

Defining the Indefinable: Study Abroad and Phonological Memory Abilities

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1. Introduction

Teachers, students and researchers alike agree that the study abroad (SA) experience is a crucial one in the development of second language (L2) skills, although we may not always be able to pinpoint exactly what it is about a student's skills that lead us to this conclusion. In fact, Regan (1995:246) determined that even in the absence of specific and measurable linguistic gains, students of SA improve in some "indefinable way" that we all recognize although are not always able to put into words, much less quantify with numbers. (For the purposes of this paper, Regan's phrase is used largely rhetorically as it is precisely the subsequent research reviewed below that has helped us to begin to define these factors.) The purpose of the project presented here is to further our progress in establishing what that indefinable element of improvement is, based on research collected during a six-week summer SA program with college students from the United States. While we are unable to provide definitive answers at this point, the results indicate that mimicry skills may ultimately play a part in leading us to recognize the improved linguistic abilities of students who have studied abroad as compared to those who have not.

2. Previous research

2.1 *Study abroad*

Many studies have attempted to define that "indefinable" factor mentioned by Regan and noted by language teachers in their classrooms. The aim of most of these studies is to arrive at a greater understanding of what factors account for what we perceive as improved fluency or oral skills (Brecht et al. 1995, Freed 1995, Lafford 1995, 2004, Lee 2000, Segalowitz & Freed 2004). These works discuss improvements in communication strategies, negotiation of meaning, rate and length of speech, disfluent pauses, repairs, and a number of other definable features that help paint the picture of the indefinable. Overall, their findings generally indicate increases in one or more measurements of proficiency during the SA experience, but are inconclusive in terms of why and how these improvements occur.

Other researchers have chosen to focus on specific linguistic and structural gains (Allen & Herron 2003, Bacon 2002, Collentine 2004, Howard 2001, Ryan & Lafford 1992, Towell et al. 1996), such as vocabulary or development of tense and aspect marking. Again, results are promising in favor of students who complete SA programs, but are inconclusive in terms of findings, and not always comparable in terms of different methodologies, etc. Along similar lines, a smaller number of studies has looked specifically at phonetic/phonological development as it pertains to improved pronunciation as a result of SA (Díaz-Campos 2004, Simões 1996), although yet again there is no definitive conclusion to be reached: while Simões (1996) found improved vowel production in his participants, Díaz-Campos (2004) did not find conclusive evidence of improved phonological skills in his.

Another approach has been to look at the sociolinguistic and pragmatic improvements that are possible during SA, in the hopes of finding the key to the indefinable in a sociocultural perspective. These studies (Allen & Herron 2003, Bacon 2002, Marriot 1995, Siegal 1995) provide fascinating insights into the cultural and pragmatic development in which SA students engage, although they too are unable to provide conclusive evidence in favor of a particular aspect of gain. Finally, other studies

concentrate on the day-to-day activities of SA interaction (Wilkinson 2002) or even on student perspectives on the value of instruction and SA (Brecht & Robinson 1995, Miller & Ginsberg 1995), and while they too provide invaluable insights into the students' perspective, they do not help us uncover the evidence we are seeking in our attempt to define the indefinable.

This substantial research provides mostly promising data for students hoping to improve their language skills during a stay abroad. In fact, thanks to this research, we have come to understand that what Regan saw as indefinable is most likely the result of a lack of proper criteria with which to classify the kind of improvements made during SA. However, results are not entirely conclusive in any area, and therefore we cannot say for certain what it is that helps SA students "seem" more advanced, how we can define it, or how to measure it.

Furthermore, studies on shorter SA programs, such as summer terms, are even more inconclusive with respect to identifiable gains. Yet researchers and teachers who have observed students of these programs would also undoubtedly agree that there is some improvement, even in that short period of time. These shorter programs are especially of interest given their popularity and accessibility, even for students with double majors or limited finances. Therefore, the primary question at the heart of this study is what can improve, in terms of L2 skills, during a short program? Is this something we can observe and measure? How can we define that gain?

