# The Effects of Explicit Instruction on Sound Changes for Japanese EFL Learners

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**Abstract**

**[Purposes]** This research examines whether explicit instruction on sound changes will contribute to the development of phonetic recognition.

**[Method]** The data of 72 Japanese EFL university students were analyzed. The students were divided into two experimental groups that receive explicit instruction on contraction, assimilation, blending, *r*-linking, unreleased plosives, or weakening, and a control group that received no treatment but the reading instruction. The data were analyzed on the basis of the classical test theory (CTT) and the item response theory (IRT).

**[Results]** The results of the pre-test and the post-test showed that two experimental groups significantly outperformed the control group. There was no statistically significance difference discovered between CTT and IRT.

**[Conclusion]** It is advisable to inform EFL teachers of the fact that explicit instruction on the rules and patterns of sound changes is beneficial to learners.

**Key Words:** explicit instruction, sound change, dictation, explicit instruction, item response theory, classical test theory

## 1. Introduction

The role of explicit knowledge has been receiving a major empirical focus of attention in the fields of foreign language education and second language acquisition research. Previous research revealed that explicit instruction on grammatical structures has a strong impact on the interlanguage (re)structuring (Carroll and Swain 1993; Kubota 1994, 2000). That is, the provision of explicit metalinguistic information tends to lead to improved performance of EFL (English as a foreign language) learners.

There has been no empirical study to examine whether

explicit instruction on sound changes contributes to higher performance in comprehension, to the best of my knowledge. The current research examines the instructional effect of explicit knowledge on learners' performance in dictation.

## 2. The Study

This study focuses on the effect of explicit instruction on sound changes in English for Japanese EFL learners.

### 2.1. Research Questions

Two research questions are posed in this research:

**Research Question (1):** Will the learners benefit from explicit instruction on sound changes?

**Research Question (2):** Will there any statistical difference in the results between the classical test theory (CTT) and the item response theory (IRT)?

### 2.2. Hypotheses

Hypothesis 1 is related to Research Question 1 and Hypothesis 2 to Research Question 2.

**H1:** Explicit instruction on sound changes will lead to improved performance on dictation tests.

This research aims to examine whether the two experimental groups (Groups A and B) will outperform the control group (Z). Previous research (Carroll and Swain 1993; Kubota 1994, 2000) shows that explicit metalinguistic knowledge enables learners to (re)formulate their interlanguage syntax. The result led to the formation of Hypothesis 1.

**H2:** There will be no statistically significant difference between the classical test theory and the item response theory.

According to Kubota (2000), the ability parameter estimated in IRT demonstrated the random variations that are assumed in ANOVA, in the same way as the number-correct scores in CTT did. He concluded that one can use IRT models on a practically equal footing with CTT. This result led to the formation of Hypothesis 2.

### 2.3. Subjects

Eight-three Japanese EFL university students (first year) participated in this research. The data from 6 subjects in the experiment had to be excluded from the analyses, since they missed one or more of the following: the pre-test, the treatment, and post-test. As a result, 72 subjects (24 in each group) of 83 were randomly selected for the data analyses.

## 2.4. Research Procedures

The research procedure includes the pre-test, the treatment, and the post-test.

**Session 1: Pre-test**

The pre-test was administered to the subjects on the tape (see Appendix). They were asked to do dictation, listening to the tape and filling in the blanks. The sentences of 25 test items were recorded by a native speaker of English with a natural speed.

Chastain (1976: 369), for instance, stated that the purpose of dictation is twohold: first, taking dictation provides additional reinforcement to the relationship between the sound and the symbol that was established in reading aloud. ... Second, the dictation, properly given, is an excellent test for the development of the students' auditory memory. With intermediate and advanced learners, the dictation provides a measure of overall language proficiency (Valette 1977: 243). Therefore, the dictation test was used to examine the instructional effect on sound changes. The test took 10 minutes.

