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# Comprehensible Output and the Effects of Music and Movement in Spanish Language Acquisition

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## Abstract

Music and movement may have the potential to trigger memories and connections that affect mood and behavior. According to research in Second Language Acquisition (SLA) (Del Campo, 1997), meaningful communication is composed of three important elements: gestures, verbal language and intonation. Gestures and movement account for nearly 70% of communication, whereas the remaining 30% of meaningful communication lies in intonation and verbal language. Earworms, or Involuntary Musical Imagery (INMI), have played an important role in marketing by using music that gets “stuck” in the brain. Factors such as note duration, pitch intervals and exposure to an environment or movement associated with the onset of INMI may explain the brain’s ability to easily recall and reproduce songs or dances. For this reason, the use of INMI might be useful when coupled with teaching methods such as Total Physical Response (TPR), which require full body interaction in language education and could be effective in memory recall by using gesturing, our most dominant form of communication. Though music and movement have been independently proven effective in SLA, studies have not yet combined and analyzed the effectiveness of both of these forms of communication.

Incorporating gestures and music into classroom instruction may help second language learners grasp complicated lexical concepts such as prepositions, which can be difficult to understand because they describe both abstract and concrete relationships between animate and inanimate objects. This study looks at spatial prepositions that describe physical location to determine if it is easier for language learners to visualize the physical location with the use of musical imagery and gesture in tandem. Specifically, participants in the experimental group will mirror a teacher-led dance that includes instrumental music, vocabulary of prepositions and chanting. Subjects will be assessed for comprehension immediately following the lesson. One week later, participants will be assessed to determine the effects on memory recall. A control group will receive a lecture-based lesson with the same assessment administered at the same intervals as the experimental group. The data will be analyzed to determine the effects of the combined TPR and INMI methods on the language learner’s ability to recognize, retain and reproduce the new vocabulary. Subjects in the experimental group will also receive a survey following the study that will assess their overall experience as well as the effectiveness of the methods used.

Keywords: Involuntary Musical Imagery, Movement and Second Language Acquisition

## Introduction

Music and movement have been studied independently for their usefulness in SLA; however, studies have yet to combine these methods to determine their effectiveness in tandem. Body language, movement and gestures are a natural form of communication, yet they may not be consistently utilized in a traditional lecture-based classroom setting, where verbal language dominates. Songs incorporated in classroom curricula can be helpful in guiding learning, however, it may be a more useful teaching tool than previously thought. A closer look at musical components that have been theorized to work best for reinforcing lessons may provide critical information about how music helps language learners acquire difficult concepts. This study focuses on movement with the aid of background music and chanting to determine the successfulness of these combined strategies in SLA. Specifically, the purpose of this research is to determine whether the use of INMI and movement can increase a learner's ability to understand, recall and reproduce grammatical vocabulary terms.

### Effects of Music in SLA

Comprehending meaning in verbal language begins with analyzing speech sounds. Fonseca-Mora (2000) theorized that discourse intonation and pitch are the initial components of communication in language acquisition. Music is frequently incorporated into classroom curricula, particularly at the elementary level, with memorable songs such as "The Itsy Bitsy Spider" and "Head and Shoulders, Knees and Toes" in order to teach basic spatial concepts. Lessons that incorporate familiar nursery songs may allow students to recall complicated language concepts more easily than through traditional language methods. Apart from adapting songs, music is combined with other visual media, such as pictures and drawings, to enhance student understanding and learning. According to Medina (1990), the combination of illustrations and music often yielded the highest average gain in language acquisition. Understanding how other forms of music and INMI can be integrated into learning to maximize language acquisition is an important aspect of this study.