2.2 Phonological memory and mimicry

While the vast amount of research into SA and language acquisition has undoubtedly helped our picture of how study abroad immersion helps the acquisition process, there are still unanswered questions. Among these questions is the one posed above, that is, what area is it that improves during study abroad and that leads us to identify that indefinable gain in our students? One possibility may be related to phonetic skills. Mimicry abilities may improve through study abroad, which allows students to reproduce L2 sounds, even without understanding all of them. While the research presented above on foreign accent and phonological gains during SA was inconclusive, previous research has linked mimicry skills to more accurate pronunciation in an L2 (Kendrick 1997). Perhaps this is the skill that is, at least in part, responsible for some of the perceived improvements in oral communication overall. (It must be noted that it is beyond the scope of this paper to examine the extensive research on L2 phonological development and the factors that intervene in this process. While this research is of course valuable, the focus of this study is on mimicry skill development only.)

In fact, the idea that mimicry skills improve during SA follows neatly from previous research on SA and on phonological development as well. Segalowitz and Freed's (2004) study investigating fluency gains during SA examines the amount of information that students can relate in a single utterance. It would follow that this ability develops as a result of developing or improving phonological memory (Ellis 1996). As Ellis describes phonological memory, learners must learn and analyze sequences of sounds to form words, words to form phrases, etc. Essential in this process is a learner's short-term memory capacity, which affects his ability to repeat phonological sequences. Examining mimicry skills, then, is one possible way of exploring the development of phonological memory. Given the great quantities of spoken input available to SA students, it is of interest to determine the impact that such input has on phonological memory and subsequent phonological skills.

3. The present study

3.1 Research questions

With the previous literature in mind, two interrelated research questions guided this study. They are listed in (1):

- (1) Research questions
 - a. What changes result in students' abilities to mimic L2 sounds after a 6-week SA program?
 - b. What changes result in students' abilities to mimic L2 words and phrases after a 6-week SA program?

It is hypothesized that after participating in a SA program, students will be better able to mimic both L2 sounds and L2 words and phrases, supposedly as a result of improved phonological memory as defined by Ellis (1996). The study described in the following section was designed to test these questions and thus to indirectly establish whether or not such improvements lead to perceived gains in L2 fluency and production.

3.2 Methodology

3.2.1 Participants

The participants in this study were 19 undergraduate Spanish students who were taking part in a 6-week SA program in Mexico. All participants were native speakers of English and were enrolled in third-year Spanish language, literature or linguistics classes. The participants all came from the same university, where they were pursuing majors or minors in Spanish. All participation was voluntary. Data were collected from the participants on the first and last days of their stay in Mexico.

3.2.2 The program

As stated above, the participants were taking part in a summer-session SA program in Guanajuato, Mexico, which was organized through their university. There were a total of 30 students of intermediate level or bilingual background, although only the non-bilingual students were considered for inclusion in the study. All students lived with families for the duration of the stay, and took two courses that met daily. Students had a choice of taking two of the following three courses: Conversation, Introduction to Hispanic Linguistics, and Business and Marketing in Latin America. While there was overlap in their selection, not all students had the same class schedule. Two of the courses were taught by professors from the students' home university, and one was taught by a professor from Guanajuato. Nonetheless, the courses were similar in terms of required homework and reading and meeting hours per week, and all courses were taught exclusively in Spanish. The program also included biweekly trips and excursions to nearby sites of historical and cultural interest, which all students attended.

3.2.3. Data collection

Each participant was interviewed and tested once at the beginning and again at the end of the SA period, with the first round of data collection occurring on the first full day of the stay in Guanajuato and the final one occurring on the last full day of the stay. The researcher was also one of the professors in charge of the program and was thus able to observe the students in their classes, with their families, and on excursions. Although multiple data sources were collected, the task described and analyzed here is a mimicry task.

In one-on-one interview sessions, the participants heard 10 sentences read out loud by the researcher (a non-native Spanish speaker with native-like pronunciation). The sentences were purposely longer than average working memory limits would easily tolerate (between 19 and 26 syllables, with an average length of 22.2 syllables); each sentence also contained one invented but phonotactically possible nonce word. The nonce words contained 2, 3 or 4 syllables and included a variety of syllable structures and patterns; all nonce words functioned as either nouns or adjectives in the sentences. The location of the nonce word in the carrier sentences varied, but was never the first or last word of any sentence. Sample sentences are given in (2), with the invented words italicized and the number of syllables indicated in parentheses.