**Session 2: Treatment**

A week after the pre-test, the subjects received the following treatments. The textbook "*Hit parade listening*" (Kumai and Timson 1998) was used in the experimental groups to teach the rules of sound changes in English.

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**[Experimental Groups]**

**Group A** — Explicit instruction in Units 1 to 7 (seven units)

**Group B** — Explicit instruction in Units 8-10, 13-15, and 18 (seven units)

**[Control Group]**

**Group Z** — No explicit instruction on sound changes but reading texts

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The subjects in Group A studied the rules of sound changes with regard to the test items Nos. 1-10. Group B was provided explicit instruction on sound changes regarding the test items Nos. 11-17 and 23-24 (Appendix).

The treatments were provided to Groups A and B in ten class sessions. Group A was explicitly taught contraction, assimilation, and blending in the following units, including the relevant examples. The length of the treatment was 15 minutes on average.

Unit 1: contraction (1) *I have→I've, who has→who's*
Unit 2: contraction (2) *I will→I'll, I will not→I won't*
Unit 3: contraction (3) *who is→who's, there is→there's*
Unit 4: contraction (4) *must have→must've,*
*should have→should've*
Unit 5: assimilation (1) mee*t y*ou [t]+[j]→[ʧ],
mi*ss y*ou [s]+[j]→[ʃ]
Unit 6: assimilation (2) woul*d y*ou [d]+[j]→[ʤ],
a*s y*ou [z]+[j]→[ʒ]
Unit 7: blending (1) thank‿you [k]+[j]→[kj],
help‿you [p]+[j]→[pj]

The subjects in Group B were explicitly instructed on sound changes such as contraction, unreleased plosives, *r*-linking, and weakening in the following units of the ten class sessions, including the presentation of the relevant examples. The treatment took 15 minutes on average.

Unit 8: contraction want to→wanna, going to→gonna
Unit 9: unreleased plosives (1) goo*d* job, sea*t* belt
Unit 10: unreleased plosives (2) ge*t to*gether, ta*ke c*are
Unit 13: blending (2) put‿up, should‿I
Unit 14: blending (3) an‿easy, mention‿it
Unit 15: *r*-linking far‿away, take care‿of
Unit 18: weakening made *the* [ðə], reading *an* [ən]

The control group (Group Z) was not provided any instruction on sound changes, but the subjects used the textbook for reading, "*Focus on skillful reading*" (Terauchi et al. 1997) in ten class sessions. The treatment was 15 minutes long on average.

**Session 3: Post-test**

Three months after the pre-test and two weeks after the last treatment, the same pre-test was given to the subjects on the tape. The test was 10 minutes long.

### 2.5. Data Analysis

The alpha level was set at $\alpha$=.05. A one-way completely randomized and a two-way repeated-measures ANOVA were employed to compare the means. The data were analyzed on the basis of both CTT and IRT. The statistical computer package, GB-STAT 5.0 (Dynamic Microsystems, Inc. 1994) was used for data analysis. In IRT, RASCAL 3.5 (Assessment Systems Corporation 1995) was used to make a multiple-group IRT analysis for groups and tests.

One point was given when the subjects responded to a test item correctly in CTT. The test included a total of 25 test items.

### 3. Results

A full mark of the dictation test was 25 points. Table 1 shows the means and standard deviations by group and test in CTT and IRT (RASCAL). The means of correct responses are depicted in Figure 1. Table 2 demonstrates the results of one-way completely randomized ANOVA on the pre-test. The CTT results indicated that group differences were not significant ($F_{2,69}$=1.56, p=.217, ns), as shown in Table 3. The same results were obtained in the IRT (RASCAL) statistical analysis ($F_{2,69}$=1.32, p=.273, ns). Accordingly, it appears that any comparative effects due to treatment were not related to the prior knowledge or language ability of any one group. In addition, the relatively low scores on the pre-test revealed that there was room for the improvement that was anticipated after treatment.