### Music, Cerebral Processing and Vocabulary Recall

According to De Groot (2006), "Words easy to imagine are usually words that refer to concrete entities and words hard to imagine usually refer to abstract entities" (p. 473). In her studies of how background music affects vocabulary acquisition and recall, De Groot found that the use of music in teaching uncommon words increased the participants' understanding and retention by 11.6%, as well as a 5.8% increase with commonly used words. This research may be useful when applied to classroom grammar lessons and vocabulary acquisition. Commonly used vocabulary, like those taught in "Head and Shoulders, Knees and Toes," might be better learned when students are scaffolded by these techniques. However, finding ways to introduce these complex concepts by coupling the lesson with a memorable musical piece might show an even greater increase in retention and recall overall.

### INMI

One possible connection between memory and music as it relates to this study may be found in the research of INMI. INMI, or earworms, are musical compositions that get "stuck" in the brain. Episodes of INMI music can have a cause and effect relationship with thought processes. Onset of earworm activity can be directly related to the emotional state or environment of the listener, either by triggering an INMI episode related to a thought or physical location that reminds the listener of a specific musical piece. Hearing a song that creates mental images or evokes emotions might also produce an INMI event. A recent study by Williamson and Müllensiefen (2012) identified and ranked the categories of INMI based

on participants' responses. According to Williamson and Müllensiefen, music exposure, memory triggers, affective states, and low attention states are the major contributors to INMI episodes. Though no definite structure for earworm music exists, some common traits have been discovered that could be related to an increase in INMI events. Williamson and Müllensiefen note these commonalities in their analysis of music included in their study, indicating the importance of melody structure: "Together these features indicate that, in general, INMI tunes tend to contain notes with longer durations but smaller pitch intervals as compared to the matched control tunes that were not mentioned as INMI in our internet database" (Results section, para. 1). As Sacks (2006) explains, earworms can be engraved, or "preserved," in the human mind (p. 2530). The ability to use these types of songs in teaching could have the potential to create musical imagery events that "stick" with the language learner and reoccur in the subconscious, thus reinforcing lessons taught in the classroom. Study subjects may be able to recall information simply by observing their physical environment. Imagery could be triggered by moving around desks that were used in the lesson, causing an INMI event in the brain that replays and repeats the vocabulary and music.

### Movement and Gestures in Language Acquisition

Gestures and movement are effective communication tools. From primates to honeybees, gestures, calls and movements are critical for survival. The ability to convey meaning without speech serves as an important method of communication. Much like other species, humans rely on nonverbal communication. Gestures such as eyebrow raising or lowering, smiling and folding the arms are subtle visual signals that convey messages to others. In a comparison of verbal and nonverbal language, Corballis (2009) states, "Visual language is also more iconic, and most people resort to gesture, or drawing, when trying to communicate with those who speak a different language. Some sort of manual gesture is necessary even for the acquisition of speech; in learning the names of objects, for example, there must be some means of indicating which object has which name" (562). Additionally, Spanish music therapist, Del Campo (1997), claims 70% of human communication is attributed to gestures and nonverbal communication (as cited in Mora, p.147). Traditional lecture-based learning includes a small percentage of meaningful discourse by limiting the use of music and movement, which may inhibit learning. Finding deeper connections between nonverbal communication and teaching methods may help students acquire language more naturally than relying heavily on the remaining 30% of discourse, which relates to verbal language an intonation.

### Linking Movement and Music

Creating teaching methods that maximize the learner's ability to understand and use the language is critical in developing communicative ability. Comprehensible communication is fundamental in SLA and the purpose of language education is the successful output. Krashen (1982) states, "...conversational competence gives students the tools they need to manage conversation, and is thus an essential part of instruction, since it helps to insure that language acquisition will take place outside of class, and after the instructional program ends" (p. 69). Lecture-based language instruction must move beyond traditional pedagogy to the more widely used method of discourse, gestures and movement, which may help students acquire language more efficiently and retain it with the use of reinforcers found in their learning environment.

