



Experimental Studies on Prosodic Features in Second Language Acquisition: Training Japanese learners to produce natural English

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【 学位論文題目 】

Experimental Studies on Prosodic Features in Second Language Acquisition: Training Japanese learners to produce natural English (第二言語習得におけるプロソディに関する実証的研究 ―自然な英語を身につける訓練とは―)

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論文要旨

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専攻 グローバル文化専攻 先端コミュニケーション論

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論文題目

Experimental Studies on Prosodic Features in Second Language

Acquisition: Training Japanese learners to produce natural English

(第二言語習得における音韻に関する実証的研究 - 自然な英語を身につける訓練とは -)
(アロソディ)

論文要旨

This dissertation is organized into four sections, three of which describe different experimental studies relating to the acquisition of English prosodic features by Japanese university students. The last section describes my implications in respect of phonetic pedagogy mainly based on the three studies.

Study 1 dealt with the influence of model sounds on speech production. The aim of the study is to compare students' own creative reading sounds with their imitating reading sounds. One tool for learning prosodic features may be the frequent imitation of model sounds. In creating authentic software or a textbook of English pronunciation training, voices of some native speakers of the language are usually recorded as models. 20 students had taken a pretest. Ten sentences out of forty were recorded without model sounds in the test. The same sentences were also recorded after they listened to model sounds as a posttest. The fundamental frequencies of each sentence and the duration of some target consonants were measured by a speech analyzer. Auditory impressions of two native teachers of English and two Japanese teachers of English were also examined.

The results of the study revealed the effects of the model reading on the subjects' production. Especially in prosody, the duration of sentences, consonants, and vowels approximated that of the model reading. As for the unfamiliar consonants, there was no significant change between before-listening (BL) and after-listening (AL). That means the subjects could recognize the

prosodic features by listening to the model reading only once or twice and produce the sound in a similar way. However, regarding unfamiliar consonants, they could not recognize the difference, and they did not produce them either. The implication of this is that both suprasegmentals and segmentals are indispensable in teaching pronunciation of a foreign language. Both groups of teachers observed that students' pronunciation had improved in most cases. It is still early to conclude that the subjects acquire or improve the prosody of the target language because they were exposed to the model reading only once or twice for each stimulus. More extensive experiments including studies of retention would contribute to understand how the subjects change their production if they participate in further pronunciation training.

Study 2 investigated the effectiveness of applying low-pass filters to computer-assisted English pronunciation training. Electric low-pass digital filtering of speech has been used in a considerable number of experiments to highlight the prosodic features of speech. Some attempts to apply low-pass filters to language learning have been made but the effectiveness has not yet been empirically proved. If the application is found to be effective to acquire the prosody of the target language, we might develop training software using low-pass filtered sound. The experiment, using a pretest-posttest design, provided 13 native Japanese-speaking learners of English with 10 training sessions focused on prosody using a real-time computerized pitch display. Multiple exemplars produced by native speakers of English provided training feedback. A group of seven learners were trained with low-pass filtered models while another six students were given non-filtered examples. Learners' recorded pre- and posttest productions were analyzed by computer software and also presented to four raters for evaluation. Acoustic analyses by computer and listener judgments were used to determine how accurately the suprasegmentals were produced and to what extent they contributed to foreign accent. The 7-point scales were used in the subjective evaluations. The analysis of variance (ANOVA) was used and it revealed a significant difference between the low-pass group and the non-filtered group, especially in the results of acoustic analyses. As for subjective evaluations, both groups showed improvement and the difference was not significant. The results suggest that English prosody training using low-pass filters contributed to acquire the accuracy of pronunciation of the language. The training without low-pass filters was also effective to improve English prosody according to the subjective evaluations. That means we could apply the low-pass filtering to the prosody training of the language if we prioritize accuracy.

Study 3 referred to the priority of prosodic features over individual sounds in second language acquisition. Phonetics, phonology and other aspects of language have long been viewed as being best learnt through a bottom-up approach. Traditional works on phonetic pedagogy began with the description of vowels, consonants, words and connected speech. It was natural for more practical textbooks on pronunciation to deal with individual speech sounds first, then vocabulary, phrases, and discourse units. According to this approach, learners would reach a particular level of proficiency by accumulating the mastered entities of the target language. Over the years, however, there has been a shift towards a more holistic top-down approach. The current emphasis in pronunciation teaching seems to reside in the prosodic features, or the suprasegmentals of language. However, in Japan, there seems to be relatively little interest in pronunciation teaching and the bottom-up approach is still common in the English language classroom. Indeed, concerning both approaches, theory has not been sufficiently supported by empirical researches.

This study aims to examine which approach is more effective in pronouncing English naturally. There were four groups of subjects: Group A; learning consonants and vowels first, then prosody in phrases or sentences, Group B; learning prosody first then consonants and vowels, Group C; learning prosody and individual sounds together, and Group D; a control group which didn't practice but took the pretest, the midtest, and the posttest. The subjects in this study were all Japanese university students and joined the experiment voluntarily. Sound data of the pre/mid/post-tests were collected using original software. Sentence or phrase duration and F0 ranges were measured using Praat. Data were also judged by four raters as to whether they sounded natural as English. The results were analyzed in ANOVA. Findings show that Group B achieved by far the highest results in both acoustic analyses and subjective evaluations.

