

CROSS-LANGUAGE PERCEPTION OF ITALIAN AND JAPANESE CONSONANT LENGTH CONTRASTS: A COMPARISON OF NATIVE ITALIAN LISTENERS WITH AND WITHOUT JAPANESE LANGUAGE LEARNING EXPERIENCE

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ABSTRACT

Both Italian and Japanese use consonant length contrastively. We investigated whether there is any difference between two groups of native Italian speakers with different Japanese experience in their perception of native Italian and non-native Japanese length contrasts. One of the groups included 14 Italian learners of Japanese and the other group included 14 Italian speakers without knowledge of Japanese. These two groups and a control group of ten native Japanese speakers identified length contrasts in Italian and Japanese. The two Italian groups did not differ in identifying native Italian contrasts, but those who were learning Japanese outperformed their fellow Italian speakers without knowledge of Japanese in identifying non-native Japanese contrasts whilst not reaching the native Japanese level. We tentatively conclude that, in cross-language perception of the consonant length contrast in Japanese, there is an additional benefit of Japanese learning for native Italian speakers even when positive transfer may be assumed.

Keywords: cross-language perception, consonant length contrasts, Italian, Japanese, singleton/geminate.

1. INTRODUCTION

Languages such as Italian and Japanese use consonant length contrastively. For example, in Italian, *eco* means ‘echo’ and *ecco* means ‘here (it is)’. In Japanese, on the other hand, *yoka* means ‘leisure’ and *yokka* means ‘fourth day’. This is an area of pronunciation that is known to pose difficulties to non-native learners in both of these languages (e.g. [1, 5, 12, 19]). However, it is unclear what happens when Italian and Japanese speakers learn each other’s language. Would they still face difficulties in processing consonant length in the non-native language even though they are familiar with length contrasts in their native language (L1)? In other words, for L1 Italian and L1 Japanese speakers, we might expect non-native contrasts to be discriminated

with high accuracy as a result of positive L1 transfer and the benefit of learning each other’s language to be negligible. Thus, we sought to gain a better understanding of if and how the L1 experience with consonant length contrasts might transfer to the processing of non-native length contrasts by comparing two groups of L1 Italian speakers with and without Japanese learning experience. Their identification of Italian and Japanese length contrasts was compared to that of a group of L1 Japanese speakers.

While numerous studies have demonstrated the difficulties non-native learners have in the acquisition of consonant length contrasts (in particular, learners whose L1 does not use length contrastively, e.g. English or Korean [5-8, 21, 22]), research focusing on learners whose L1 does use length contrastively (e.g. Arabic or Italian) is limited [14, 15]. However, given a split in the phonetic literature regarding the positive or negative role of previous linguistic experience for both segmental [4, 24] and non-segmental [13-15, 17, 20-23, 25] features of speech sounds, we hope to gain some valuable insight into cross-language perception of consonant length by comparing listeners from two different languages, Italian and Japanese.

While consonant length is contrastive in both Italian and Japanese, some phonetic characteristics linked to the phonological contrast are known to be different. While vowels preceding geminates are *shorter* (by up to 37%) than vowels preceding singletons in Italian [3, 16], vowels tend to be *longer* before geminates than before singletons in Japanese [5, 9, 10]. This type of cross-linguistic phonetic difference may affect how native Italian and Japanese listeners process singleton vs geminate contrasts in each other’s language.

2. METHODS

2.1. Stimuli preparation

2.1.1. Speakers

Three (2 males, 1 female) native speakers of Italian and seven (4 males, 3 females) native speakers of Japanese in their 20-60s participated in the recording

sessions lasting between 45 and 60 minutes. The authors with expertise in phonetics/phonology of these target languages auditorily confirmed that all the speakers clearly differentiated the singleton and geminate consonants by duration. The speakers were recorded in a recording studio at a university in Sydney, Australia or at a research institute in Tokyo, Japan. They received \$20 (or equivalent in Japanese yen) for their participation. None of these speakers participated in the perception experiment. According to self-report, they had normal hearing.