Table 1: Means and standard deviations by group and test

| | | [CTT] | | [Rascal] | |
|---|---|---|---|---|---|
| Groups | n | Mean | SD | Mean | SD |
| Pre-test | | | | | |
| Group A | 24 | 8.50 | 3.20 | -1.10 | 1.03 |
| Group B | 24 | 7.08 | 2.15 | -1.53 | 0.75 |
| Group Z | 24 | 7.79 | 2.87 | -1.32 | 0.95 |
| Post-test | | | | | |
| Group A | 24 | 12.42 | 3.65 | 0.11 | 1.06 |
| Group B | 24 | 11.63 | 3.15 | -0.14 | 0.89 |
| Group Z | 24 | 9.38 | 3.93 | -0.86 | 1.24 |

Figure 1: Means of correct responses
**[CTT]**

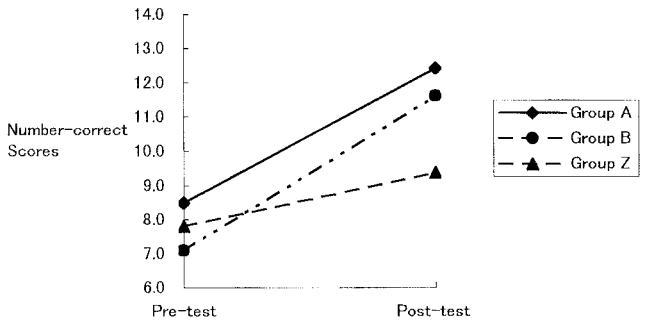

Figure 1 (continued)

**[RASCAL]**

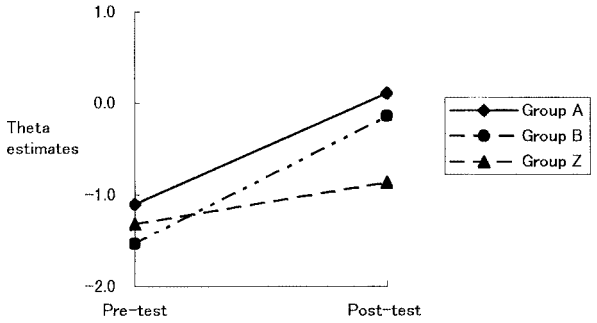


Table 2: Results of one-way completely randomized ANOVA

**[CTT]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Between groups | 24. 08 | 2 | 12. 04 | 1. 56 | 0. 217 |
| Within groups | 531. 79 | 69 | 7. 71 | | |
| Total | 555. 88 | 71 | | | |

**[RASCAL]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Between groups | 2. 22 | 2 | 1. 11 | 1. 32 | 0. 273 |
| Within groups | 57. 79 | 69 | 0. 84 | | |
| Total | 60. 01 | 71 | | | |

Table 3 displays the results of a two-way repeated-measures ANOVA. The CTT results indicate that the group by test interaction was statistically significant ($F_{2,69}$=9.37, p=.0003). The same result was obtained with IRT ($F_{2,69}$=9.63, p=.0002). Therefore, the simple main effects were tested with both CTT and IRT, using separate error terms, to determine at which levels the factors were significant.

Table 3: Results of two-way repeated-measures ANOVA

**[CTT]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Between subjects | 1291.33 | 71 | | | |
| Groups | 85.26 | 2 | 42.63 | 2.44 | 0.0947 |
| Subjects within groups | 1206.06 | 69 | 17.48 | | |
| Within subjects | 676.50 | 72 | | | |
| Tests | 403.34 | 1 | 403.34 | 129.56 | <.0001 |
| Groups x Tests | 58.35 | 2 | 29.17 | 9.37 | 0.0003 |
| Tests x Subjects within groups | 214.81 | 69 | 3.11 | | |
| Total | 1967.83 | 143 | | | |

