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Bilingual Cognition - Effects of Different Levels of L2 Proficiency on the Cognitive Decision of Shapes and Mass – A Report of the Cases of Japanese Bilinguals in Japan and in the UK

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1. Introduction

After spending a certain period abroad, people acquire different habits in speech. As they speak their first language, unfamiliar gestures and foreign words may appear in their speech, or the structures of the sentence may be changed, and it can be seen as a bizarre phenomenon in the eyes of monolingual native speakers of that language. Is it caused by the experience living abroad, being exposed to a foreign environment? Is it really culture which causes such phenomenon? Imai & Gentner (1997, 2000) state that a language has an effect upon one's cognitive states. In their study two groups of monolingual subjects, Japanese and English monolinguals, were tested their cognitive difference. Imai & Gentner found that Japanese monolinguals have a tendency in categorising objects according to their materials while English monolinguals categorise according to their shapes. Their study strongly suggests that a different language affects speakers' cognitive states differently. Being inspired by their study, Cook et al (to appear) replicated the study and investigated bilingual speakers. Their aim was to find out how people operate two different languages in the same mind; they focused on Japanese speakers whose second language was English in order to compare with the subjects of Imai & Gentner. What was found was that the higher the subjects' English proficiency, the more they act similar to the English monolinguals. However, it was never the case that the bilingual subjects performed exactly the same as the English monolinguals. Their study suggests that bilingual speakers are independent group of people whose cognitive states are different from monolingual speakers. Furthermore, each language has its own effect and when two languages are acquired, the bilingual people develop from their original conceptual states to different ones. In the present research two groups of Japanese bilinguals whose second language is English are investigated. One group of subjects resides in the U.K., and another in Japan attending an immersion university. The same experiment from Imai & Gentner was adopted to see whether or not there is any difference between bilinguals according to the different L2 proficiency.

2. Method

2.1 Subjects

Two groups of Japanese-English bilingual subjects were required to participate in this experiment. The former group of 47 subjects is mostly student attending English universities enrolling either undergraduate or post-graduate courses. Also there are a few faculty members of educational institutions such as a Japanese language school. The latter group of 75 students attends an immersion university in Japan where most of the

lectures are delivered in English by either native speakers or English speakers with native level command. All the subjects were regarded to be from similar educational and economic backgrounds. Their previous English learning experiences were three years in junior high school and another three years in senior high school making six years in total. There were a few variations of learning English before entering junior high school such as attending an English conversation school. However such cases were found in both groups, and were thought to be with little effect for conducting the experiment. All the subjects were categorised into 3 groups according to their level of L2 proficiency using Paul Nation Vocabulary Test (established by Paul Nation in 1990).

2.2 Materials

All the objects used in this experiment were replica of the objects used in Imai and Gentner (1997). There were three object types: complex, simple, and substances. The complex objects utilise factory-made artefacts having complex shapes and specific functions (i.e., a lemon squeezer). The simple objects represent solid, simple-shape entities made out of a solid substance (i.e., a pyramid made with cork). The substances were made out of non-solid substances such as Nivea cream shaped into some forms (i.e. Nivea cream laid in a shape of reverse C). Each set consists of three objects. The subjects were shown the first object (i.e., a ceramic lemon squeezer), then shown two more objects (i.e., a wooden lemon squeezer and broken ceramic pieces) and were asked which of the two objects was considered to be the same with the first object. The below summarises all the objects we have adopted into this experiment. (See Imai & Genter (1997, 4.2 Material) for more details about objects).

