Is a Picture Worth a Thousand Words? Using Images to Create a Concreteness Effect for Abstract Words: Evidence from Beginning L2 Learners of Spanish

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Abstract: This study examines the lexical representation and recall of abstract words by beginning L2 learners of Spanish in the light of the predictions of the dual coding theory (Paivio 1971; Paivio and Desrochers 1980). Ninety-seven learners (forty-four males and fifty-three females) were randomly placed in the picture or non-picture group and taught twelve concrete and twelve abstract words they did not previously know. Subjects performed a recall task on an immediate and a delayed posttest. The results showed that associating abstract words with pictures had a significant effect on their recall on the immediate posttest, but no such effect was found on the delayed posttest. The results suggest that associating abstract lexical items with pictures has a significant effect on memory representation and recall in the short term. The findings also support the predictions of the dual coding theory and show that a concreteness effect can be created for abstract words by associating them with visual images.

Keywords: abstract words/palabras abstractas, bilingualism/bilingüismo, concrete words/palabras concretas, concreteness effect/efecto de la concreción, dual coding theory/teoría de la codificación dual, lexical representation/representación léxica

Introduction

In the present study we investigate the nature of bilingual memory representation from the perspective of dual coding theory (DCT) by looking at how beginning L2 Spanish learners recall recently taught concrete and abstract words. Previous research has found that learners have a harder time learning and recalling abstract lexical items compared to concrete ones (Altarriba and Bauer 2004; Boers, Eyckmans, and Stengers 2007; de Groot 1992; de Groot, Dannenburg, and van Hell 1994; Duthie, Nippold, Billow, and Mansfield 2008; Schwanenflugel, Akin, and Luh 1992). This is attributed to the fact that abstract words are impoverished in visual imagery, while concrete words are associated with images that help learners access lexical information. Paivio and Desrochers (1980) call this the concreteness effect. However, only one study so far has shown that a concreteness effect can also be created for abstract words when these are associated with symbolic pictorial representations (Farley, Ramonda, and Liu 2012). Following the predictions of DCT, Farley, Ramonda, and Liu (2012) showed that learners who associated abstract words with visual imagery could recall them better. The current study is a conceptual replication of Farley Ramonda, and Liu (2012). We investigate the role of images in the learning of abstract and concrete words by beginning L2 learners of Spanish.
Background and Motivation

Some important issues related to the present study are the nature of bilingual memory, as well as DCT and the concreteness effect, which we discuss below.

The Nature of Bilingual Memory

The issue of the nature of bilingual memory and lexical representation is widely discussed in studies in bilingualism. There are several ways bilingual memory can be viewed, but the most prevalent question investigated in the field of bilingualism has been whether bilinguals possess one or two memory stores. From this perspective, two main positions have surfaced to describe how the two languages are represented in the bilingual memory.

According to the interdependence position, the two languages of a bilingual share one memory store and one underlying code (Heredia 2008). The shared memory store contains non-linguistic meanings that are the same in both languages, and these are marked with labels for each language. For example, this perspective suggests the word perro in Spanish and 'dog' in English are connected to the same concept. Even though each language has a different word for the concept of dog, only one meaning is present in the bilingual memory. Then, when a bilingual retrieves a lexical item, it gets "tagged" with the appropriate label for each language (Fleredia 2008). In this view, since the two languages have the same meaning code, they are expected to display the same patterns in use. Typical evidence to support this position comes from experiments comparing within- and between-language conditions that show similar results (Caramazza and Brones 1980; Schwanenflugel and Rey 1986).

According to the independence position, the two languages are organized in two separate memory stores, and each one contains specific information for that particular language. Thus, the languages are separate but interconnected. The main way the two languages are assumed to connect is through translations (Heredia 2008). Unlike the interdependence view, the independence position suggests that various lexical items do not share the same underlying code, but different codes are present for each specific language. This view relies on evidence from studies comparing conditions within the same language or across different languages, especially those that show different results (Goggin and Wickens 1971).

In the section below, we will discuss how DCT can be used to further investigate the nature of the bilingual memory.

Dual Coding Theory and the Concreteness Effect

One of the theories proposed to explain the nature of bilingual memory from an independence view is the DCT (Paivio 1971; Paivio and Desrochers 1980). According to DCT, bilinguals possess two verbal systems for each of the languages (V1 and V2) and one image system. The two verbal systems are independent, and they contain concrete and abstract words for each of the languages spoken by the bilingual. The verbal systems are independent in that a bilingual can comprehend, produce, and remember words in each language without relying on the other. However, the two verbal stores are partially connected via V1–V2 links, which allows a bilingual to perform translations in both directions between the two languages. At the same time, the V1 and V2 are both connected to the image store (I) which contains "perceptual information concerning nonverbal objects and events and for generating mental images of such events" (Paivio and Desrochers 1980: 389).