The last chapter deals with the general discussion based on the three studies. Among the findings, the most important one is in Study 3. It revealed the importance of the training order. The apparent priority of training prosodic features over individual sounds was observed. Further investigations are needed to support this finding but it will surely shed much light on our understanding of the process of speech perception and production. The findings of these studies will also contribute to develop a more effective training program on computer or can be applied to the classroom.

論文審査の結果の要旨

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論文題目	Experimental Studies on Prosodic Features in Second Language Acquisition: Training Japanese learners to produce natural English (第二言語習得におけるプロソディに関する実証的研究 - 自然な英語を身につける訓練とは)		
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要 旨

本審査委員会は、伊庭緑氏の提出した、「Experimental Studies on Prosodic Features in Second Language Acquisition: Training Japanese Learners to Produce Natural English」という題目の論文（以下、本論文と記載）を審査し、以下の結果を得た。

本論文は、効果的英語の発音教育について、プロソディと単音の2つの要素に着目し、訓練された発音の改善を目的として、実験的実証的研究を行った。また、この結果を英語教育への応用について考察を行った。

第1章では、日本語学習者の英語教育における音声学の現状を調査し、その問題点を明らかにした。また、本論文の研究の意義と貢献について述べた。

第2章では、本研究の目的と方法を述べた。また、実験の結果を分析し、その意義について述べた。

第3章では、聴覚障害者の音声教育で効果があるといわれているローパスフィルターを通したモデル音声を使用することの学習効果を検証した。ローパスフィルターを通すことにより音韻性が不明瞭となることにより、プロソディの重要な要素であるイントネーションが相対的に明示されるプロソディ学習への効果が期待される一方、不自然なモデル音声を何度も聞かせることの倫理面での懸念があったが、実験結果からは、ローパスフィルターを通した音声を使った学習者群とそうでない群で効果に差がなかった。

第4章は、本学位論文の中心をなす部分である。学習者を4つの実験群に分け、プロソディ訓練と単音訓練の配置を4種類【(1)プロソディ→単音、(2)単音→プロソディ、(3)プロソディと単音を混合、(4)訓練なし】に分け、訓練前、中、後の発音の比較により効果を検証した。その結果、訓練効果の大きさは(1) > (2) = (3) > (4) となり、(1)のプロソディ→単音の群が最も発音の改善に効果があることが実証された。ただし、プロソディ訓練と単音訓練で、訓練課題のインタラクティブ性が異なっており、プロソディ訓練課題では強制的に発音をさせ、その結果も画面表示していたのに対し、単音訓練では学習者が発音をしても結果が訓練画面上に示されることがないという変数が重畳していた。

第5章では、3つの実験の結果から、大学生を対象とした英語教育においてモデル音声の復唱課題を核とした訓練が発音の改善に有効であること、プロソディと単音の導入時期によって訓練効果が異なることが証明された。ただし、訓練手法にプロソディ訓練対単音訓練という変数に、発音を強制的にさせたかどうか、発音に対するフィードバックがあったかどうかというインタラクティブ性の強度が重畳しており、今後の実験が必要ではあるが、発音訓練の初期にインタラクティブなプロソディ訓練の効果を実証したことと、本論文の結果の英語教育への実践について具体的な方向性を考察した。

本論文は、大学英語教育の立場からより効果的な学習方法を見出したいという具体的な動機と、連続と続く英語教育と音声科学、それぞれの分野の研究を調査したうえで実施したものである。研究の手法は実験心理学の手法をとり、2つの実験（第2章、第3章）の結果から、中心となる実験計画を導くという計画性に優れた論文であり、独創性、論理性の面で評価できる。また、すべての実験で結果を論ずるにあたり、英語の自然性について判定者による主観評価の結果と、音響分析という客観的指標の双方を用い、適切な統計手法を用いて結果を導出している。その結果、同じ訓練を同じ量行っても、順序によって訓練効果が異なることを示した世界最初の実験結果であり、大きな発見を導いた。本論文で得られた知見は、日本の英語教育のみならず、外国語教育や、その他の教育分野にも展開可能なものであり、優れた学位論文といえる。

なお、3つの実験のうちの実験1、2（第2、3章）については下記の査読付き論文として採択されており、本論文が当該領域における学術研究の水準を満たしていると判断できる。なお、実験3（第4章）も投稿準備中である。

- (1) The influence of model sounds on the speech production, 「言語と文化」第11号 pp.45-67 (2008年3月) 甲南大学国際言語文化センター
- (2) The Effectiveness of Low-Pass Filters in English Pronunciation Training Language Education and Technology 第46号 pp.21-40 (2009年6月) 外国語教育メディア学会