Type	Target Items		Test Items	
	Shape plus materials	label	Same shapes	Same materials
Complex objects	Ceramic lemon squeezer	Ejulem	Wooden lemon squeezer	Ceramic pieces
	Copper T junction	Evetty	Plastic T junction	Copper pieces
	Red plastic clip	Tapy	Metal clip	Red plastic pieces
	Wooden whisk	Luften	Plastic whisk	Pieces of wood
Simple objects	Cork pyramid	Nehear	Plastic pyramid	Cork piece
	Plastic flying saucer shape	Aniam	Wooden flying saucer shape	Pieces of plastic
	Red play-dough half egg	Mukol	Plastic half egg	Red play-dough pieces
	Orange wax kidney shape	Kelase	Purple plaster kidney shape	Orange wax pieces
Substance	Reverse C-shape in Nivea cream (white) ⊃	Onlar	Reverse C in transparent hair-gel	Blob of Nivea
	Foam capital gamma shape Γ	Muhaba	Clay gamma shape	Pile of foam
	Sawdust capital omega shape Ω	Kelede	Leather omega shape	Two piles of sawdust
	Sand S-shape	Storal	Glass beads in S-shape	Three piles of sand

There were four sets of objects in each group of complex, simple and substances. Hence all together 12 sets were tested by the subjects. Each object had a non-sense name. For example, the above example of lemon squeezer was named 'Ejulem'.

2.3 Procedure

2.3.1 English proficiency test

To begin with, English proficiency of the two groups of bilingual subjects was examined. The Paul Nation Vocabulary Test was adopted to check the subjects' English proficiency. This is a commonly used language proficiency test to quickly check subjects' English

proficiency levels, e.g., as a placement test for an English language school. This vocabulary test consists of 90 vocabulary questions spread in five bands (18 questions in each band) based on frequency levels. The lowest level A is selected from 1,000 most frequently used vocabulary, the next level B with 2,000, C with 3,000, D with 5,000, and the highest level of E with 10,000, that undergraduate university students should be familiar with. All the subjects were tested individually in a quiet room. It was found that the average score of the test for the immersion university students was 49.81, and 72.30 for the UK resident group. Having done the proficiency check, it was revealed that we have a variety of Japanese bilingual speakers as subjects with different English proficiency, which was an ideal setting to examine different types of bilinguals.

2.3.2 Experiments

As they finished the test, they proceeded to the actual experiment in another room, where one experimenter conducted the experiment while another kept the record of their answers. As shown in the Table 1 above, each experimental object was named with a nonsense name, e.g., the lemon squeezer was named 'Ejulem'. On showing the first object (i.e., a ceramic lemon squeezer), the experimenter announced 'This is 'Ejulem'. Uncovering the other two objects on plates (i.e., a wooden lemon squeezer and broken ceramic pieces), the experimenter then asked the subjects 'Which plate has 'Ejulem?' All the instructions were conducted in Japanese[1].

3. Results
3.1 Distribution of Paul Nation Vocabulary Test
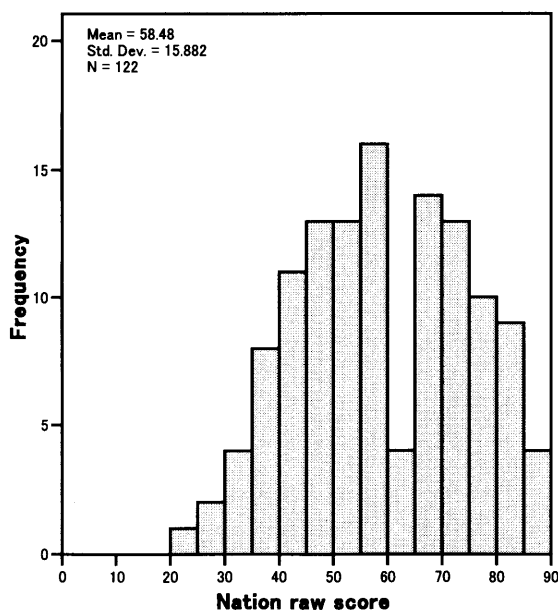
Fig. 1: Distribution of scores

Figure 1 shows the distribution of Paul Nation Vocabulary Test done by the two groups of

