THE MAGICAL REALISM OF METAPHOR: CROSS-CULTURAL COMPARISONS IN
USE OF METAPHOR IN COGNITION

BY

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THESIS

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ABSTRACT

Three experiments explore the hypothesis that due to linguistic and cultural factors, metaphor usage – or thinking in terms of what something is like – differs across cultures. In Experiment 1, a lexical decision task supported the hypothesis that perception of what something is like tends to be faster and more automatic in Latino participants than in Anglo participants. In Experiment 2, Anglo participants were less able to solve a problem framed metaphorically than Latino participants were. To ensure that a preference for metaphor is not applicable to all bilingual populations, we included bilingual Asian participants in Experiment 3. In this study, Latino participants rated arguments presented with metaphors as more persuasive than arguments that did not have metaphors, while the opposite pattern was found in Anglo and Asian participants. The findings from these three studies provide support for the hypothesis that the Latino preference for metaphor is real and pervasive. Implications in the domains of education and public health interventions are briefly noted.

To Mom and Dad, for their love and support

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

Have you ever eaten pizza that tastes like cardboard? Seen something run over, flat as a tortilla? Heard a train snorting like a boar hog? In the United States, metaphors are found everywhere – the classroom, business seminars, newspapers, and children's books. However, we argue that due to cultural and linguistic factors, metaphors are even more ubiquitous and powerful in Latino cultures.

A metaphor is a figure of speech where one word or phrase is used in place of another, creating an analogy between the two words or phrases (Merriam-Webster, 2010). Metaphors are used in argumentation, to evoke imagery, and to clarify one's viewpoint. Many authors extensively use metaphor, however the acceptance and commonality of metaphor differs across cultures.

1.1 Anglo Distrust of Metaphor

English philosopher John Locke warned of the danger of metaphor in his influential Essay Concerning Human Understanding (1841). While encouraging the use of precision and concision, Locke denounces the "figurative application of words" as "insinuating wrong ideas, moving the passions, and misleading the judgment". Metaphor and other figures of speech allow speakers to purposefully obscure meaning or lay the burden of translation on the listener, leading to "abuse" of the English language (p. 360).

The English language is designed for precision and accuracy (Wierzbicka, 2006). Linguists believe that the English language, when including technical and regional vocabulary, is

comprised of the most words of any language – estimates range from 750,000 to over 1 million (Oxford English Dictonary). This massive vocabulary means that an English speaker, given enough ambition and a dictionary, can find a word to mean exactly what he or she means to say. American English in particular is unique, as each group of early immigrants contributed words from their homeland which have become colloquial (hamburger and deli from German, plaza and mosquito from Spanish, etc.).

Social norms also influence precision and accuracy in language. Anglos tend to be more direct in communicative styles than other cultures, preferring to just "say it how it is". In contrast, interdependent cultures prefer indirect communication, which allows the listener to save face and maintain relational harmony. Much work has shown that Anglos prefer this direct style of communication in social relations while others rely more on indirect speech in conjunction with contextual cues such as body language and power distance (Markus and Kitayama, 1991; Sanchez-Burks et al., 2003). Studies on language production and interpretation show interesting communication patterns of American students. For example, Holtgraves (1997) developed the Conversational Indirectness Scale which asks participants to rate statements such as "I usually assume there are no hidden meanings to what someone is saying" and "I deeply analyze what people say to understand their real meaning". He found that Americans valued "saying what one means directly". This research supports the notion that Anglos prefer to use direct speech rather than less literal, indirect speech such as metaphor.