### Methodology

Permission to conduct the study was obtained and participants gave informed consent. Participants were chosen based on current enrollment in university level Spanish 102 courses easily accessible to the researcher. Five research groups, consisting of two experimental groups (N=71) and two control groups (N=39), were selected for the study, however, upon review, the decision was made to exclude data obtained from the 101 Spanish class since participants had dissimilar language education compared to subjects at the 102 level. The remaining totals were N=23 for the control group, and N=25 for the

experimental group. Three sessions were administered to each group with a duration of fifteen minutes. First, each of the subjects were given a baseline assessment to identify the meaning and use of five prepositions as well as a questionnaire. One week later, subjects received a lesson on spatial prepositions and were immediately given a brief multiple choice assessment to determine receptive knowledge of the new vocabulary. The final meeting occurred one week later and included a picture assessment that asked subjects to identify the location of the prepositions, provide the word and use the vocabulary in a sentence. Surveys were also distributed to the experimental group that contained questions relating to the prepositions and whether participants thought about those words or the musical composition within the past week. The purpose of the survey was to determine if participants had an earworm event and were able to recall the vocabulary as a result of the exposure to the music used in the lesson.

## Participants

Demographics collected for the experimental group showed a mean of 2.78 years of high school Spanish courses and a mean of 1.74 semesters of Spanish at the college level. Participants in the control group had a mean of 2.92 years of Spanish instruction in high school and a mean of 1.88 college semesters of Spanish. Subjects in the study were 18 years of age or older and were enrolled in first year Spanish at the university.

Following the baseline assessment, participants were given a questionnaire containing a list of nine songs with earworm qualities and asked to indicate the tunes for which he or she can recall the lyrics. Participants remembered the song lyrics on approximately five (4.85) of the songs that were given (see appendix A). The same list was used to determine whether subjects knew the dances or movements associated with the nine songs. Of the dances provided, the subjects recalled an average of 5.39 songs. Additionally, 47 of the 48 participants self-reported that they learn by doing. The songs chosen for the questionnaire all contained earworm components and associated dances or movements. They were selected to determine the effectiveness of earworm music, as well as movements and gesture, in recalling lyrics.

Three participants were identified as nonnative English speakers during the initial questionnaire. It was determined that data collected from the subjects were not inconsistent with responses given by native English speakers, and the responses were therefore included in the results of the study.

Further descriptions of study participants can be seen in the tables below:

Table 1

### *Participants According to Treatment*

Level	Control	Experimental	Total N
Beginner 102	23	25	48

Table 2

*Questionnaire Data (see appendix A)*

Group	N	Years HS Scale 1-5	Semesters College Scale 1-3	Native English Speaker Yes=1 No=2
Control	23	M=2.92	M=1.88	1=22 2=1
Experimental	25	M=2.78	M=1.74	1=24 2=1
Overall	48	2.85	1.81	1=46 2=2

## Procedure

Participants in the experimental groups mirrored a teacher-led dance that included instrumental music, vocabulary of prepositions and chanting. Desks were used as the point of reference in the experiment to show the location of the preposition. At the start of the treatment, subjects were in a standing position and began mimicking the researcher's movements to each position around the desk. Instructions were given to follow along with chanting and movements once the selected classical music piece began to play. Participants listened to a brief horn prompt on a looped classical music piece and began to mirror the researcher. Five prepositions were recited verbally by the researcher and participants with aid of music. The music, movement and chanting was repeated three times. Three of the vocabulary words were recited twice during each repetition of the treatment, resulting in six recitations of each of the three words. The remaining two prepositions were uttered once during each repetition, resulting in a use of three times throughout the treatment. Participants were then assessed for comprehension using a multiple choice test immediately following the lesson as well as one week later to determine the effects on memory recall.

The control groups received a lecture-based lesson with a slideshow presentation. The illustrations used in the presentation demonstrated the location of the preposition by using a picture of a desk and a mouse. Each slide showed the image of a mouse near each location surrounding the desk. The vocabulary word then appeared on the screen and participants were given additional explanation by the researcher that described the preposition on the slide. Following each slide, a classroom desk was used to demonstrate the location. At the end of the treatment, subjects were given a review of each of the vocabulary words using the classroom desk. Participants received a total of four verbal and visual explanations for each of the prepositions. Identical assessments were administered at the same intervals as the experimental group.

