusion

The focus of this study was PLR, a focal prominence marker, as the main difference between focused constructions in Japanese which uses it, and Persian which does not. The first experiment investigated the acoustic correlates of contrastive focus in Persian and revealed that pitch expansion and post-focal reduction are the main mechanisms to mark focal prominence in this language. Vowel quality and intensity are irrelevant regarding focus, and despite what is claimed in the literature, focused word lengthening is used only by some speakers. The second experiment examined L2 focused utterances and compared them with native speakers' utterances and demonstrated that PLR, which is present in Japanese but absent in Persian, is clearly observable in the speech of L1 Japanese/L2 Persian speakers as an L1 transfer effect in L2. On the other hand, most L1 Persian/L2 Japanese speakers fail to produce PLR in their focused constructions, due to its inexistence in their first language.

This research contributes to the fact that some prosodic inaccuracies of L2 are predictable as L1 interferences. Further studies are needed to develop training methods to reduce these L1 transfer effects.

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