1.2 Latino Embracement of Metaphor

Contrasting with an Anglo distrust of metaphor, Latino cultures embrace figurative language, even contributing heavily to a new genre of literature in which the metaphoric is often made literal – magical realism. This genre transforms the known into the unknown, when "[the

marvelous arises] from an unexpected alteration of reality… where the strange is commonplace" (Carpentier, 1995). Different from fantasy authors, magical realists emphasize the magical in our everyday world without creating fantasy worlds and creatures. Although the genre is not restricted to Latino authors, it holds a special place in Latino culture. The list of Latino magical realists is extensive, including Gabriel Garcia Marquez, Isabel Allende, Miguel Angel Asturias. This transition between reality and the magical is often done with the help of metaphor (Merivale, 1995).   For example, instead of simply saying that Jose's mother intuitively knew he was dead, Marquez (1970) uses metaphor to describe the journey of Jose's blood: "A trickle of blood came out under the door, crossed the living room, went out into the street… it crossed through the parlor, hugging the walls so as not to stain the carpet… and came out in the kitchen where Jose's mother was cracking eggs."   The reality of Jose's murder is magically transformed via the metaphor of his blood as an agent capable of travel.

Given that Latino authors are well-known for their use of metaphor and figurative language, we thought that a content analysis of existing cultural products could be informative. We decided to look at the pinnacle of literary achievement – the Nobel Prize in Literature.

The Nobel Prize in Literature is awarded each year (except for times of war) to "the person who shall have produced in the field of literature the most outstanding work in an ideal direction" (nobelprize.org). Authors are awarded either for particular works or entire corpuses, and a speech is made in honor of each recipient. A short biography is included for each author, noting the type of literature the author is most famous for as well as geographical information (birthplace, current home, etc.) and linguistic information (languages spoken, most common language used in writing). If metaphor and figurative speech are indeed more pervasive in Latino cultures, we might expect that Latino authors would be overrepresented in the Nobel-

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winning poet population as metaphor is a central component of poetry (Aristotle, 335 BC/2005). Of the 65 prize winners after World War II, 29 were noted for their poetry. Of these 29, 7 were from Latino countries. While approximately 7% of the world speaks Spanish or Portuguese as a first language, 24.1% ($CI_{.95} = 7.76\%, 40.24\%$) of Nobel Prize winning poets speak Spanish or Portuguese as a first language. These results indicate that there are more Latino poets awarded the Nobel Prize in Literature than one would expect solely given the Spanish-speaking population.

The prevalence of magical realism in Latino literature and the results of our content analysis support the notion that metaphor is highly pervasive, but do not explain *why* Latinos favor this type of imagery and metaphoric language and thought. What is causing this effect of magical realism and metaphor usage? We argue that linguistic and cultural forces shape this Latino proclivity toward metaphor.

Linguists differentiate between two types of languages – satellite-framed (S-languages) and verb-framed (V-languages) (Slobin, 2003). The distinction comes from codability of manner or motion. In S-languages, manner is coded directly in the verb ("The man walked down the hall") while in V-languages, manner is optional. "The man entered the hall" is perfectly acceptable and additional words are necessary to be more specific: "The man entered the hall by walking." English is typified as an S-language, while Spanish and Portuguese are V-languages.

As manner verbs are frequently used in S-languages, speakers tend to have large vocabularies differentiating between types of manner, while V-language speakers will have fewer distinctions. Borrowing an example from Slobin, the Spanish *escabullirse* is equivalent to the English *creep, glide, slide, slip, or slither.* One word in Spanish can be five distinct, finely distinguished words in English. With limited manner verbs, Spanish speakers must be more

creative when choosing words to describe movement. Often they make comparisons between concepts that have no words to those that do. While there is no single word for "toes" in Portuguese, speakers can compare the concept to words they do have – "dedos de pe" or "fingers of the feet". One effective way to do this is via metaphor. To create the same mental imagery in Spanish as in English, authors or speakers must add a modifier to the verb, perhaps by describing what the creature is like or what it moves like ("It moves like a snake" for slither, "like a kite" for glide, etc.). Because manner is not "hidden or wrapped up" in the verb, v-language speakers may actually be more sensitive to manner – it's more likely to be noticed because it is a stand-alone, explicitly described part of the sentence (Papafragou, Massey, and Gleitman, 2002).