DCT suggests that, on one hand, the three components of bilingual memory (V1, V2, and I) and are largely independent, allowing bilinguals to comprehend, remember, and think about nonverbal objects with no interference from the verbal stores, and vice versa. However, on the other hand, the connections between the three components can allow for dual coding of lexical
items (in verbal systems and the image store). For example, when an English-Spanish bilingual hears or sees the concrete lexical item *perro* (dog), their Spanish V2 may activate the image of a dog in their image system, the word ‘dog’ in their English V1, or both. Also, a picture of a dog may trigger the recall of the word ‘dog’ in their English V1, the word *perro* in their V2, or both. DCT predicts that words that are dually coded can be recalled better than the ones that are coded only verbally or visually.

One implication of DCT is that concrete lexical items are more easily recalled than abstract ones, as they are associated with concrete concepts (Paivio 1991). Empirical data from a number of studies lend support to the notion of this concreteness effect (Altarriba and Bauer 2004; de Groot 1992; de Groot, Dannenburg, and van Hell 1994; Duthie et al. 2008; Paivio, Khan, and Begg 2000; Schwaneflugel, Akin, and Luh 1992). In addition, the picture superiority effect (words associated with pictures having an increased rate of recall) has been shown in a number of studies (Paivio and Lamberts 1981; Vaid 1988). Also, various studies have looked at the effects of pictorial and visual stimuli with regards to self-selected learner strategy (Barcroft 2009), annotations within a text (Chun and Plass 1996; Jones 2004), isolated lexical items (Shen 2010), imagery keyword mediators (Ellis and Beaton 1993), objects and nonobjects (Barcroft and Sunderman 2008), etymological meaning (Boers, Eyckmans, and Stengers 2007), and reading fluency (Liu 2004).

For example, Liu (2004) investigated whether images, such as cartoons could enhance English as a Second Language (ESL) students’ reading comprehension. Participants of lower and higher proficiency were given both low- and high-level texts that were either accompanied by comic strips or not. The results showed that lower proficiency learners whose high-level texts were accompanied by images performed significantly better than the ones who were not exposed to pictures. However, the presence of images did not significantly affect the performance of higher proficiency learners. These findings suggest that lower proficiency learners benefit more from images with more difficult texts. The reason might be that learners rely more on the image system when they are presented with concepts difficult to access through verbal information alone.

Also, Boers, Eyckmans, and Stengers (2007) explored whether the learning and retention of idioms could be enhanced through reliance on imagery related to etymology. DTC would predict that association with etymological meaning would trigger a concrete mental image that would encode the word in addition to the verbal information. The experiment used computer-mediated instruction to teach English students a number of idioms of various etymological origins (food, religion, construction, war, etc.). After the students answered what they thought the etymological origin of each word was, the correct answer and etymological information was displayed. The results showed that etymological information helped participants comprehend meaning and facilitate recall of idioms. Such information appears to have triggered mental images and made the concept of the idiom more concrete for the learners involved in the experiment.

In addition, Barcroft (2009) looked at the strategies most frequently used by students in intentional vocabulary learning and how they relate with performance. The English-speaking participants were exposed to new Spanish words and pictures, and then completed posttests, as well as questionnaires about the strategy they used to remember the words. The results showed that the learners used twelve different types of strategies, and that the second language (L2) word-picture association was the most frequent and was significantly better than L2–L1 translation and repetition. These findings show that learners prefer to rely on images to memorize and recall words over other strategies, and this yields beneficial results to vocabulary learning.

Recently, Shen (2010) investigated whether pictures make a difference in how beginning Chinese learners acquire isolated lexical items. The experiment used two instructional methods: verbal encoding and verbal plus imagery encoding. The verbal plus imagery encoding instructional method involved pictures or acting out the meaning of words. The results showed that the verbal plus imagery encoding had a significant effect on learning the sound, shape, and meaning of abstract words. However, the same effect was not observed for the concrete words.
The author assumed the reason for this lies in the nature of concrete words that already have mental images associated with them. Therefore, the addition of images or acting out the meaning during instruction does not significantly affect their recall.

Of particular interest to this experiment is the study conducted by Farley, Ramonda, and Liu (2012) who investigated whether attaching meaningful and rich visual images to abstract lexical items through metaphorical, emotive, and symbolic imagery would significantly affect their recall. The L1 English L2 Spanish participants in this experiment were divided into two groups and taught new concrete and abstract words. In group 1, the participants learned the new concrete and abstract vocabulary words through a picture instructional method. During the instruction stage, the L2 Spanish learners saw the target words three times as they were associated with pictures and English translations. The subjects actively participated during the learning phase, and they acquired the meaning of the words by choosing the correct picture from several options during three learning activities. In group 2, the learners were taught the same words using only English translations. As the participants in this group were learning the vocabulary, they were asked to choose the correct meaning of each word from several options of words in English.

The results of Farley, Ramonda, and Liu (2012) showed that the participants in the picture group performed significantly better than those in the non-picture group on the recall of abstract words on both the posttest and the delayed posttest. This means that the picture instructional treatment made a significant difference on the rate of recall of the abstract words. The results supported the predictions of DCT because the words that were dually coded were recalled better. However, Farley, Ramonda, and Liu (2012) was the first known study to show that the concreteness effect can be generalized to abstract words as well. Interestingly, a significant effect for concrete words was not found. This means that associating concrete words with images did not significantly increase their recall. The researchers attributed this finding to the already existent mental representations of concrete words in the learners’ mental lexicons. Since, according to DCT, the concrete words are inherently connected to images, additional visual images during instruction did not make a significant difference. This finding fits with the predictions of DCT because it shows that vocabulary instruction that fosters the association of words with images is especially effective for words that are naturally impoverished in visual imagery (abstract words). At the same time, association of lexical items that are naturally more visual (concrete words) with pictures does not make a significant difference.