2.1.2. Speech materials

Tables 1 and 2 show examples of Italian and Japanese words used in this study. The /((C)VC(C)V(n)/ tokens contained singleton or geminate consonants intervocalically. Italian uses length contrasts for a wide variety of phonemes differing in voicing, place and manner of articulation [2, 16, 18]. In Japanese, on the other hand, voiced obstruent geminates are disfavoured and their occurrence is limited mostly to loanwords [9, 11, 12]. The Italian items included (C)VC(C)V (non)word tokens where the medial C was /p t k b d g f v s dʒ n/. The Japanese items included (C)VC(C)V(V/n) (non)word tokens where the medial C was /p t k s tʃ/.

To record the stimuli to be used in the perception study, each word was presented on a computer screen in random order and was produced in two separate conditions: one in isolation and the other in a carrier sentence (/diko X di nwovo/ ‘I say X again for Italian’ and /sokowa X to jomimasu/ ‘You read it as X there’ for Japanese). The pace of presentation was controlled by the experimenter (the first author). The speech materials were digitally recorded at a sampling rate of 44.1 kHz and the target words were segmented and stored in separate files. To avoid interspeaker variation in fluency (specifically, the duration of a pause before and after the target (non)word), only tokens produced in isolation were used as experimental stimuli in this study.

Table 1: Examples of Italian test words used.

Manner	Singleton	Geminate
stop	<i>sete</i> ‘thirst’	<i>sette</i> ‘seven’
fricative	<i>rosa</i> ‘a rose’	<i>rossa</i> ‘red’
affricate	<i>agio</i> ‘ease’	<i>aggio</i> ‘premium’

Table 2: Examples of Japanese test words used.

Manner	Singleton	Geminate
stop	<i>saka</i> ‘a slope’	<i>sakka</i> ‘an author’
fricative	<i>sosen</i> ‘ancestor’	<i>sossen</i> ‘to take the initiative’
affricate	<i>ichi</i> ‘one’	<i>icchi</i> ‘agreement’

2.2. Participants

Three groups of listeners participated. The first and second groups consisted of native speakers of Italian with (NNJ-Italian, 7 males, 7 females, *mean age* = 23.4, *sd* = 1.6) or without (NI, 7 males, 7 females, *mean age* = 28.9, *sd* = 7.6) Japanese learning experience, respectively. These Italian speakers were students at a university in Turin, Italy. Two of the NNJ-Italian listeners had JLPT (Japanese Language Proficiency Test, according to which, the easiest level is N5 and the most difficult level is N1) N2, six had N3 and one had N4, respectively. The third group (NJ) consisted of 10 (5 males, 5 females, *mean age* = 25.5, *sd* = 6.9) native speakers of Japanese. They were recruited from the student/staff populations at universities or from the local communities in Australia or Japan. The participants were tested in a sound-attenuated booth or quiet classroom on the university campus in their country of residence.

2.3. Procedures

The procedures were identical to those used in our previous research [22], i.e. forced-choice identification task. The listeners responded to 84 Italian tokens and 252 (84 x 3 blocks) Japanese tokens in a self-paced experimental session lasting between 30 and 40 minutes. The listeners’ task was to decide whether the medial consonant was short/singleton or long/geminate and indicate their choice on the computer using a custom-made software application.

3. RESULTS

3.1. Overall results

Figure 1 shows the distributions of percentages of correct identification for the Italian and Japanese stimuli by the three groups of listeners. As expected, all three groups were highly homogeneous at ceiling and more accurate in identifying length categories in their L1 than the non-native languages. The two groups of interest, NNJ-Italian and NI, differed little in their mean percentages for L1 Italian (99% vs 97%) and were more accurate than the L1 Japanese group (90%). However, the two Italian groups differed by 7% (96% vs 89%) with respect to the Japanese stimuli. While the NNJ-Italian group was slightly less accurate than the NJ group (99%) in identifying the Japanese singleton/geminate, they clearly outperformed the NI group, demonstrating a positive influence of Japanese learning.

A two-way repeated-measures analysis of variance (ANOVA) with group (G: NJ, NNJ-Italian, NI) as a between-subjects factor and stimulus language (L: Italian, Japanese) as a within-subjects

factor yielded significant main effects of G and L and a significant two-way interaction effect. Table 3 shows the results of a two-way ANOVA.

Figure 1: The distributions of correct identification scores (%) by three groups of listeners (NJ, NNJ-Italian, NI). The bold horizontal line in each box indicates the median. The bottom and top lines of the box indicate the first and third quartiles. The small points outside the box are outliers.