The data were analyzed to determine the effects of the combined TPR and INMI methods on the language learner's ability to understand, retain and reproduce the new vocabulary. Participants also completed an opinion survey following the study that assessed their experiences and the effectiveness of the methods used.

A Likert Scale was used to gather baseline data to determine the breadth of participants' understanding of five Spanish prepositions (see appendix B). The subjects were asked to circle the preprinted response that reflected what they felt was their knowledge of each word. If they chose the response that indicated a full understanding of the word, participants were provided a space to use each preposition in a sentence.

## Data Analysis

An independent samples *t*-test was conducted to determine the significance of the treatment by comparing means between the control and experimental groups to determine if there was any significant difference between groups. The assessment for receptive knowledge (see Table 3) was administered immediately following the treatment; the assessment for productive knowledge was given one week later (see Table 4). Opinion surveys administered after the productive knowledge assessment asked students to review the treatment as well as provide responses relating to INMI events (see Appendix D). The survey data are shown in Table 5.

Table 3

*t*-test for Receptive Knowledge

Level	N	P	Control	Experimental
Beginner 102	48	0.06	5.13 (0.07)	5.48 (0.17)

Table 4

*t*-test for Productive Knowledge

Level	N	P	Control	Experimental
Beginner 102	48	>0.009	9.26 (0.32)	8.08 (0.30)

Table 5

*Survey Data*

Q1	Greatly Increased	Slightly Increased	Neutral	Slightly Decreased	Greatly Decreased
How did the lesson affect your understanding of prepositions?	8%	40%	48%	0%	4%
Q2	Greatly Helped	Somewhat Helped	Neutral	Somewhat Interfered	Greatly Interfered
Comment on the music used in the lesson:	24%	20%	36%	16%	4%
Q3	Greatly Helped	Somewhat Helped	Neutral	Somewhat Interfered	Greatly Interfered
Comment on the movement/ dance used in the lesson:	24%	40%	16%	12%	8%

The treatment in the experimental group was focused on the vocabulary words and didn't include verbal examples of the uses of each word, therefore the data pertaining to sentence production were excluded from the results.

No significant effect on language acquisition ( $P = .06$ ) was found in the treatment of the experimental group, despite previous research that indicates otherwise.

## Discussion

The classical music piece used in the study was analyzed for INMI components and selected based on the presence of small pitch intervals and long note duration, as identified by Müllensiefen (2012). Though the selected piece contained some of the elements that are present in other earworm songs, INMI events are different for each person and depend on many factors, not solely pitch, note duration and melody. According to Müllensiefen (2012), contributors like low attention states, environment and emotion play a role in the development of earworms, any subsequent INMI events and their duration. The researcher worked to create a positive learning environment that could generate an earworm based on an emotional state. A secondary focus was the use of items found in the learning environment (chairs and desks) that participants would be in contact with during the lesson as well as the week before the final assessment. Analyzing the role of the physical environment might help determine what factors contributed to any INMI event subjects might have experienced. Data analysis found that 24% of participants had an earworm event related to the treatment. The opinion survey that addressed the learning environment showed 44% of subjects reported a positive experience during the treatment.

Changes to the study may be needed to ensure the data are more consistent and reflective of the variables analyzed, including how the information is presented to both control and experimental groups, procedures used to conduct post assessments, and the method of choosing participants. The participants of both groups were volunteered by their instructors and study subjects were not always receptive to the study components. In addition, control and experimental groups were administered the assessment at different times and in different classrooms, so the environment was not consistent between the groups. These inconsistencies may have contributed to the overall results of the study which showed no correlation between groups.