The purpose of the present study is to conduct a conceptual replication of Farley, Ramonda, and Liu (2012) in the DCT framework with beginning Spanish learners by investigating whether an instructional method that fosters the association of concrete and abstract words with specific visual images has a significant immediate and delayed effect on the recall of these lexical items. (For detailed information on our instructional method and how it was used, please see the Method and Procedure section below.)

**Research Questions**

The present study sought to answer the following research questions:

1. Does association of lexical items (abstract and concrete) with visual images affect their rate of recall by beginning L2 learners of Spanish?
2. Does association of abstract lexical items with visual images affect their rate of recall by beginning L2 learners of Spanish?
3. Does association of concrete lexical items with visual images affect their rate of recall by beginning L2 learners of Spanish?

The answers to these questions would show whether the predictions of DCT regarding the recall of concrete and abstract words can be confirmed by the current experiment with beginning
L2 learners of Spanish. Only one experiment has previously shown that the acquisition and recall of abstract lexical items can be enhanced by associating them with images (Farley, Ramonda, and Liu 2012). The current study's answers to the research questions above could either raise doubts about the assumptions of DCT or provide further evidence for its predictions.

**Method and Procedure**

**Participants**

The current study originally included 154 Spanish learners at Texas Tech University. They were enrolled in eight sections of Comprehensive Spanish Review, a first semester required course. Four of the participating sections (seventy-seven subjects) were randomly assigned to the picture group and the other four sections (seventy-seven subjects) were in the control (non-picture) group. Participants were considered to be beginning Spanish learners in terms of their knowledge of the vocabulary used in the experiment and the course level in which they were enrolled.

On the basis of the pretest and the background questionnaire administered at the end of the experiment, we eliminated twenty-two subjects who were not present for all parts of the experiment, thirteen who reported previous study of other languages, two who had more than three years of high school Spanish, three who had extended study abroad experience in Spanish-speaking countries, five who grew up bilingual or reported speaking a language other than English at home, six who had hearing difficulties, four who had a score higher than 0 on the pretest, and two who reported engaging in additional outside of class practice with the vocabulary used in the experiment. Thus, fifty-seven learners were eliminated from the original number of 154 subjects.

The participants included in the final data analysis were ninety-seven Spanish learners (forty-four males and fifty-three females), out of which fifty-one were in the picture group (twenty-two males and twenty-nine females) and forty-six were in the control (non-picture) group (twenty-two males and twenty-four females).

All subjects included in the final results reported having been monolingually raised in English and speaking only English at home. The second language learners started learning Spanish as adults beginning in high school or college. The participants had at least one year of formal Spanish instruction, and none had extended study abroad experience in Spanish-speaking countries. They had not previously studied other languages, and they had no additional practice with the words used in this experiment. In the beginning of the study, none of the participants knew any of the words, as only subjects scoring 0 on the pretest were included in the final results.

**Materials**

The materials used in the current study consisted of a pretest, an immediate posttest, a delayed posttest, two sets of treatment PowerPoint slides, and a background questionnaire.

To determine participants' prior knowledge of the words used in the experiment we used a pretest containing the same twenty-four lexical items used in Farley, Ramonda, and Liu (2012), including twelve abstract and twelve concrete words. For the purposes of this study, we considered words abstract if they denoted non-material things, and concrete if they referred to material objects. We selected words unfamiliar to beginning Spanish learners that were at least two syllables in length and that did not have cognates in English (e.g., *chismorreo*/*gossip,* *congoja*/*sadness,* *cobija*/*blanket,* *enano*/*dwarf*). For a complete list of experimental lexical items used, please see Appendix A. In order to control for previous exposure to the experimental lexical items, none of the words was part of the curriculum of the Intensive Spanish Review course in which participants were enrolled, and they were not covered in the course textbook. In addition, the course instructors did not know which words would be used in this study, and
they were not present in the classroom during any part of this experiment. The pretest contained instructions in English asking participants to write the correct translation for the Spanish words. The twenty-four Spanish experimental lexical items were listed below the instructions. To diminish the potential impact of ordering, we randomized the words. They were presented in two columns of twelve words each with a blank to the right of each word where participants were instructed to write the corresponding English translations. The same pretest was used for all participants in the treatment (picture) group and the control (non-picture) group.

To investigate the immediate recall rate of lexical items by beginning Spanish learners after the picture or the non-picture treatment, we used an immediate posttest containing the same words that previously appeared on the pretest. It contained instructions in English asking participants to write the correct translation for the Spanish words, as well as a model, as shown in (1):

(1) Model:  

The experimental words were listed below the model. The words were randomized again to avoid the potential impact of ordering, and they did not appear in the same order as the randomized pretest list. Similar to the pretest, they were presented in two columns of twelve words each with a blank to the right of each word where participants were instructed to write the corresponding English translations, as in (2):

(2) Vergüenza Testarudez  

The same immediate posttest was used for the treatment and the control group.

