日本人大学生に対する５桁以上の英数字の教え方

ジェイムズ　ジョゼフ　スコット*

Teaching Large Numbers in English To Japanese University Students

James J. Scott*

Abstract

英語をかなり流暢に話せる人でも，日本人には大きな数を正確に言ったり，聞き取ることが苦手な人が多い．数が増える場合，英語では ten（十），hundred（百），thousand（千）というように３つのステップであるのに対し，日本語には十，百，千，万というようにステップが４つあるためであると思われる．その結果，５桁以上の数の場合，例えば ten thousand と ichi man、one hundred million と ichi oku というように，英語と日本語では頭につける数が違う．大学一年生を対象に実施した，大きな数を英語で正確に言ったり，聞き取れるようにする方法について検討したので報告する．

KEY WORDS : *English, university, numbers*

Background

Many Japanese who are proficient in most other areas of English seem to have trouble saying large numbers in that language. This can pose problems when such an individual converses with a foreigner and the conversation turns to topics in which such numbers play an important role. For example, if a Japanese who is otherwise fluent in English says that his house costs "three million yen" (3,000,000), the foreigner will believe him, but will be surprised to find that houses are so cheap in Japan. In all likelihood, the Japanese gentleman probably meant 30,000,000 but guessed incorrectly when he tried to translate "san zen man" into English (the correct translation, of course, is "thirty million").

In the above example, the mistake would have no major consequences. It was a different matter when a foreigner who is a friend of the author arrived in Japan and made inquiries regarding the deposit necessary for installing a telephone in her home. When she was told that a telephone line would cost her seven-hundred thousand (700,000) yen, she decided she could not afford it. Later, she learned that the actual cost would have been seventy thousand (70,000) yen.

The author suspects that the problem can be accounted for in large part by the difference in the ways that the two number systems progress. English numbers progress through a series of

*鹿屋体育大学 National Institute of Fitness and Sports in Kanoya, Kagoshima, Japan.

three-step sequences, while Japanese numbers progress through a series of four-step sequences. In English, a new component enters the picture every third step (ten, hundred, thousand, ten, hundred, million). But in Japanese, a new component enters the picture every fourth step (ju, hyaku, sen, man, ju, hyaku, sen, oku). As a consequence, any one-to-one correspondence between the two systems breaks down as soon as we get to five-digit numbers (10,000=ten thousand=ichi man). This poses no problem so long as we confine ourselves to reading and writing in arabic numerals : any adult will understand what the numerals "1,750,000" mean, even if he can only say the number correctly in his native language. However, it does pose a problem for the Japanese individual who suddenly finds himself in a situation where he must say a large number in English : "Hyaku nana-ju-go man'? Let's see. The English for 'hyaku nana-ju-go' is 'one hundred seventy-five.' But 'one hundred seventy-five thousand' doesn't sound right. What should I say?" Under such circumstances, the individual may fall back on guess work--saying "seventeen million five hundred thousand" or one hundred seventy-five thousand" when the correct answer is 'one million seven hundred fifty thousand." Of course, the Westerner trying to say large numbers in Japanese will be faced with roughly the same problem.

Over the years, the author has witnessed hundred of Japanese university students attempting to cope with large numbers in spoken English. The author's attempts to teach Japanese students how to say such numbers--and understand them when they are apoken--met with limited success. In the fall of 1995, the author attempted a new approach.

Methodology

The author teaches four first-year English Conversation classes at a Japanese university. In the last session for each group, the author conducted a review of numbers in English.

The review consisted of a numbers game. Each class was divided into teams of three or four students each. The author would read a series of three numbers in English. The students would listen and add the numbers. The first student to tell the author the correct answer in English would get a card for his or her team. At the end of the game, the team with the most cards would be the winner.

The author started with relatively easy numbers-for example, "five, plus twelve, plus fifteen" (5+12+15). Then he moved to progressively larger numbers.

As expected, students encountered difficulty when the answers crossed the "ichi-man" (ten thousand) threshold. For example, students would understand that "three thousand, plus five thousand, plus seven thousand" equals 15,000, but they were unsure how to say "15,000" in English.

At this point, the author stopped the game for a few minutes to go over some highlights of the English number system on the board. He did this two ways :

(1) He drew a table showing the progression of the two number systems through five digits :

ju	10	ten
hyaku	100	one hundred
sen	1,000	one thousand
ichi-man	10,000	ten thousand

(2) He pointed out that, in English, the numbers to the left of the comma are treated as a single unit (e. g., "15,000= fifteen thousand) .