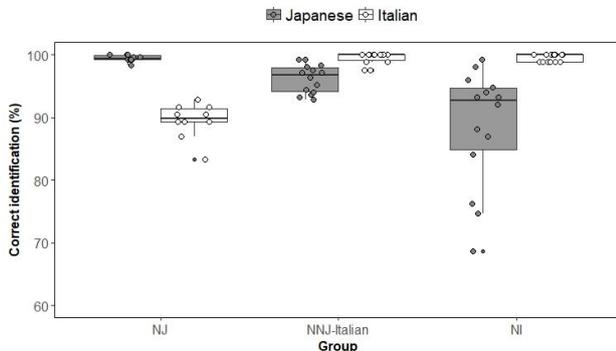


Table 3: Results of Group x Language ANOVA.

Factor	df	F	p
G	2, 35	6.0	< .01
L	1, 35	7.6	< .01
G x L	2, 35	36.4	< .001

Table 4 shows the results of a one-way ANOVA which assessed the effect of Group (not assuming equal variances) for each language and Dunnett's Modified Tukey-Kramer pairwise multiple comparison post hoc tests.

Table 4: Results of one-way ANOVA assessing the effects of Group and multiple comparison tests (significance level at .05).

L	df	F	p	Between-group comparisons
Italian	2, 17.6	62.2	< .001	NJ < NNJ-Italian, NI
Japanese	2, 18.5	21.9	< .001	NI < NNJ-Italian < NJ

Although, as already noted, the NNJ-Italian listeners were not as accurate as the NJ listeners at this stage, they were significantly more accurate than the NI listeners in identifying the Japanese consonant length contrasts. As for the Italian stimuli, only the NJ listeners were significantly less accurate than the two groups of Italian listeners who did not differ from each other. Apparently, Japanese learning experience did not interfere with the L1 Italian perception of the NNJ-Italian listeners.

3.2. Direction of misperception

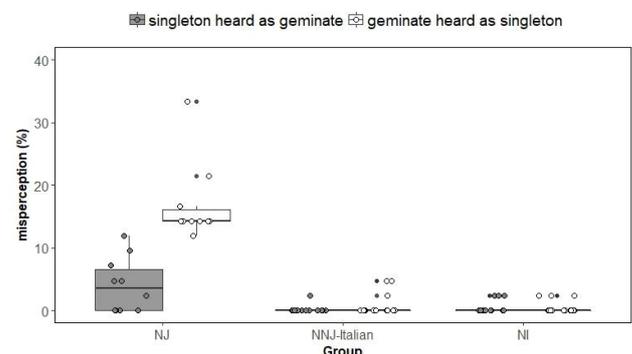
In addition to overall accuracy of length identification by three groups of listeners, we were also interested

in determining whether and to what extent intervocalic singletons were misperceived as geminates and similarly with respect to possible misperception of intervocalic geminates as singletons. The direction of misperception was expressed as the percentage of target singleton or geminate tokens erroneously perceived as the other category.

3.2.1. Italian stimuli

Figure 2 shows the distributions of singletons misperceived as geminates and geminates misperceived as singletons for the Italian stimuli. While the two native Italian groups misperceived very few tokens, the NJ listeners misperceived the Italian geminates more frequently than the Italian singletons.

Figure 2: Percentage of misperception according to direction from singleton to geminate (shaded bars) and from geminate to singleton (white bars) by three groups of listeners (Italian stimuli).



A two-way repeated-measures ANOVA with group (G: NJ, NNJ-Italian, NI) as a between-subjects factor and Direction of Misperception (D: singleton as geminate, geminate as singleton) as a within-subjects factor yielded significant main effects of G and D and a significant two-way interaction effect. Table 5 shows the results of a two-way ANOVA.

Table 5: Results of Group x Direction ANOVA.