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[1] 'This is 'Ejulem'.' was announced as 'kore wa 'Ejulem' desu.' 'Which plate has 'Ejulem'?' was announce as 'dochira no osara ni 'Ejulem' ga notte imasuka.'

subjects. The figure shows a near bell-shape distribution. What can be seen from the figure is that a variety of subjects are gathered for the present research in terms of their English proficiency. In order to look precisely into the subjects' performance on the experiment, two bilingual groups were mixed together (as in the figure 2) and grouped into three proficiency groups of 'low', 'middle' and 'high', according to their Nation score. The 'low' group was formed with those who scored 45 or below, those who scored between 46 and 65 were grouped into the 'middle', and those who scored 66 or higher were grouped into the 'high' group. The figure 2 below shows the distribution of the new groupings with their original L2 setting distinction. The total number of subjects in each group is 28 for the 'low', 48 for the 'middle', and 46 for the 'high'.

Figure 2: Distribution of Immersion and UK subjects to the vocabulary levels

(n=122)
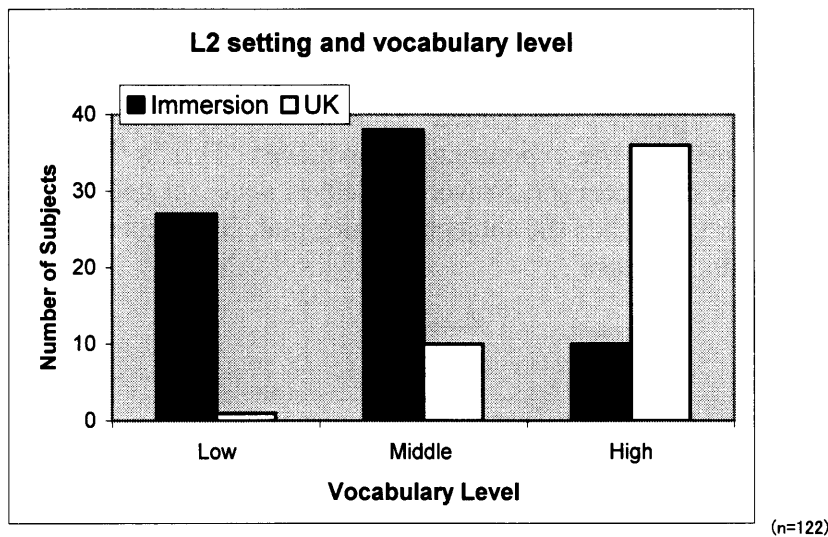
3.2 Performance on the experiment

The groups newly shuffled into vocabulary levels were examined for their performance on the experiment. The results will be presented in percentile in the figures below in order to contrast the results across the L2 proficiency groups although the statistical analysis has been conducted with the raw data.