(2) Sample sentences

- a. Con la llegada del *fimesol* todos los problemas se resolvieron. (20)
- b. El pequeño *raitó* se metió en la cama y no quería salir. (20)
- c. Se podía escuchar el *tabar* de los obreros desde lejos. (19)
- d. Para ser *blarucio* es necesario practicar mucho y estudiar cada día. (23)

Participants were asked to repeat the entire sentence they heard as accurately as possible, immediately following the researcher's reading. At the end of the SA program the process was repeated with 10 different sentences. The sentences were counterbalanced so that the pre- and post-SA interviews included 10 brand new sentences for each participant.

3.2.4. Data analysis

Each participant's recording was listened to and transcribed in order to establish the accuracy of each repetition. In cases where there were variations in pronunciation, phonetic notation was used to indicate the precise manner in which participants pronounced the words in question. With this information, the number of invented words (out of the possible 10) that were correctly repeated was calculated for both the pretest and the posttest. In addition to looking at repetition of entire words, the vocoid segments (including vowels and glides) that were accurately reproduced were also calculated; this was done since it seemed that although entire word production was fairly inaccurate, participants seemed more able to mimic the vowel-like sounds they heard than to accurately reproduce the consonantal segments. Finally, we also examined how many overall syllables per sentence were reproduced in the pretest and the posttest.

It is important to note here that while the number of whole nonce words a participant could repeat each testing session was easy to calculate (at one per sentence, equaling 10 total possibilities per session), the other calculations could not be as exact. The nonce words used in the experiment varied in terms of the number of vocoid segments they contained, ranging from two vowels in the simplest case to up to four segments, including vowels and glides, in the case of words with diphthongs. Similarly, the number of total syllables per sentence varied, as was mentioned above, from 19 to 26. Therefore, it was impossible to compare the raw numbers for these two measurements, and instead the numbers were converted to percentages that reflected mean participant accuracy in their reproduction.

For the statistical analyses a series of matched two-tailed t-tests for repeated measures were performed to compare participant performance in the pretest and posttest on the three variables discussed. First, to examine nonce-word reproduction, a t-test comparing the mean number of total words reproduced correctly in the two sessions was run. For the vocoid reproduction, another t-test compared the mean percentages of the number of vocoids reproduced correctly in the nonce words, again looking at pre- versus posttest. Finally, a similar t-test compared mean percentages of total number of syllables (per sentence) that were reproduced correctly in the two testing sessions. Each of these analyses sheds light on the participants' mimicry skills before and after the SA experience. The results of these tests are discussed and analyzed below.

4. Results

4.1. Invented words

The accurate reproduction of invented words was surprisingly low, as can be seen in Table 1. In the pretest, participants averaged less than one accurate word per session; this average actually decreased in the posttest. In other words, these results provide no evidence in favor of an increased ability to mimic nonce words after participating in a SA program.

	Mean	N	Std. Deviation
Pretest	.79	19	.71
Posttest	.53	19	.61

Table 1: Number of invented words reproduced correctly in pretest and posttest

Table 2 provides the relevant t-test information, which shows that this difference, although a decrease, was not significant in statistical terms. Also of interest here is the considerable standard deviation among the participants, indicating that perhaps these data are unreliable at helping us establish what changes may be taking place in terms of participants' mimicking abilities.

	t	df	Sig. (2-tailed)
Pretest vs. Posttest	1.756	18	.096

Table 2: 2-tailed t-test comparing pretest to posttest

4.2. *Nonce vocoids*

We turn then to the vocoid segments in each nonce word that were accurately reproduced each time; recall that here we must look at average percentages of accuracy per participant rather than raw numbers owing to the different makeup of each nonce word. The mean percentages are given in Table 3, and the results of the t-test in Table 4.