In addition, large class sizes and limited space to perform the music and movement lesson may have affected the results of the study. Furthermore, two of the experimental groups had scheduled exams in class following the assessments administered on two of the three sessions. This could have contributed to hurried responses, incomplete study instruments as well as participant withdrawal from the study. It is possible more participants may have continued with the experiment had the assessments been given on a different day.

Additional limitations relating to study instruments were also a factor in subject participation. Some survey questions were less effective than others and this was apparent in some responses. Ambiguity in this area hindered tracking of progress of some individuals. The baseline questions did not probe for precise knowledge of prepositions obtained in previous Spanish classes. As a result, it is not known whether subjects accurately understood the uses and meanings of the words prior to the treatment and assessments.

Since this study was somewhat limited, it may advantageous to the study to look at the possible connections in memorability in relation to the songs and dances in the questionnaire and earworm components to see if there is an impact on student learning. It's possible that an earworm connection exists between note duration and movement duration. Identifying which songs and movements are most memorable could give greater insight into the factors that trigger INMI events and the possible role that movement plays in earworm activity.

Another important aspect of the research lies in the prepositions in the songs and the number of recitations. As previously mentioned, two of the prepositions were uttered once during each repetition, and one of the prepositions was demonstrated in two different locations. Students were asked to circle the prepositions they thought about during the previous week to determine the effects of the movement. The preposition that required a bending movement, which might have been an uncomfortable position for some participants, was the least recalled vocabulary word. However, the preposition that was used in two

different locations was the word most students remembered. Future studies might consider looking at how movement, distance, repetition and effort influence memory recall and earworm events.

Because it is difficult to control all variables in research involving human subjects, within each of the experimental and control groups, inconsistencies may exist in variables such as responses, music volume, participation in treatment, proximity to other subjects, hindrance of furniture and visibility and audibility of researcher by participants during the activity. Social dynamic was another factor in participation in this study. Some groups were more interested in the research than others. Additionally, small clusters of participants within each class weren't as willing to take part in the activity as the rest of the class. Conversely, some small social groups in each class eagerly participated in the treatment, showing an active interest in the study. These behavioral observations cannot be linked to collected data to determine whether the treatment was effective and to what degree, however. The participants identities were confidential and were only known to the instructor to ensure the data gathered are reliable indicators of the results of the study.

## **Conclusions**

While the effects of the treatment may not have been significant, variables that were beyond the control of the researcher were evident in both the control and experimental groups. Additionally, some participants exhibited difficulties responding to questions that were abstract and required self-assessment of their own learning. Changes to the questions may be needed to ensure subjects have a clearer understanding of the study questions. Also, modifications to the location of the study may be needed to ensure participants are able to participate comfortably during the exercise.

Although no correlation was found between language acquisition and movement music, further research is needed. Studies have shown that music and movement can be beneficial in learning and grade schools successfully use these methods in various disciplines. Due to evidence from previous studies, it is recommended that modifications to this study should be made and a second experiment should be conducted. Future research might include music used in advertisements or popular music with earworm components, concrete grammatical concepts or vocabulary relating to the participants' learning environment during the study, singing rather than chanting, as well as dances using minimal steps with a duration similar to the note duration in the song.

Language acquisition can be challenging for many, but is often required for meaningful and effective communication in today's global society. Finding ways to simplify language learning is an important element to successful second language acquisition and effective teaching methods.

## Appendices

### Appendix A

#### Questionnaire

1. How many musical instruments do you play? **0 1 2 3 4 5+**
2. Do you listen to music while you study? **YES NO**
3. Have you ever had a song “stuck” in your head? **YES NO**
4. If you’ve had a song stuck in your head, how long did it stay? **1hr 2hrs 3hrs 4hrs 5hrs+**
5. Do you learn by doing? **YES NO**
6. Do you know the *lyrics* to the songs listed below? Circle each one you know:

