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研究課題名(和文)新しい語彙の般化における潜在的・明示的学習と統合の役割

研究課題名(英文)The role of implicit and explicit learning and its consolidation in the generalization of morphological knowledge

研究代表者

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研究成果の概要(和文)：本研究は、第二言語における派生形態規則を聞いて学ぶ場合の、偶発的学習と明示的学習を比較した。日本人中級英語学習者にテスト時に文法性判断課題を行ってもらい、その正解率と反応時間を、学習直後と一週間後に測定した。テスト時の意識の主観的判断と、実験後の口頭報告と合わせて、学習した知識の性質が潜在的なものが明示的なものかを調べた。両学習者とも学習直後では有意な学習効果があったが、一週間後は、明示的学習者のみ学習効果が持続した。両学習者の間に反応時間の有意な差はなかった。偶発的学習者は主に無意識的知識を発達させていた一方、明示的学習者は明示的知識に頼っていたが、その一部は後に無意識的知識となっていた。

研究成果の学術的意義や社会的意義

本研究の主な結果は以下のとおりである。

(1)日本人英語学習者は、聴覚提示された英語の派生形態規則を明示的にも偶発的にも学習できる。(2)学習後に更なる学習がなければ、偶発的学習は効果を失うが、明示的学習は一週間後も効果を維持できる。(3)偶発的学習は主に無意識的知識を発達させる。一方、明示的学習は主に意識的知識に頼るが、一部の知識はその後無意識的なものとなる。これらは次の点で新しい発見である。  
(1)学習対象として派生形態規則を扱った。(2)偶発的学習と明示的学習を比較する際に、獲得した知識が潜在的知識か明示的知識かを明らかにした。(3)偶発的学習と明示的学習の遅延効果を明らかにした。

研究成果の概要(英文)：The aim of the current study was to compare both incidental and explicit auditory learning of second language (L2) derivational morphology by measuring the accuracy and the reaction time of a grammaticality judgment task. Furthermore, the study was set up to examine the nature of acquired knowledge using subjective measures of awareness during the testing phases and post-experimental verbal reports. The delayed effects of learning were investigated by testing participants immediately after the learning and one week later also. The results showed a significant learning effect for the incidental and explicit learners immediately after exposure, but only the explicit learners maintained the learning effects a week later. Both types of learners showed no significant difference in the reaction time. Incidental learners primarily developed implicit knowledge, while explicit learners relied on explicit knowledge to a large extent, part of which became unconscious later.

研究分野：外国語教育

キーワード：偶発的学習 明示的学習 潜在的知識 遅延効果 派生形態規則

### 1 . 研究開始当初の背景

The main issue the present study attempts to address is how people acquire and generalize new morphological systems. This is a critical aspect of language competence: the ability to produce an unlimited number of expressions by combining a limited number of linguistic units (Diessel, 2004; Pinker & Jackendoff, 2005). This creativity is reflected in the process of generalization across individual exemplars to which people are exposed that evidently emerges in morphological learning (Tamminen, Davis, Merks, & Rastle, 2012; Tamminen, Davis, & Rastle, 2015).

### 2 . 研究の目的

The aim of the current study was to compare incidental and explicit auditory learning of L2 derivational suffixes by measuring the accuracy and the reaction time of a grammaticality judgment task administered to Japanese learners of English at an intermediate level. A further aim was to explore whether the resultant knowledge was implicit or explicit in nature through the analysis of subjective measures of awareness during the testing phases, in addition to post-experimental verbal reports. The study also examined the delayed effects of learning by testing participants immediately after learning and one week later. In particular, the research aims to address the following four research questions:

- (1) To what extent are adult learners able to acquire L2 derivational morphology incidentally through auditory exposure?
- (2) To what extent is their performance comparable to that of explicit learners?
- (3) What is the nature of the acquired knowledge: implicit or explicit?
- (4) Are there any delayed effects of learning demonstrated by the different learning groups?

### 3 . 研究の方法

#### Participants

For the current study, sixty Japanese university students were recruited as participants (43 females, 17 males) with an age range from 18 to 21 ( $M = 19.80$ ,  $SD = 1.09$ ). All participants were native speakers of Japanese and had studied English as a foreign language for more than six years. Their scores of English proficiency tests administered in Japan were 400-470 at TOEFL ITP, 440-600 at TOEIC L&R, or Eiken Grade Pre-2 and Grade 2. Participants were approximately equivalent to A2/B1 levels in the Common European Framework of Reference for Languages based on the conversion table provided by the Ministry of Education, Culture, Sports, Science and Technology, Japan (2015).