	Mean	N	Std. Deviation
Pretest	29.86%	19	14.17
Posttest	35.88%	19	19.16

Table 3: Percentage (%) of invented word vocoids reproduced correctly in pretest and posttest

	t	df	Sig. (2-tailed)
Pretest vs. Posttest	-1.759	18	.096

Table 4: 2-tailed t-test comparing pretest to posttest

These results indicate that participants are marginally better at reproducing vocoids than overall words, and that after participating in a SA program this ability does slightly improve. However, the t-value of -1.759 is again not statistically significant. Also, again, it is worth pointing out the notable standard deviation in these results. Thus, we have here only slight evidence of improved ability to mimic vocalic elements in nonce words after a SA program.

4.3. *Total syllables reproduced*

Finally, then, we look at the accurate reproduction of overall syllables per sentence that participants were able to reproduce before and after the SA program. Recall once more that for this comparison we must look at averages rather than raw numbers. The percentages are given in Table 5.

	Mean	N	Std. Deviation
Pretest	43.90%	19	12.34
Posttest	49.82%	19	13.67

Table 5: Percentage (%) of total syllables reproduced correctly in pretest and posttest

What is immediately evident here is the greater accuracy, both pre- and post-SA, of the participants in their reproduction of overall syllables as opposed to the words or segments of the invented words. Also worth pointing out is the relatively smaller standard deviation here as well. The results of the t-test are provided in Table 6.

	t	df	Sig. (2-tailed)
Pretest vs. Posttest	-2.718	18	.014

Table 6: 2-tailed t-test comparing pretest to posttest

In this case, the difference between the pretest and posttest values is statistically significant, indicating a significant increase in the participants' ability to reproduce or repeat longer strings of syllables after participating in the SA program. Note, though, that given the results of the two previous tests, we must conclude here that this increase is with respect to the reproduction of real words and not invented words or segments.

4.4. Summary and discussion

To summarize these results, we have seen that the participants' ability to reproduce nonce words and/or their vocoid segments did not change significantly over the course of their SA experience. However, their ability to reproduce extended numbers of syllables did significantly improve. With these findings in mind, we can revisit the research questions that guided the study.

The first question asked if students are more adept at mimicking FL sounds after a period of SA. Unfortunately, if we measure this ability with the mimicry of nonsense words, the answer to this question is negative, or at least only minimally more adept, but not significantly so. So we turn to the other question, if students who participate in SA are more able to mimic long strings of FL sounds and words. In this case, the answer is yes, there is significant improvement in the pre- versus posttest results. This ability to retain and reproduce more syllables may reflect an increase in phonological memory among the participants. Recall also that here we are looking at mostly real words, so this improvement could also be a result of increased comfort with the language – in lexical or phonotactic terms – although unfortunately this study was not designed to determine the cause of such an improvement.

5. Conclusion

The main goal behind this study was to offer a new perspective and a unique glimpse into aspects of language change during SA in order to gain a better understanding of the “indefinable” gain our SA students experience. The hypothesis behind the study was that this gain was somehow related to improved mimicry skills, as they relate to greater phonological memory abilities. Unfortunately, those hypotheses have not been definitively borne out, although we do see evidence of a greater ability to mimic longer strings of L2 words and phrases. In spite of the somewhat inconclusive nature of the results, the findings of the study are promising in and of themselves. If future studies are able to find a conclusive link between phonological memory development and study abroad, we would make great gains in defining fluency and L2 abilities in our students who study abroad as well as those who do not. Future studies in this vein would undoubtedly benefit from the data of a control group, since any increase evidenced here cannot be compared to an at-home group and thus has limited generalizability.

While this study does not provide a conclusive answer to the problem posed in the title of the paper – what precisely is it that improves during SA that leads to Regan's “indefinable” gains – it does provide hopeful areas of research for future work. We must also keep in mind that these data only look at unnatural, laboratory-initiated speech, so they present only a miniscule element of the whole picture of student abilities during SA. We as researchers need to continue to look at what students do in spontaneous conversation, their communication strategies, and their fluency, since these areas surely also hold elements of the “indefinable” gains.

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