To determine the learners' delayed recall rate of concrete and abstract words after the picture or the non-picture treatment, we used a delayed posttest including the target words from the pretest and the immediate posttest. Like the pretest and immediate posttest, the delayed posttest's instructions were in English, and participants were asked to write the correct translation for the Spanish words. Similar to the immediate posttest, it included a model as in (1), and the Spanish words were listed below the model. They were randomized again to avoid the possibility of an order effect, and they did not appear in the same order as the on the pretest or the immediate posttest. As on the pretest and immediate posttest, they were presented in two columns of twelve words each with a blank to the right of each word where participants were instructed to write the corresponding English translations. The same delayed posttest was used for subjects in both groups.

Two types of treatment PowerPoint slides were used to teach the twenty-four target words to participants. We used seventy-seven slides divided into three main tasks for the picture group. Each task consisted of twenty-five slides, including one for instructions and twenty-four for each of the experimental lexical items. Out of the seventy-seven slides, seventy-two consisted of the experimental words and the corresponding pictures and translations, and five included a title page and instructions for the three tasks and the immediate posttest. The participants heard and saw the words and accompanying pictures three times. All slides had a black background with the Spanish words displayed in light blue and the English ones in white. Task 1 instructions asked students to remember the words they were about to hear and see as best they could and to repeat them after the researcher. The next twenty-four slides included each Spanish word displayed at the same time as a picture associated with it. The next click (after the researcher read the Spanish word and the students repeated it) revealed the English translation on the same slide. The words were randomized and did not appear in the same order as on any assessment measures. Then, Task 2 instructions asked students to select one out of two pictures corresponding to each Spanish word. The twenty-four slides that followed presented all the target lexical items accompanied by two pictures. The next click (after the students gave their answer) revealed the correct answer (A or B) along with the correct English translation. The order of presentation was randomized...
again. Next, Task 3 instructions asked students to select the correct Spanish translation for each English word and accompanying picture. Each of the next twenty-four slides displayed a word in English, two Spanish words, and a picture corresponding to the English word. The next click (after the students answered) revealed the correct Spanish translation. The last slide included instructions for the immediate posttest. All four Spanish sections randomly assigned to the picture group received the same treatment.

We also used seventy-seven slides divided into three main tasks for the control group. This instructional presentation was similar to the treatment the picture group received, but no pictures were associated with the words on any of the slides. Task 1 instructions asked students to remember the words they were about to hear as best they could and to repeat them after the researcher. The next twenty-four slides included each Spanish word presented in a random order (different from the order of the words on any assessment measures) followed by its English translation revealed after the researcher read the Spanish word and the students repeated it. Then, task 2 instructions asked students to select the correct English translation for each Spanish word. The twenty-four slides that followed presented all the target words accompanied by two English translations. The next click (after the students gave their answer) revealed the correct answer (A or B) along with the correct English translation. The words were presented in a randomized order. Next, task 3 instructions asked students to select the correct Spanish translation for each English word. The next twenty-four slides displayed a word in English and two Spanish words. The next click (after the students answered) revealed the correct Spanish translation. Again, the order of the words was randomized, and it was different from the posttests. The last slide included instructions for the immediate posttest.

To determine students' eligibility in the experiment we used a background questionnaire that asked for participants' name, biological gender, classification, major, previous enrollment in Spanish courses, additional experience with Spanish (study abroad, family, etc.), languages spoken at home, previous study of other languages, sight or hearing impairment, and participation in additional outside of class practice with the lexical items used in the current experiment. All the printed materials, including the pretest, immediate and delayed posttests, and background questionnaire were one page printed in black Times New Roman twelve-point font on letter-size white paper.

Procedure

All the subjects participated in the current study during class time. The experiment was conducted in forty minutes over two class periods. The eight Spanish sections selected to participate were randomly assigned to the picture or the non-picture group, and in cases where an instructor taught two sections, one was assigned to the picture and one to the non-picture group.

The students were seated in a semicircle, and the researcher used PowerPoint 2007 for the treatment phase, and pencil and paper recall tasks for gathering the data. To ensure confidentiality of student participation and control for any additional use of experimental words by the teachers during the experiment, the class instructors were not present for any part of the experiment, and they had no information regarding the words used in the experiment.

Pretest

At the beginning of the first day, the researchers read and provided the participants with an information sheet about the study. The information was in English to ensure that all participants could understand it. Immediately following the information about the study, the researchers administered the pretest in order to determine if the participants knew any of the target words. The pretest included the target words that were later taught during the treatment phase and tested on the posttests. The words on the pretest were randomized to control for effects due to
item order. The subjects were instructed to write the English translations of any words they knew. All participating sections completed the pretest in about five minutes. Subjects that provided a correct translation for at least one word on the pretest were eliminated from the final analysis.

**Instruction Phase**

Following the pretest, participants were taught the experimental words using the PowerPoint treatment slides. To ensure unvarying treatment in all sections and control for intervening variables, the same researcher conducted the treatment in all eight sections. Participants were asked to learn the words as best they could. The instruction phase consisted of three parts.