Having explained that much, the author returned to the game, progressing to the point where answers exceeded one million (for example, "three hundred thousand, plus four hundred thousand, plus five hundred thousand"). As expected, the students once more encountered difficulty.

At this point, the author stopped the game again and added the following numbers to the tables on the board :

ju-man	100,000	one-hundred thousand
hyaku-man	1,000,000	one million
sen-man	10,000,000	ten million

The author emphasized that every three digits, the English system adds a comma (,) and a new word (ie, 1,000,000=one million). After doing so, the author resumed the game, continuing until the answers reached ten million (10,000,000).

It should be noted that the author used large, simple numbers, but not complicated numbers (e. g., five-hundred thousand, plus eight-hundred fifty thousand, plus nine-hundred thousand, but not eight thousand five hundred and twelve, plus thirteen thousand two-hundred and fifteen, plus seventeen thousand four hundred and eight). This is because the author was merely trying to teach the students how to match the English words with their numeral counterparts--he was not trying to teach them mathematics.

The Examination

At the end of the Fall, 1995 school term, the author administered an examination to his English Conversation I students, testing their knowledge of the material covered during the course of the term. The first two parts of the examination focused largely on recognizing numbers in spoken English.

Part I consisted of six addition problems. For each problem, the author would read a series of three numbers and then repeat the series one time. The students were required to write the numbers they heard and then add up the numbers. For example, if the author said, "seven, plus ten, plus twelve," the students were required to write "7+10+12=29,"

Out of the six addition problems, the first five did not cross the ichi-man threshold (i. e., the author did not say any number larger than 9,999) and need not concern us here. The sixth problem-three hundred seventy-five thousand, plus five hundred thousand, plus six hundred and fifty thousand (375,000+500,000+650,000) did cross that threshold. The author hoped that the students' performance on this problem would give some indication of how well they had grasped the concepts presented to them during the numbers games that had been played in the review session.

Part II consisted of six items for which the author told the students the prices in dollars and cents. For example, if the author said, "The hamburger costs two dollars and seventy-five cents," the students were expected to write "$2.75." Again, the last item was the only one to cross the ichi-man threshold ("The airplane costs one million, five hundred thousand dollars," where the students were expected to write "$1,500,000.").

The author believed that the task would be a difficult one, inasmuch as the spoken English does not lend itself to direct translation into spoken Japanese. "One million" does not equal one ("ichi") of anything in Japanese. Similarly, "five hundred thousand" does not equal "five hundred" of anything in Japanese (i. e., the term "go hyaku sen" is not used in the Japanese language) .

Results

The results are shown in the accompanying tables. Table 1 shows what happened when students attempted to write in arabic numerals what they heard when the teacher said, "Three hundred seventy-five thousand, plus five hundred thousand, plus six hundred and fifty thousand." "Correct" means that the student wrote all four numbers (the three numbers given, plus the total) correctly in arabic numberals. That is, the students wrote 375,000 + 500,000 + 650,000 = 1,525,000. "Partially correct" means that the students got the number of digits correct in each instance, but wrote one or more of the numbers incorrectly (for example, one student wrote 335,000 instead of 375,000). "Incorrect" means that, for one or more of the numbers, the student did not use the correct number of digits (for example, 37,500 instead of 375,000).

Table 1 shows that, of the 54 students who attended class when we reviewed large numbers by playing the numbers game, 25 (46.3%) gave correct answers, 16 (29.6%) gave partially correct answers, and 13 (24.1%) gave incorrect answers. Of the 19 students who did not attend class when we played the numbers game, 8 (42.1%) gave correct answers,3 (15.8%) gave partially corect answers, and 8 (42.1%) gave incorrect answers.

Table 2 shows what happened when students attempted to transcribe-using the dollar sign and arabic numerals-the price they heard when the author said, "The airplane costs one million five hundred thousand dollars." "Correct" means that the student wrote "$1,500,000." "Incorrect" means that the student wrote something else (the reasons for using "correct," "partially correct," and "incorrect" in Table 1, while using only "correct" and "incorrect" in Table 2 will be explained under the "Discussion" section below).

Table 2 shows that, of the 54 students who attended class when we played the numbers game, 36 (66.7%) gave the correct answer, while 18 (33.3%) gave incorrect answers. Of the 19 students who were absent on the day we played the numbers game, 9 (47.4%) gave the correct answer, while 10 (54.6%) gave incorrect answers.