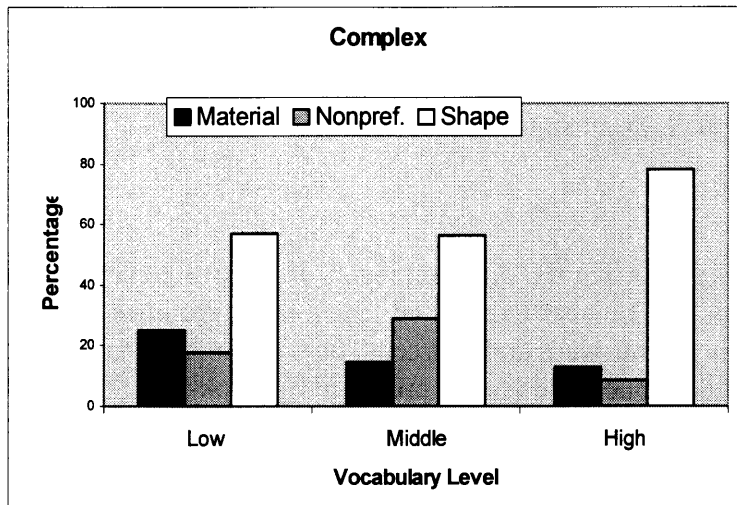Figure 3: Performance on Complex objects

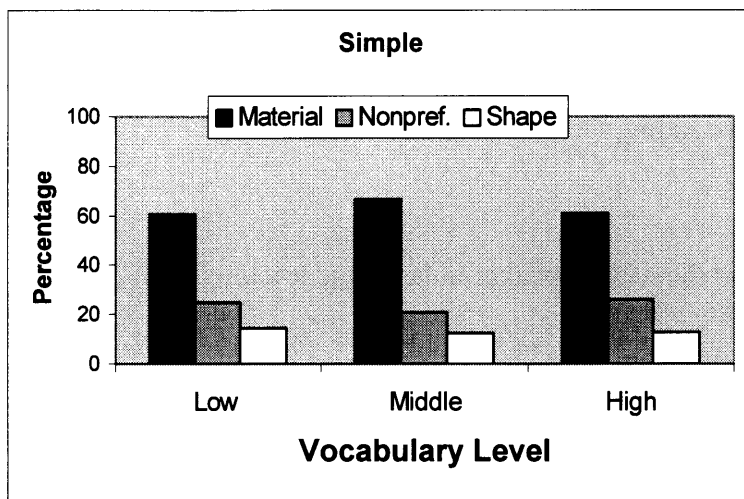Figure 4: Performance on Simple objects
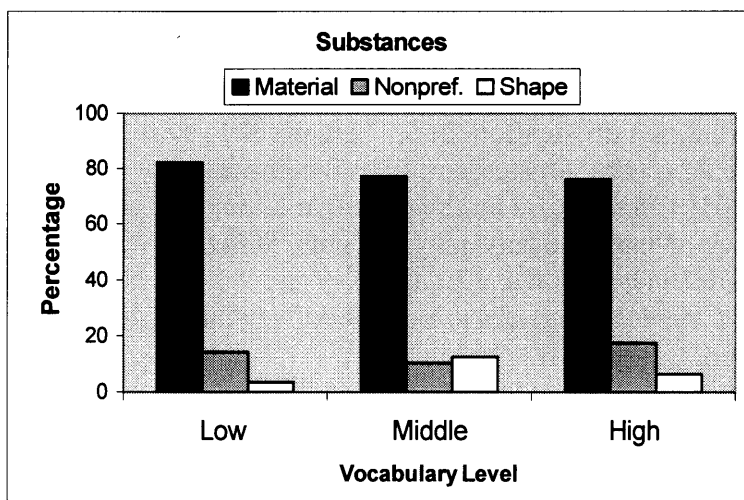

Figure 5: Performance on Substance objects

Figure 3, 4, and 5 above show how the three groups performed on the objects of complex, simple and substances respectively. While the distribution of the three preferences (material, non-preference, and shape) looks alike for the simple objects and substances,

the preference distribution for the complex objects is noticeably different from each other amongst the three groups. As the results were investigated under statistical analyses, it has been found that the groups showed significantly different preferences for the complex objects, in other words the degree of preference towards shapes or towards materials (Crosstabs, Gamma = .291, p. = .037, exact significance).

Discussion

The finding from this research suggests that the different levels of L2 proficiency play a role on our cognitive states. This can be also interpreted that a language does give an effect upon our cognitive states in various ways and degrees. The phenomena found in the present research support the Multi-Competence Theory proposed by Cook (e.g., 1999 and 2002), which suggests that as the result of L2 acquisition, bilingual speakers develop their unique models of language in terms of not only competence but also of the organisations of languages in their mind.

Due to the fact that there were only 122 subjects involved in this research and the data have not been compared with other groups of subjects, i.e. Japanese and English monolingual speakers, more subjects are required in order to conduct a thorough investigation on this research inquiry. However, the finding from the present research can be a firm first step toward understanding the bilingual cognition.

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