In the first part of the instruction phase, the participants were shown and read the instruction slide for task 1 in English, which asked them to remember the words as best they could and to repeat them after the researcher. Each of the following twenty-four slides presented the words in a randomized order. The picture group saw the Spanish word and a picture corresponding to it, while the control group saw only the Spanish word. The researcher read the word, and the students repeated it, after which the researcher revealed the meaning of the word via an English translation on the same slide.

In the second part, the subjects were shown and read the instruction slide for task 2 in English. The picture group was asked to select one out of two pictures corresponding to each Spanish word. The control group was asked to select one out of two English translations for each Spanish word. The Spanish word was at the top of the slide and the pictures or the English translations were below it. The researcher read the Spanish word, and prompted the participants to select option A or B. After the students responded, the researcher revealed the correct answer on the same slide.

In the third part, the students were shown and read the instruction slide for task 3 in English. The participants were asked to select the correct Spanish translation for each English word. The picture group saw a word in English followed by two Spanish words, and the picture corresponding to the English word. The control group saw the English word followed by two Spanish words. The researcher prompted the students to answer by reading the two Spanish options, ¿haraganería o chismorreo? ('laziness or gossip?'). After the students responded, the researcher revealed the correct Spanish translation on the same slide.

The entire learning phase lasted about fifteen minutes in each participating section. After the treatment was completed, the researcher displayed a slide asking students to take a short quiz on the vocabulary items they had just learned.

**Immediate Posttest**

The immediate posttest was a recall task of the twelve abstract and twelve concrete words. The format was the same as on the pretest, but the words were randomized to avoid the possibility of an order effect. Students were provided the Spanish words, and they were asked to recall their meaning in English, following a model shown in the instructions. Students completed the task in eight minutes.

**Delayed Posttest**

Exactly one week after the pretest, treatment, and immediate posttest, the researcher administered the delayed posttest. The format was identical to the immediate posttest, but the words were randomized again to control for effects due to item order. The students were asked to recall the English translations for the Spanish words following a model, and they were given eight minutes to complete the task. No participant included in the final analysis engaged in any additional practice with the words used in the experiment between the treatment and the delayed posttest.
Background Questionnaire

The background questionnaire was the last part of the classroom experiment. The questionnaire was described in the Materials section above. It was administered immediately after the delayed posttest. The researcher asked the students to fill it out to determine if their data could be included in the final results. Participants took two minutes to complete this task.

Upon completion of the background questionnaire the participants were notified that the experiment had ended.

Scoring

Each correct English translation on the pretest and immediate and delayed posttests received a score of one point. We considered a response correct if the participants wrote the exact translation equivalent taught during the instructional phase or a close synonym. In the picture group a number of learners provided responses such as ‘frustration’ or ‘anger’ instead of ‘wrath’ for the abstract Spanish word ira. Also, several learners wrote ‘bird’ instead of ‘crane’ for the concrete Spanish word grulla. We counted such responses correct, since this further shows the reliance on the image system in addition to the verbal system to access lexical information. The total score for each assessment measure could range between 0–24, or 0–12 for the abstract words, and 0–12 for the concrete ones. Only the data of participants who scored 0 on the pretest and who reported not having had additional practice with the experimental lexical items was included in the final results. In addition, only the participants meeting the eligibility criteria discussed previously (raised monolingually in English, started learning Spanish as teens or adults in high school or college, no previous study of other languages, no study abroad experience) were part of the final analysis.

The data from all eight participating Spanish sections was combined and analyzed as two groups: picture or control (non-picture) group, according to the instructional treatment they received. The results are discussed below.

Results

There were no differences between the picture and non-picture groups on the abstract or concrete lexical items on the pretest, as only subjects scoring 0 were included in the final analysis. Therefore, we believe that all the observed effects are due to treatment and not to previous knowledge.

A series of repeated measures ANOVAs were conducted to address the research questions. To investigate whether association of lexical items (abstract and concrete) with visual images has a significant effect on their rate of recall by beginning L2 learners of Spanish, we first computed a repeated measures ANOVA on the abstract, concrete, and total scores for the picture and non-picture group. Table 1 shows the descriptive statistics for the picture and the non-picture group, including the recall scores of abstract, concrete, and total words on the pretest, immediate posttest, and delayed posttest. On the immediate posttest, the picture group scored on average 13.25 on all words, including 6.39 on abstract and 6.86 on concrete words. The non-picture group scored on average 10.26 on all words, including 4.43 on abstract and 5.83 on concrete words. On the delayed posttest, the picture group scored on average 3.51 on all words, including 1.37 on abstract and 2.14 on concrete words. The non-picture group scored on average 2.87 on all words, including 1.20 on abstract and 1.67 on concrete words.