**The Itsy Bitsy Spider**

**Gangnam Style**

**Head and Shoulders, Knees and Toes**

**I’m a Little Teapot**

**The Electric Slide**

**The YMCA**

**The Macarena**

**The Hand Jive**

7. Do you know the *dances/movements* for the songs listed below? Circle each one you know:

**The Itsy Bitsy Spider**

**Gangnam Style**

**Head and Shoulders, Knees and Toes**

**I’m a Little Teapot**

**The Electric Slide**

**The YMCA**

**The Macarena**

**The Hand Jive**

8. How many *years* of high school Spanish have you had?
9. How many *semesters* of college Spanish have you had?
10. Are you a native speaker of English? **YES NO**

## Appendix B

## Assessment 1

How well do you know the following words? Circle the response and provide applicable examples that best describe your knowledge of each of the words below.	
<p><b>1. Encima</b></p> <p>I <b>know</b> what it means and <b>can</b> use it in a sentence: _____ _____</p> <p>I <b>know</b> what it means but <b>can't</b> use it in a sentence</p> <p>I've seen it</p> <p>I <b>don't know</b> what it means</p>	<p><b>2. Debajo</b></p> <p>I <b>know</b> what it means and <b>can</b> use it in a sentence: _____ _____</p> <p>I <b>know</b> what it means but <b>can't</b> use it in a sentence</p> <p>I've seen it</p> <p>I <b>don't know</b> what it means</p>
<p><b>3. Al lado</b></p> <p>I <b>know</b> what it means and <b>can</b> use it in a sentence: _____ _____</p> <p>I <b>know</b> what it means but <b>can't</b> use it in a sentence</p> <p>I've seen it</p> <p>I <b>don't know</b> what it means</p>	<p><b>4. Enfrente</b></p> <p>I <b>know</b> what it means and <b>can</b> use it in a sentence: _____ _____</p> <p>I <b>know</b> what it means but <b>can't</b> use it in a sentence</p> <p>I've seen it</p> <p>I <b>don't know</b> what it means</p>
<p><b>5. Detrás</b></p> <p>I <b>know</b> what it means and <b>can</b> use it in a sentence: _____ _____</p> <p>I <b>know</b> what it means but <b>can't</b> use it in a sentence</p> <p>I've seen it</p> <p>I <b>don't know</b> what it means</p>	

*Appendix C*

## Assessment 2

1. Al lado \_\_\_\_\_

- a. around
- b. through
- c. within
- d. next to

2. Detrás \_\_\_\_\_

- a. in front
- b. behind
- c. inside of
- d. around

3. Encima \_\_\_\_\_

- a. on top of
- b. behind
- c. inside of
- d. within

4. Enfrente \_\_\_\_\_

- a. below
- b. across from
- c. In front
- d. outside

5. Debajo \_\_\_\_\_

- a. next to
- b. on top of
- c. between
- d. below

*Appendix D*

## Survey

**1. How did the lesson affect your understanding of prepositions?**

- 1- Greatly increased understanding
- 2- Slightly increased understanding
- 3- Neutral
- 4- Slightly decreased understanding
- 5- Greatly decreased understanding

**2. Comment on the *MUSIC* used in the lesson:**

- 1- Greatly helped with learning the vocabulary
- 2- Somewhat helped with learning the vocabulary
- 3- Neutral
- 4- Somewhat interfered with learning the vocabulary
- 5- Greatly interfered with learning the vocabulary

**3. Comment on the *MOVEMENT/DANCE* used in the lesson:**

- 1- Greatly helped with learning the vocabulary
- 2- Somewhat helped with learning the vocabulary
- 3- Neutral
- 4- Somewhat interfered with learning the vocabulary
- 5- Greatly interfered with learning the vocabulary

*Appendix D (continued)*

**4. Circle the words you thought about during the past week:**

Encima

Debajo

Al lado

Enfrente

Detrás

**5. Did you think about, sing or hum the music used in the lesson during the past week?**

Yes

Not Sure

No

**6. Describe the learning environment during the lesson:**

Positive

Neutral

Negative

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