**[RASCAL]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Between subjects | 124.54 | 71 | | | |
| Groups | 8.54 | 2 | 4.27 | 2.54 | 0.0862 |
| Subjects within groups | 116.00 | 69 | 1.68 | | |
| Within subjects | 64.44 | 72 | | | |
| Tests | 37.33 | 1 | 37.33 | 121.56 | <.0001 |
| Groups x Tests | 5.92 | 2 | 2.96 | 9.63 | 0.0002 |
| Tests x Subjects within groups | 21.19 | 69 | 0.31 | | |
| Total | 188.98 | 143 | | | |

Table 4 displays the analysis of the simple main effects. The CTT results show that the group difference was statistically significant on the post-test ($F_{2,69}$=4.44, $p<.05$). Test differences were significant in Groups A, B, and Z, respectively ($F_{1,69}$=59.13, 79.51, 9.66, $p<.01$). The RASCAL results indicate that the group difference was statistically significant on the post-test ($F_{2,69}$=5.10, $p<.01$). Test differences were significant in Groups A, B, and Z, respectively ($F_{1,69}$=57.13, 75.61, 8.08, $p<.01$). Hence, the CTT and IRT analyses were in accord.

Table 4: Analysis of the simple main effects

**[CTT]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Groups at Pre-test | 24.08 | 2 | 12.04 | 1.50 | ns |
| S at Pre-test | 554.91 | 69 | 8.04 | | |
| Groups at Post-test | 119.53 | 2 | 59.76 | 4.44 | <.025 |
| S at Post-test | 927.74 | 69 | 13.45 | | |
| Tests in Group A | 184.08 | 1 | 184.08 | 59.13 | <.01 |
| Tests in Group B | 247.52 | 1 | 247.52 | 79.51 | <.01 |
| Tests in Group Z | 30.08 | 1 | 30.08 | 9.66 | <.01 |
| S x Tests | 214.81 | 69 | 3.11 | | |

**[RASCAL]**

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Groups at Pre-test | 2.22 | 2 | 1.11 | 1.27 | ns |
| S at Pre-test | 60.30 | 69 | 0.87 | | |
| Groups at Post-test | 12.24 | 2 | 6.12 | 5.10 | <.01 |
| S at Post-test | 82.85 | 69 | 1.20 | | |
| Tests in Group A | 17.55 | 1 | 17.55 | 57.13 | <.01 |
| Tests in Group B | 23.22 | 1 | 23.22 | 75.61 | <.01 |
| Tests in Group Z | 2.48 | 1 | 2.48 | 8.08 | <.01 |
| S x Tests | 21.19 | 69 | 0.31 | | |

Multiple comparisons were made to determine which levels were different from each other, using Fisher's LSD (Least Significant Difference). The results of between-group comparisons of means on the post-test are shown in Table 5.

Table 5 shows that in the CTT analyses, Groups A and B significantly outperformed the control group (Group Z) on the post-test (i.e., on the Post-test, Group Z < Groups A & B). The same result was found with IRT. Consequently, I conclude from the results of the CTT and IRT (RASCAL) analyses that the treatment provided to Groups A and B (i.e., explicit instruction on sound changes) was more effective than the no treatment (Group Z). Thus, hypothesis 1 was confirmed.

Table 5: Multiple comparisons of groups on the Post-test

| [CTT] Mean | [RASCAL] Mean | | A | B | Z |
|---|---|---|---|---|---|
| 12.42 | 0.11 | A | | | |
| 11.63 | −0.14 | B | | | |
| 9.38 | −0.86 | Z | ** | ** | |

** p<.01, * p<.05

The following result was obtained with regard to between-test comparisons, as Table 4 shows:

Groups A, B & Z: Pre-test < Post-test

That is, in both the CTT and IRT analyses, the treatments for Groups A, B, and Z were effective.

Regarding H2, the overall data revealed that no statistically significant difference was discovered between CTT and IRT, with the exception that in the analysis of the simple main effects, the group differences on the post-test were statistically significant at the .025 level in CTT ($F_{2,69}$=4.44) and at the .01 level in IRT ($F_{2,69}$=5.10). The critical value is $F_{critical(2,69)}$=3.91 at the .025 level and $F_{critical(2,69)}$=4.95 at the .01 level. This exceptional result does not suggest that the IRT (RASCAL) analysis is more conservative than the CTT analysis, since there was only one difference in the results discovered in the whole data set and the difference of F-value was minute. One can use the IRT model on a practically equal footing with CTT in classroom settings.