Aside from the linguistic distinctions between English and Spanish, cultural differences may also play a role in Latino preference for metaphor. Simpatía is a well-documented script followed by Latino cultures (e.g., Triandis et al., 1984), in which positive social behaviors are emphasized and negative behaviors are deemphasized. To be simpatíco means to readily attempt to share feelings and thoughts with others, to be warm and congenial, and to value interpersonal harmony. One way of achieving interpersonal harmony is through indirect means of communication. In order to reduce conflict, speakers prefer indirect means of communication, rather than direct communication which can be seen as rude and invasive. Instead of directly imposing one's beliefs or asserting a statement in conversation, a speaker in an interpersonal culture chooses indirect speech which leaves the listener to interpret the underlying meaning (Matsumoto, 1988). Using indirect speech in this way (burdening the listener) is in direct opposition to the Anglo preference for directness and precision of language (burdening the speaker). Although interdependence is more commonly associated with East Asians, Latino

cultures are also characterized as interdependent (Triandis et al., 1984). There are various forms of indirect communication, so while one would expect both Asians and Latinos to use indirect communication, the form chosen is likely to vary by culture.

In addition to emphasizing interpersonal harmony, Latinos especially value emotional interaction (Sanchez-Burks, Nisbett, and Ybarra, 2000). This emotional interaction extends to all aspects of life, from the home to the job. For example, Latinos emphasize socioemotional aspects of a workplace over task-related ones (suggesting "more time spent paying attention to other's feelings" as an improvement to the job rather than "more time spent working"; Sanchez-Burks, Nisbett, and Ybarra, 2000). A Latina storyteller will attempt to instill in others the same feelings that a situation evoked in her. A metaphor is not a direct comparison between two concepts, but it is a direct comparison between *feelings* evoked by the two concepts (Hayakawa, 1978). For example, there are many metaphors comparing love to fire ("The passion kindled", "Meet my new flame", "He found someone new and left me burned again."). The speaker is not saying that being in love is literally being on fire, but the feeling of love is what she imagines fire to be like (spreading rapidly, consuming, beautiful but devastating, producing warmth). Stating that one's "heart is on fire" leads the listener to automatically infer exactly how the speaker is feeling. This emotional sharing is highly valued in a simpatía culture. The culture of simpatía differs from East Asian cultures in the acceptability of emotionally charged interactions; and because metaphor is more evocative, we would hypothesize that East Asians would choose a different indirect form of communication than simpatíco Latinos.

As simpatía emphasizes both emotional interaction and indirect communication, and metaphor is an indirect means of communication with a large emotional component, it seems possible that Latino cultures embrace metaphor in everyday communication. We examined this

proclivity for metaphor in three different ways – an implicit reaction time task, a problem solving

task, and a persuasion task.

CHAPTER 2

IMPLICIT MEASURES TASK

2.1 Introduction

For this study, we wanted to investigate if participants of different ethnicities reacted to ambiguous stimuli in different ways. Our hypothesis is that if Latino participants are more likely to perceive the world as "what it is like" due either to usage of metaphor in language or culture, they may be more likely to quickly associate an ambiguous image with something that "it is like". One who describes the world metaphorically would see connections between seemingly unrelated objects – a cloud and a rabbit, for example. Additionally, the transformation of ambiguous stimuli like a tree or clouds into something like a dancer or rabbit would also potentially instill the imagery with emotion, characteristic of simpatía. The image is no longer just a tree, but something simple and graceful to behold, like a dancer.

Subjects participated in a reaction time task in which they were shown an ambiguous image and then asked to respond to a string of letters as either a word or a non-word. The string of letters was either a target positive word (a descriptor of the image, "rock"), a target metaphorical word (a possible description of the image if we expand the description to include what the stimuli looks or is like, "crocodile"), or a string of letters that are pronounceable in English but not a word ("blouf", for example). As our participants are at a predominantly Anglo university, we wanted to be sure that our Latino participants were not just thinking of themselves as "students at an Anglo university" but that they might also be drawing on their experience as members of a Latino culture. Because of this concern, we introduced a prime designed to cause bicultural participants to "switch frames" (Hong, Chiu, and Kung, 1997) or to shift their