Discussion

If we only look at the "correct" answers in Table 1, it would appear that there is nosignificant difference on the addition problem between those students who attended the review session and those who did not (46.3% versus 42.1%). However, if we combine the "correct" and "partially correct" answers, then a significant difference does emerge (75.9% versus 57.9%). The author contends that we do, in fact, obtain useful information by combining the two categories. That is, those students who gave "partially correct" answers understood the point of the numbers game (i. e., assigned the correct number of digits to large numbers) but had difficulties distinguishing between discrete items in English that sound very much alike. Thus, a student who wrote "615,000" when the teacher said "six hundred fifty thousand" understood that the number in question required six digits (the objective of the numbers game). He simply had trouble distinguishing betweentwo English words that sound very much alike (fifty and fifteen). This is a problem that native speakers must contend with as well, albeit to a lesser degree. Thus, by combining the "correct" answers with the "partially correct" answers, we get a reasonably accurate count of the number of students who understood the point of the numbers game. That 75.9% of those students who took part in the numbers game gave "correct" or "partially correct" answers, compared with only 57.9% of those students who did not take part in the game, suggests that taking part in the game may have enhanced their understanding of how large numbers progress in spoken English.

The case is somewhat different in the problem where the students must transcribe the price of the airplane. None of the components--"one," "million," "five hundred," "thousand"--can easily be confused with other English number words. The student who grasps what was being taught in the numbers game will presumably understand that "one million" requires a "1" followed by a comma, "five hundred thousand" requires a "500" followed by a comma, and the absence of any other numbers requires three 0's following the last comma--i. e., the answer must be 1,500,000. A failure to give the correct answer would indicate that the student fails to understand some element in the progression of English numbers. Hence, an answer such as "1,000,500" would suggest a failure to understand that the "five hundred" must precede the "thousand." Thus, all answers were identified as "correct" or "incorrect," with no "partially correct" answers. That 66.7% of those students who took part in the numbers game gave correct answers to this problem, while only 47.4% of those who did not take part in the games were able to do so would suggest that the numbers game helped the students to grasp the concepts involved.

For a number of reasons, any conclusions drawn from this study must be extremely tentative. The author's originally intention was simply to devise and use a game that might help his students to cope with large numbers in spoken English. It was not until he saw the results on the final examinations that the author considered the possibility of analyzing the data to see if any useful conclusions could be drawn from them. In essence, the procedure followed by the author was the reverse of that followed in most scientific research. Under normal conditions, researchers collect data with the aim of answering a given question. In this instance, the author gathered the data for one set of reasons (playing the numbers game to help students cope with large numbers, then giving an examination to test their proficiency) and then recognized that the data could be used for another purpose (to arrive at some tentative conclusions regarding how well the numbers game had accomplished its goals).

Had the author known in the beginning that he would use his data as the basis for a study of the efficacy of the numbers game, he would have administered a pre-test to the students before they took part in the game--ideally, testing both those students who would take part in the game and those who would not. The pre-test could then have served as a benchmark against which to measure subsequent results. However, given the manner in which the study was actually conducted, the only comparisons that could be made were those comparing the performance of students who had taken part in the numbers game with the performance of those who had not. Such comparisons do suggest that students who took part in the numbers game performed better on the examination than those who did not. However, such comparisons of necessity overlook two important factors :

(1) Student motivation and academic ability. Those students who took part in the games did so because they came to class on the days in which the games were played, while those who failed to take part in the games did so because they were absent. Perhaps those students who came to class on the days that the games were played were simply "better" students than the ones who were absent. If so, then those students might have scored better on the examination simply because of factors that had nothing to do with the numbers game itself.

(2) Alternative ways of teaching large numbers in spoken English. It is theoretically possible that any of a variety of ways of teaching large numbers (drill work, memorization, lectures) might work just as well as using a numbers game. This issue was not addressed in the study.

Conclusions

The study discussed above grew out of the author' s desire to find an approach to teaching large numbers in spoken English that would prove more successful than the approaches he has employed in the past. Based on analyses of final examinations conducted after using games to teach students how to cope with such numbers, the author is inclined to believe that the approach described does accomplish that objective. However, more research--including pre-testing and the use of control groups where alternative approaches to teaching this subject matter are employed--is needed before any conclusions can be drawn with a reasonable degree of certainty.

Table 1. Relationship between class attendance on the day numbers were reviewed and answers to question 6 on Part I of the examination.

	Correct	Partially Correct	Incorrect
Attended Class	25 (46.3%)	16 (29.6%)	13 (24.1%)
Did not attend	8 (42.1%)	3 (15.8%)	8 (42.1%)

Table 2. Relationship between attendance and answers to question 6 on Part II of the examination.

	Correct	Incorrect
Attended Class	36 (66.7%)	18 (33.3%)
Did not attend	9 (47.4%)	10 (52.6%)