Figure 1 provides a visual representation of the mean scores for the abstract, concrete, and total words during the three testing times for each group. As shown in Table 2, the repeated measures ANOVA on composite scores (abstract and concrete words) showed a main effect for Treatment (p = .013), and a significant interaction between Time and Treatment (p = 0.003).
Table 1. Descriptive statistics for mean scores by group and time

<table>
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<tr>
<th>Measure</th>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
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<tbody>
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<td>Pretest</td>
<td>Picture</td>
<td>51</td>
<td>0.00</td>
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<td>0.000</td>
<td>0.00</td>
<td>0.000</td>
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<tr>
<td></td>
<td>Non-Picture</td>
<td>46</td>
<td>0.00</td>
<td>0.000</td>
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<td>0.000</td>
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<tr>
<td></td>
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<td>0.00</td>
<td>0.000</td>
<td>0.00</td>
<td>0.000</td>
<td>0.00</td>
<td>0.000</td>
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<tr>
<td>Immediate</td>
<td>Picture</td>
<td>51</td>
<td>6.39</td>
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<td>6.86</td>
<td>3.099</td>
<td>13.25</td>
<td>5.782</td>
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<tr>
<td>Posttest</td>
<td>Non-Picture</td>
<td>46</td>
<td>4.43</td>
<td>2.536</td>
<td>5.83</td>
<td>2.775</td>
<td>10.26</td>
<td>4.955</td>
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<tr>
<td></td>
<td>Total</td>
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<td>5.46</td>
<td>2.905</td>
<td>6.37</td>
<td>2.980</td>
<td>11.84</td>
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<td>Delayed</td>
<td>Picture</td>
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<td>1.37</td>
<td>1.612</td>
<td>2.14</td>
<td>1.600</td>
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<tr>
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<td>Non-Picture</td>
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<td>1.67</td>
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<td></td>
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<td>1.92</td>
<td>1.572</td>
<td>3.21</td>
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Table 2. Summary table for repeated measures ANOVA using scores on abstract and concrete words from picture and non-picture group

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<th>SS</th>
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<td>Between-subjects Effects</td>
<td>Treatment</td>
<td>1</td>
<td>106.480</td>
<td>106.480</td>
<td>6.407</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>2</td>
<td>7153.640</td>
<td>3576.820</td>
<td>363.086</td>
</tr>
<tr>
<td></td>
<td>Treatment × Time</td>
<td>2</td>
<td>120.238</td>
<td>60.119</td>
<td>6.103</td>
</tr>
<tr>
<td>Error (treatment)</td>
<td>95</td>
<td>1578.798</td>
<td>16.619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (time)</td>
<td>190</td>
<td>1871.720</td>
<td>9.851</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Comparison between Picture and Non-picture Group on All Words
To investigate whether the association of abstract lexical items with visual images has a significant effect on their rate of recall by beginning L2 learners of Spanish, we performed a repeated measures ANOVA on abstract scores. The results revealed a main effect for Treatment ($p = 0.004$) and a significant interaction between Time and Treatment ($p = 0.0001$), as shown in Table 3. Also, Figure 2 shows a visual representation of the mean scores for the abstract lexical items of the picture and control groups on the pretest, immediate posttest, and delayed posttest.

Table 3. Summary table for repeated measures ANOVA using scores on abstract words from picture and non-picture group

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between-subjects Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>1</td>
<td>36.723</td>
<td>36.723</td>
<td>8.593</td>
<td>0.004</td>
</tr>
<tr>
<td>Within-subjects Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>1548.078</td>
<td>774.039</td>
<td>285.758</td>
<td>0.000</td>
</tr>
<tr>
<td>Time X Treatment</td>
<td>2</td>
<td>56.697</td>
<td>28.348</td>
<td>10.466</td>
<td>0.000</td>
</tr>
<tr>
<td>Error (treatment)</td>
<td>95</td>
<td>405.965</td>
<td></td>
<td>4.273</td>
<td></td>
</tr>
<tr>
<td>Error (time)</td>
<td>190</td>
<td>514.657</td>
<td></td>
<td>2.709</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Comparison between Picture and Non-picture Group on Abstract Words

To investigate whether the association of concrete lexical items with visual images has a significant effect on their rate of recall by beginning L2 learners of Spanish, we computed a repeated measures ANOVA on concrete scores. The results displayed in Table 4 show no significant effect for Treatment ($p = .650$) and no significant interaction between Time and Treatment ($p = 0.115$). In addition, Figure 3 provides a visual representation for the mean concrete scores of the picture and control groups on the three assessment measures.

To find the interaction between Time and Treatment on the abstract scores of the two groups, we conducted a one-way ANOVA. Table 5 shows a significant difference between the picture and non-picture group on the immediate posttest ($p = 0.001$), and no difference between groups on the delayed posttest ($p = 0.553$). This suggests that the picture treatment made a significant difference on the recall of abstract words on the immediate pretest. We also conducted a post-hoc
Table 4. Summary table for repeated measures ANOVA using scores on concrete words from picture and non-picture group

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between-subjects Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>1</td>
<td>18.139</td>
<td>18.139</td>
<td>3.494</td>
<td>0.650</td>
</tr>
<tr>
<td>Within-subjects Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>2050.488</td>
<td>1025.244</td>
<td>344.389</td>
<td>0.000</td>
</tr>
<tr>
<td>Time X Treatment</td>
<td>2</td>
<td>13.044</td>
<td>6.522</td>
<td>2.191</td>
<td>0.115</td>
</tr>
<tr>
<td>Error (treatment)</td>
<td>95</td>
<td>493.167</td>
<td>5.191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (time)</td>
<td>190</td>
<td>565.629</td>
<td>2.977</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3. Comparison between Picture and Non-picture Group on Concrete Words

The paired samples t-test (shown in Table 6) on the abstract scores of the two groups, which revealed significant differences between pretest and immediate posttest, pretest and delayed posttest, and immediate posttest and delayed posttest (p = 0.0001). This suggests that there were significant gains made from the pretest to the immediate posttest, and from pretest to the delayed posttest, but there was a significant decline from immediate posttest to the delayed posttest. Both groups made significant gains on abstract words, but the picture group performed significantly better on the immediate posttest.