activated values from one internalized culture (that of "student in a world of Anglo norms") to another (that of "Latino"). Spoken language is one way of causing frame switches (Ramirez-Esparza et al., 2006) but we hoped to have an effect simply by reminding participants about the languages they speak. To do this, we asked participants "What language do you speak at home?" We hoped that we would enable frame switching just by having fluent Latinos state that they speak Spanish – instead of being in the "student at an Anglo school" frame, these participants would now be shifted more towards the "Spanish-speaking Latino" frame (though there are limits to the effectiveness of this given that the study was conducted in English). However, some of our Latino participants responded that they speak only English at home. For these participants, it is hypothesized that they will retain the "Anglo" frame. If a non-fluent Latino's response to "What language do you speak at home?" is interpreted by the participant as "Not Spanish", he or she may even more heavily slide into the Anglo frame.

We were unsure if this association between an ambiguous stimuli and what it is like would be automatic or would require several seconds of elaboration and thought. We decided to pursue both possibilities through two separate reaction time tasks. In the task designed to elicit an automatic reaction, images were very briefly flashed on the screen. If instead the association demanded more time and effort, we designed a task in which images remained on the screen for a longer period during which participants were asked to describe the images aloud. Our hypothesis is that Spanish-speakers who are primed with speaking Spanish would react more quickly to the metaphoric words while non-Spanish speakers who are primed with speaking English will react more quickly to the straightforward terms.

2.2 Procedure

Participants entered the lab and were seated at one of two computers. After signing

informed consent forms, half of the participants were then primed by the experimenter who

asked, "Can I ask which languages are spoken in your family?" (referred to in analyses as the

Language Prime). The experimenter briefly introduced the study and described the lexical

decision task to the participants. She instructed the subjects to read instruction screens carefully

and emphasized that there were two different tasks on the computer. In the Flash Condition,

images would flash very briefly on the screen (500 milliseconds) and then the participant would

be presented with a string of letters and asked to determine if those letters comprised a word or

not by pressing the appropriate key (1 on the number pad for words, and 2 for non-words). In

the Aloud Condition, the images remained on the screen for longer (10 seconds) and the

participants were asked to describe those images out loud, as if they were describing the images

to a friend. The image would then be followed by a string of letters and the participants were

again asked to determine if the letters were a word or not. The Aloud and Flash conditions were

randomly ordered and all subjects participated in both. In all cases, "XXXXX" was presented as

both a forward and backward fixation target to ensure that participants were focusing on the

center of the computer screen. Participants' responses and reaction times were recorded by

DirectRT Software. See Figure 2.1 for a sample of the stimuli used, including images and target

words.

2.3 Results

236 undergraduates at the University of Illinois, Urbana-Champaign completed the study

for course credit. Age ranged from 18 to 27 (mean of 19) and of the 230 participants who

completed the demographic questionnaire, 107 were male and 123 were female. Of those 230 participants, 119 indicated ethnicity as Caucasian, 88 were Latino/a, and 23 indicated that they were multi-racial or "other". Those indicating ethnicity as multi-racial or other will be excluded from these analyses. Participants saw each of the images in both the Flash and Aloud conditions. Each image was randomly paired with a metaphoric target in one condition and a positive target in the other condition. For example, if participants saw Image 1 in the Flash condition, it was paired with either the positive target "dog" or the metaphoric target "mop" and when they encountered the image again in the Aloud condition, it was paired with the other target. Due to this randomization of target type, some participants responded to none or only one metaphoric or positive target word in the Flash condition (meaning that all or all but one of a target type randomly appeared in the Aloud condition). Because no reliable mean score for these participants could be computed in the Flash Condition, their responses are also excluded from the analyses.

We examined the remaining 187 participants' mean reaction times for all positive trials and all metaphoric trials. If participants had more than 20% incorrect responses in either the positive or metaphoric target category, we eliminated their results from the analysis[1]. After applying this correction, 165 participants remained: 99 Caucasians and 66 Latinos.