## 4. Discussion

The current research found that Groups A and B significantly did better than the control group (Group Z) on the post-test. That is, explicit instruction on sound changes (e.g., contraction, assimilation, blending, *r*-linking, unreleased plosives, and weakening) contributed to the development of the learners' phonetic recognition. Many EFL learners in Japan complain that they have difficulty understanding natural conversation between native speakers, which differs in speed from the dialogs in English textbooks. They tend rather to pay equal attention to every word phonetically than to be able to disregard weak, reduced, or unreleased sounds. One reason for that is their L1 (Japanese) is a syllable-timed language, whereas the target language (English) is a stress-timed language. Therefore, gaining explicit knowledge of the rules and patterns of sound changes owing to explicit instruction was found to be beneficial to EFL learners that attempt to recognize natural interaction by native speakers on a phonetic level.

There was a surprising result in Group Z: this control group performed better on the post-test than on the pre-test. Practice effects of two tests, the exposure to the target items in and outside of the class, or the influence of other classroom teaching on sound changes may account for their higher performance. The learners, however, orally reported after the post-test that they had not received any phonetic instruction explicitly with regard to the target items on the test. It also

seems that practice effects were not influential since the post-test was administered three months after the pre-test. The result may imply that regarding phonetic recognition, learners in ordinary teaching settings may benefit to some extent from a variety of instruction, even if explicit instruction that deals with sound changes is not provided in class.

## 5. Conclusion

The finding in this research suggests that it is advisable to inform EFL teachers of the fact that explicit instruction on the rules and patterns of sound changes is beneficial to learners.

Further research should examine whether EFL learners will benefit from explicit instruction on sound changes in their production, that is, whether their oral performance will improve owing to the provision of explicit instruction. The comparison of the current finding to ESL contexts will also be explored in further investigation to examine whether explicit instruction will be more effective to EFL than ESL learners who are exposed daily to a large amount of input and meaning interaction in their environments.

**Note**

I would like to thank Prof. Leon Richards for his insightful comments on earlier versions of this study.

## Appendix:

**Test**: Listen to the tape and fill in the blanks.

[NB: The answers are in the bracket here.]

1. **(I've)** **(been)** to Disneyland several times.
2. Karen's busy. She **(won't)** **(arrive)** until ten.
3. Tom, **(there's)** **(someone)** waiting at the door.
4. I wonder **(who's)** **(coming)** to the party.
5. You **(should)** **(have)** been more careful.
6. **(Would)** **(you)** mind speaking a bit slower?
7. It's not so difficult. Do **(as)** **(you)** are told.
8. We're throwing a party this weekend. **(Won't)** **(you)** join us?
9. You look pleased. What **(makes)** **(you)** so happy?
10. May I **(take)** **(your)** order?
11. Let's **(get)** **(together)** again soon.
12. I can **(take)** **(care)** of myself.

13. That's (**up**) (**to**) you to decide.
14. (**Good**) (**job**)! You made it this time.
15. Does this (**sound**) (**good**) to you?
16. I can't (**put**) (**up**) with your lies any more.
17. What (**should**) I cook for dinner?
18. This is a present. Can you (**wrap**) (**it**) up, please?
19. We've (**run**) (**out**) of money.
20. I'm exhausted. Let's (**call**) (**it**) a day.
21. Could you (**ask**) (**her**) how much she wants?
22. Can you (**get**) (**it**) from the nearby supermarket?
23. I think you (**made**) (**the**) right decision.
24. Can we meet (**at**) (**the**) hotel?
25. We used to be (**better**) (**off**) at that time.

(Kumai and Timson 1998)

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