#### Stimuli

The stimuli were 144 sentences including nonwords attached with 12 suffixes based on real English suffixes forming three grammatical categories (Noun: -mənt, -nəs, -ʃən (ʒən), -əti; Adjective: -fəl, -ɪʃ, -əl, -ik; Verb: -eit, -ən, -aɪz, -ifaɪ). The suffixes were selected from 32 major English suffixes reported in Harwood and Wright (1956). The stems of the nonwords consisted of two syllables: consonant plus vowel plus consonant (CVC) plus /ɪ/, /i/, /ɪs/, /ɪz/, /is/, /iz/, or /əs/. The CVC parts of the nonwords were constructed with reference to Noble

(1961), ensuring a variation of vowels and consonants. The participants' L1 (Japanese) has similar derivational suffixes (Shibatani, 1990; Tsujimura, 2007). For example, when the suffix *-sa* is attached to an adjective “*yasashii*” (*kind*), the derived form “*yasashisa*” (*kindness*) serves as a noun.

### **Procedure**

The experiment consisted of two phases: the learning phase and the testing phase. In the learning phase, the incidental learning group listened to 48 grammatical sentences twice (96 sentences in total). After they listened to each sentence, participants were requested to choose one of the two pictures on the computer screen which they thought matched the content of the sentence. Whether their choice was correct or not was indicated by a different sound: a chime or a beep. The provision of this kind of feedback presumably prompted the semantic processing of the sentences while avoiding raising awareness as to what they were learning. Furthermore, their choice could be made just on the basis of the English words in the sentences such as “at home”, “in the library”, “at school” and “doctor”, which was intended to prevent participants paying much attention to the novel words and the suffixes. The order of the presentation of the sentences was randomized for each participant, and the learning period lasted about 15 minutes.

The explicit learning group received an explanation in Japanese (using PowerPoint slides) that English has three types of suffixes which form nouns, adjectives, and verbs. Participants then listened to auditory examples of 12 suffixes and sentences including the suffixes (three grammatical categories x four suffixes) with explanations written on PowerPoint slides. No suffix or sentence was presented in the written mode. The explanation was repeated three times for about 15 minutes, almost the same amount of time for the incidental learning group. Participants were not allowed to go back to the previous slides.

Meanwhile, the control group had no learning phase.

**Testing phase:** The three groups took the grammaticality judgment test twice: immediately after the learning phase (Day 1) and a week later (Day 8). Participants listened to one of the two versions of 48 sentences including new nonwords with the suffixes, and judged whether each sentence was grammatically correct or incorrect as quickly and accurately as possible by pressing designated buttons on the response pad. Participants had to complete this task without being given any information about which aspect of the sentence was grammatical or not. It was assumed, however, that the use of basic English word order and the highly familiar words used in the experimental sentences (except for the suffixed nonwords) prompted similar expectations among the three groups regarding a grammaticality judgment (Hamrick & Sacks, 2018). The sentences were presented in randomized order for each participant. Half of the sentences were grammatically correct (e.g., ‘The doctor likes to show his bəfɪzmənt’) and the other half were grammatically incorrect (e.g., ‘The teacher tries to səfɪsɪk at school’). There was no feedback in the testing phase. The correct response rates and reaction times were obtained during the testing phase.

After each trial, participants were asked to indicate on a four-point scale how confident they were in their decision (*no confidence, somewhat confident, very confident, or absolutely certain*) and what the basis of their judgment was (*guess, intuition, memory, or rule*). Explanations about what the English terms in the four-point scale meant were provided in Japanese. No participant seemed to be confused about the differentiation between the terms. Even the distinction between *guessing* and *intuition* was relatively clear to participants. The phenomenology of *intuition* was labelled as “*chokkan*” in Japanese to mean knowing that a judgment is correct, but not knowing why, while guessing was labelled as “*atezuppou*” in Japanese to mean not knowing either (Dienes & Scott, 2005).

Different stimulus sentences were used on Day 1 and Day 8. After the testing phases on Day 8, participants filled out a debriefing questionnaire that asked whether they might have noticed any rules or patterns in the sentences they had heard, and if so, when they noticed them (during the training, the first testing phase or the second testing phase). This was followed by an oral interview that elaborated on the questionnaire.