Discussion

Our first goal was to investigate whether the association of lexical items (abstract and concrete) with visual images affects their rate of recall by beginning L2 learners of Spanish. The findings show that the picture treatment is better than the non-picture treatment as assessed by the total rate of recall of all words. However, in order to understand if this is due to the effect of the picture treatment on learners' recall of abstract or concrete words or both, we turn to the discussion of the results of abstract and concrete scores below.

Our second goal was to investigate whether the association of abstract lexical items with visual images affects their rate of recall by beginning L2 learners of Spanish. The results show a
Table 5. Summary of one-way ANOVA using scores on abstract words in picture and non-picture group

<table>
<thead>
<tr>
<th>Measure</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate Posttest</td>
<td>Between Groups</td>
<td>1</td>
<td>92.663</td>
<td>92.663</td>
<td>12.270</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>95</td>
<td>717.461</td>
<td>7.552</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>96</td>
<td>810.124</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed Posttest</td>
<td>Between Groups</td>
<td>1</td>
<td>0.757</td>
<td>0.757</td>
<td>0.354</td>
<td>0.553</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>95</td>
<td>203.161</td>
<td>2.139</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>96</td>
<td>203.918</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Summary of paired samples t-test using scores on abstract words in picture and non-picture group

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>SE</th>
<th>Lower</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest—Immediate Posttest</td>
<td>-6.39216</td>
<td>2.92628</td>
<td>0.40976</td>
<td>-7.21519</td>
<td>-5.56913</td>
<td>-15.600</td>
<td>50</td>
<td>0.000</td>
</tr>
<tr>
<td>Pretest—Delayed Posttest</td>
<td>-1.37255</td>
<td>1.61197</td>
<td>0.22572</td>
<td>-1.82592</td>
<td>-0.91918</td>
<td>-6.081</td>
<td>50</td>
<td>0.000</td>
</tr>
<tr>
<td>Immediate—Delayed Posttest</td>
<td>5.01961</td>
<td>2.76036</td>
<td>0.38653</td>
<td>4.24324</td>
<td>5.79597</td>
<td>12.986</td>
<td>50</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The current findings also partially confirm the results of Farley, Ramonda, and Liu (2012) who found that participants in the picture group performed significantly better than the ones from the non-picture group on the recall of abstract words on the immediate posttest. This suggests that, in the case of this study, associating abstract words with pictures has beneficial short-term effects. This supports the predictions of DCT in that words that are dually coded (both verbally and with rich imagery attached to them) are more easily recalled than the ones that are coded only verbally. The picture group, which received both verbal and visual cues for coding the new abstract lexical items, significantly outperformed the non-picture group, which had access only to verbal coding on the immediate posttest. These results are also similar to previous studies in that learners’ comprehension and recall improves from associating images with unfamiliar vocabulary (Barcroft 2009; Boers, Eyckmans, and Stengers 2007; Liu 2004; Shen 2010).

The current findings also partially confirm the results of Farley, Ramonda, and Liu (2012) who found that participants in the picture group performed significantly better than the ones from the non-picture group on the recall of abstract words on the immediate posttest. Half of their beginning L1 English L2 Spanish participants were also taught new abstract and concrete words using pictures, while the other half were taught using L1 translations. Their results showed that the use of symbolic, metaphorical, or emotive visual imagery aids the lexical representation and recall of abstract words. Just like Farley, Ramonda, and Liu (2012) the present findings imply that it is possible to create a concreteness effect for abstract words when they are associated with visual images. This is a new finding since previous studies limited the concreteness
effect to concrete words (Altarriba and Bauer 2004; de Groot 1992; de Groot, Dannenburg, and van Hell 1994; Duthie et al. 2008; Paivio, Khan, and Begg 2000; Schwanenflugel, Akin, and Luh 1992). However, it seems to be possible to dually-code abstract words as well. Sadoski (2005) has suggested that all lexical items might be somewhat concrete, since even abstract words have concrete etymological origins, but have become "dead metaphors" (229).

However, unlike Farley, Ramonda, and Liu (2012), the association of abstract words with images had an effect on their recall only on the immediate posttest. Our results provide no evidence for significant delayed effect, as in Farley, Ramonda, and Liu (2012). However, the short input session and no additional practice with the words between the immediate and delayed posttests could account for the significant drop in the rate of recall on the delayed posttest. In order to control for intervening variables, no participants engaged in additional practice with the experimental words for the week between the two posttests. Also, the instructional phase was very short—only fifteen minutes on the first day—and the participants did not see the words again until the delayed posttest a week later. In addition, our study involved different learners than Farley, Ramonda, and Liu (2012), and it is possible that individual variations played a role in terms of absolute gains for these particular learners. Also, the significant differences on the post-hoc analyses between the three assessment measures show that the gains learners made were significant from pretest to the immediate posttest and from pretest to the delayed posttest. While there was a significant decrease in the rate of recall on the delayed posttest, and both groups made gains on abstract words, the picture group performed significantly better on the immediate posttest.