Factor	df	F	p
G	2, 35	154.7	< .001
D	1, 35	20.2	< .001
G x D	2, 35	23.3	< .001

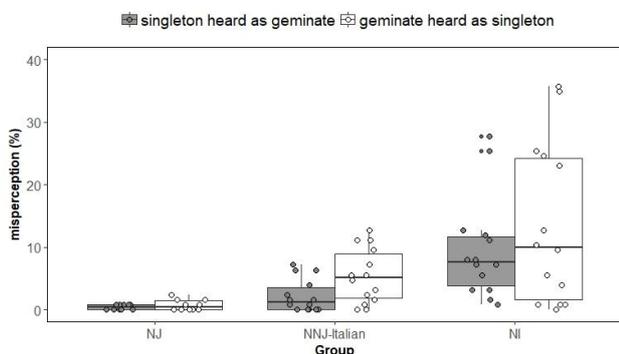
The two-way interaction arose, presumably because only the NJ group misperceived intervocalic geminates more frequently than intervocalic singletons.

3.2.2. Japanese stimuli

Figure 3 shows the distributions of singletons misperceived as geminates and geminates misperceived as singletons for the Japanese stimuli. While the NJ listeners misperceived very few tokens,

the Italian listeners, regardless of Japanese learning experience, misperceived the intervocalic Japanese geminates more frequently than the intervocalic Japanese singletons.

Figure 3: Percentage of misperception according to direction from singleton to geminate (shaded bars) and from geminate to singleton (white bars) by three groups of listeners (Japanese stimuli).



A two-way repeated-measures ANOVA with group (G: NJ, NNJ-Italian, NI) as a between-subjects factor and Direction of Misperception (D: singleton as geminate, geminate as singleton) as a within-subjects factor yielded significant main effects of G and L, but two-way interaction did not reach significance. Table 6 shows the results of a two-way ANOVA.

Table 6: Results of Group x Direction ANOVA.

Factor	df	F	p
G	2, 35	11.2	< .001
D	1, 35	5.3	< .05
G x D	2, 35	0.8	ns

The fact that the $G \times D$ interaction was not significant suggests that the direction of misperception was comparable across the three groups of listeners. In other words, the listeners generally had greater trouble with geminates than with singletons as is seen in Figure 3.

Table 7: Results of one-way ANOVA assessing the effects of Group and multiple comparison tests (significance level at .05).

D	df	F	p	Between-group comparisons
S as G	2, 18.0	11.5	< .001	NI < NNJ-Italian, NJ
G as S	2, 18.3	13.6	< .001	NI, NNJ-Italian < NJ

Table 7 shows the results of a one-way ANOVA which assessed the effect of Group (not assuming equal variances) for each direction of misperception and Dunnett's Modified Tukey-Kramer pairwise multiple comparison post hoc tests. While both NI and NNJ-Italian groups misperceived geminates

more frequently than the NJ group, the NNJ-Italian group outperformed the NI group and did not differ from the NJ group in the identification of intervocalic singletons.

4. DISCUSSION AND CONCLUSIONS

This study examined the perception of Italian and Japanese consonant length by three groups of listeners differing in their L1 and experience with Japanese. We were particularly interested in determining if native speakers of Italian with and without Japanese learning experience (NNJ-Italian and NI, respectively) differ from each other in identifying consonant length categories in their L1 Italian and in a foreign language, Japanese.

While the two Italians groups were highly accurate and did not differ in the perception of L1 Italian contrasts, the NNJ-Italian group with Japanese experience outperformed the NI group without Japanese experience in identifying non-native Japanese length contrasts. In other words, even for L1 Italian listeners who are familiar with contrastive consonant length, learning Japanese was additionally advantageous. Language-specific phonetic characteristics of consonant length as reviewed in the Introduction may play a role in how listeners perceive familiar contrasts in unfamiliar languages.

Native Estonian speakers who use vowel duration contrastively in L1 were native-like in perceiving Swedish vowel length contrasts [14]. However, they had lived in Sweden for at least 10 years and were highly proficient in Swedish, suggesting that even learners who are deemed to have an L1 advantage need an enormous amount of high-quality input in the natural environment to reach a level comparable to native speakers. Because the NNJ-Italian group still differed from the NJ group in some respects, future research needs to include more advanced Italian learners of Japanese to determine if there is an absolute limit to native Italians' perception of non-native consonant length contrasts. It would also be informative to include NJ learners of Italian (NI-Japanese) to explore if the pattern of results might be mirrored. In sum, we tentatively conclude that there is additional benefit of Japanese learning for L1 Italian listeners even though positive transfer may be assumed.

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