#### 4 . 研究成果

**(1) Research Question 1: To what extent are adult learners able to acquire L2 derivational morphology incidentally through auditory exposure?**

The incidental learners exhibited significant learning effects, at least immediately after the brief auditory exposure to the sentences in the learning phase.

**(2) Research Question 2: To what extent is their performance comparable to that of explicit learners?**

Considering the immediate measurements of learning, performance of the incidental learners was on par with that of the explicit learners. It was not the case, however, after a one-week delay where incidental learners declined to a chance-level performance, while explicit learners still remained reliable in that they performed significantly better than the incidental and the control groups.

**(3) Research Question 3: What is the nature of the acquired knowledge: implicit or explicit?**

Incidental learners were found to develop implicit knowledge given their lack of confidence and their judgment based on guess and intuition. The negative correlation between confidence and accuracy caused by a large number of choices of the “less confidence” category may be indicative of better performance with less confidence (Rebuschat, 2013). At the same time, their performance at above-chance levels based on rule knowledge suggests they also developed some explicit knowledge, although none of the participants were able to describe the derivational rule in the retrospective verbal reports. Considering that participants in the control group did not possess this kind of explicit knowledge, the explicit knowledge developed by incidental learners was arguably created through incidental exposure in the learning phase (Grey et al., 2014; Rebuschat et al.,

2015; Rogers et al., 2016; Rebuschat & Williams, 2012). Furthermore, it was found that the nature and durability of the resultant explicit knowledge seems to differ substantially between the two types of learners, given that the explicit knowledge immediately developed by incidental learners diminished afterward, but the knowledge possessed by explicit learners persisted throughout the one-week experiments.

Explicit learners were found to possess conscious knowledge both in the immediate and delayed tests. Interestingly enough, explicit learners also developed unconscious knowledge one week later evidenced by their reliance on intuition (DeKeyser, 2015; Ellis, 2005). Hamrick and Rebuschat (2012) showed, too, that learners in an intentional learning condition developed some unconscious knowledge even immediately after exposure, evidenced by their above-chance performance based on intuition.

#### **(4) Research Question 4: Are there any delayed effects of learning demonstrated by the different learning groups?**

To reiterate some points mentioned above, incidental learners were found to not retain their learning for a week. This indicates that they may need additional exposure, for example, on the day after the immediate learning or at least another time within the week. On the other hand, the learning gained by explicit learners was found to endure, and part of the resulting knowledge became unconscious later on. These results corroborate previous observations that explicit types of instruction are more efficient and the effects are more durable than implicit types (Andringa & Curcic, 2015; Ellis, 2015; Norris & Ortega, 2000; Spada & Tomita, 2010). Although these previous studies were not concerned with whether implicitly instructed participants were really unaware of what they had learned, the current research provides further evidence that explicit learning helps to develop more reliable knowledge. Regarding the question of how long it takes to gain learning effects, approximately 15 minutes might be enough for explicit learners, whereas the same amount of time is not sufficient for the effects of incidental learning to be maintained over time.

In conclusion, the current study has demonstrated that L2 derivational morphology can be auditorily learned, either incidentally or explicitly, immediately after exposure, and that learning can be maintained for a longer time only when learned explicitly. Incidental learners were found to develop primarily unconscious knowledge, whereas explicit learners were found to rely principally on conscious knowledge, part of which becomes unconscious later on.

New evidence presented in this study for incidental learning of derivational morphology and the consolidation effects gained through explicit knowledge adds a theoretical contribution to the growing literature on incidental and explicit learning of L2 grammar. The findings of this study utilizing a real L2 system as experimental stimuli may have direct pedagogical implications for L2 learning. Explicit instruction of grammatical rules may be more effective and durable than incidental learning, at least only with a one-time exercise. Incidental learning, albeit with immediate effects, seems to require extensive exposure over time to be effective.

## 5. 主な発表論文等

〔雑誌論文〕(計 1 件)

**Keiichi Ishikawa. Incidental and explicit learning of L2 derivational morphology and the nature of acquired knowledge. *Applied Psycholinguistics*** 修正原稿査読中

〔学会発表〕(計 1 件)

石川圭一. **Implicit second language learning** ことばの科学会 2017年7月16日 (於: 関西学院大学梅田キャンパス)

〔図書〕(計 件)

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〔その他〕

ホームページ等

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