Our third goal was to investigate whether the association of concrete lexical items with visual images affects their rate of recall by beginning L2 learners of Spanish. Just like Farley, Ramonda, and Liu (2012) the present study found that the picture treatment did not have a significant effect on the recall of concrete words on immediate or delayed assessment measures. We attribute these results to the fact that the concrete words are already connected to images in the memory of the bilinguals, and associating the lexical items with pictures during instruction does not provide a significant additional benefit. Dual coding theory predicts that concrete words are already associated with concrete concepts (Paivio 1991). On the other hand, this model assumes that the abstract words were not connected to the image system in the bilingual memory representation previous to instruction. Thus, instruction that fosters dual coding proves beneficial to abstract words, but does not significantly affect the recall of concrete words. Previous studies have found that concrete words are better recalled than abstract ones (Altarriba and Bauer 2004; de Groot 1992; de Groot, Dannenburg, and van Hell 1994; Duthie et al. 2008; Paivio, Khan, and Begg 2000; Schwanenflugel, Akin, and Luh 1992). However, unlike the present experiment, the studies above did not investigate whether a concreteness effect could be created for abstract words by the use of pictures. Our results support the predictions of the dual coding theory and the findings of Shen (2010) and Farley, Ramonda, and Liu (2012).

Conclusion

From a pedagogical perspective, the current study indicates that teaching abstract lexical items with visual images may help beginning second language students remember and recall the words better in the short term. Second language teachers may wish to use pictures whenever possible in the teaching of abstract lexical items to reinforce the connection between the verbal and image systems of the mental lexicon. Another implication is that in order for the effects of instruction to hold in the long term, students may need additional input and practice with the target vocabulary. Otherwise, instruction will only result in short-term gains. However, the findings of the present study are limited by the participants, the words, and the assessment measures used. Our results only speak of how college-age beginning L2 learners of Spanish remember and recall the specific abstract and concrete words we used. In addition, our
lexical pool was limited because we could not include any words that had English cognates or that were known to participants. Due to this limitation, we did not control for word frequency. It is possible that the lower frequency of some lexical items in Spanish and in English may have contributed to the lower recall of these words. In addition, our assessment measures consisted of recall tasks by using L2 words as prompts. As with nearly any empirical study of this nature, it is possible that other assessment measures would yield different results. For example, might the results be different if pictures served as prompts? Further research is needed to investigate whether the results hold with other assessment measures.

Also, due to limitations of classroom-based research, we did not control for learners’ working memory. At the same time, our participants were taught 24 new words in a short time, which may have affected their recall. However, we wanted to make the task challenging enough so that any effects would be due to the treatment, and not to the ease of the task.

In addition, the study was receptive-oriented, and we did not ask learners to engage in a production task of the L2 words. During instructional phase 1, learners were exposed to the L2 and L1 words and pictures, and they repeated the words after the researcher. During phase 2, learners selected the correct picture or L1 word corresponding to the target L2 items. During phase 3, participants selected the correct L2 word from two options given by the researcher. During no phase of the instructional treatment was there any production of the L2 lexical items. In addition, the pretest and the posttest did not ask learners to produce the L2 words. Future research could investigate the effects of such treatments on learners’ productive skills.

Future research also might investigate if the same results would be obtained with learners of a different language. A language that does not share as many cognates with English as Spanish would offer more options for what words can be used in a study. Thus, researchers could control for word frequency. Also, it would be interesting to compare several proficiency levels in how they learn and recall new lexical items. Finally, future research could employ different assessment measures (perhaps including an L2 production task) with the same or different lexical items to see if the current findings can be replicated.

WORKS CITED


APPENDICES

Appendix A: Experimental Lexical Items

Abstract Words:

- Bondad [kindness]
- Chismorreo [gossip]
- Congoja [sadness]
- Derrota [defeat]
- Desenvoltura [confidence]
- Espanto [fear]
- Haraganería [laziness]
- Ira [wrath]
- Pujanza [strength]
- Regaño [scolding]
- Testarudez [stubbornness]
- Vergüenza [shame]
Concrete Words:
Alce [moose]
Cobija [blanket]
Enano [dwarf]
Estanque [pond]
Foca [seal]
Grulla [crane]
Guepardo [cheetah]
Hada [fairy]
Lana [wool]
Mozo [bellhop]
Sapo [frog]
Trasgo [goblin]

Appendix B: Sample Assessment Test
Please write the English translation for as many of the words below as you can.

Model: gato cat

Mozo
Desenvoltura
Congoja
Enano
Cobija
Regaño
Hada
Espanto
Estanque
Haraganería
Vergüenza
Pujańza
Guepardo
Bondad
Trasgo
Lana
Chismorreo
Testarudez
Ira
Foca
Derrota
Grulla
Alce
Sapo