In the demographic questionnaire at the end of the study, each participant was asked if he or she speaks another language and, if so, was asked to indicate which language. To measure fluency, we asked 13 questions assessing the extent to which the participants spoke, understood, and read that language. Participants were asked "How much do you speak this language at home?", "To what extent do you understand this language?", etc. and responded on a scale from

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[1] Average error rate in the positive and metaphoric target categories did not differ across ethnicities in either the Aloud or Flash condition, all ps > .10.

1 to 5, with 1 indicating Very much and 5 indicating Not at All. Responses to the question about

language at home map onto our experimenter's priming question and so we used this as our

fluency variable to see how it interacted with being primed (or not). This spoken-at-home

variable can be treated as continuous (responses range from 1 to 5) or dichotomous. Although

treating fluency as continuous and applying a regression test works, it also makes sense to

evaluate fluency as dichotomous as the Anglo fluency variable is much less varied than the

Latino fluency variable. Most of our Anglo participants responded with a 1 or 2 to the question

of "How much English do you speak at home?" while the Latino participants' responses were

highly varied across the options. To determine a cut-off value, we evaluated the distributions of

participants' responses to the prime question and their responses on the demographic fluency

variable. Latinos responding with a 1 or 2 on the demographic variable were predominantly

likely to say "Spanish" for the prime question, while those responding with 3-5 were more likely

to respond with "English" or a mix of English and Spanish. Therefore, responses of 1 or 2 are

considered "fluent" and 3 or higher as "non-fluent". Of the 66 Latinos, 37 were considered non-

fluent and 29 were categorized as fluent in Spanish by these standards. Each participant also

responded to 13 English fluency variables and only 5 Anglos indicated that they spoke English at

home infrequently (circling 3 or higher).

Reaction times were recorded for responses to all words and non-words. For the

following analyses, however, we will focus on only responses to the 10 "best" images (as rated

by 154 participants in a separate task)[2]. Additionally, the following analyses look only at

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[2] For the validation task, we showed participants the images from the Reaction Time study and asked them to rate
"How much does this image look like (metaphoric target word)?", "How good of a description is "looks like
(metaphoric target word)?" and "If a friend said this 'looks like a (metaphoric target word), would you think your
friend was weird?" on a 1 to 7 Likert scale with 1 indicating poor matches between image and target word and 7
indicating good matches. Mean scores for these three questions were computed for all images and we used the
images with a mean score over 5.0 for the following analyses . Additional analyses concluded that Anglo and
Latino participants rated all of these "best" images to be equally good, all ps > .25.

reaction times in the 500 millisecond Flash condition as no significant results were found in the Aloud condition (see summary of Aloud Condition in Tables 2.3 and 2.4).

We analyzed the difference between reaction times to metaphoric words and positive words in the flash condition (metaphor RT – positive RT) as a function of culture, language prime, and fluency using a linear regression analysis including interaction terms. Results indicate a significant three way interaction between culture, prime, and the continuous measure of fluency ($b = 19.26$, $SE = 9.41$, $p < .05$). Priming fluent Latinos decreased the difference between metaphor and positive reaction times (decreased RT to metaphoric words), while priming Anglo participants and non-fluent Latinos did not have this effect (metaphor RT – positive RT is positive).

To further examine this interaction, we looked at metaphoric reaction time and positive reaction time as within-subject variables and fluency as dichotomous. Mean reaction times are presented in Tables 2.1 and 2.2. ANOVA testing showed that the interaction of word type (metaphor or positive), language prime, culture, and fluency was significant, $F(1, 157) = 4.88$, $p < .03$. A series of planned contrasts indicates that this interaction is driven by differences in the means of metaphoric and positive reaction times in fluent Latinos (-13 ms difference) vs. non-fluent Latinos (58 ms difference) and Anglos (15 ms difference), $t(164) = 3.42$, $p < .01$. It seems that the effect is being driven by the metaphoric reaction times, as the contrast between mean metaphoric reaction times in fluent Latinos (M = 529) and Anglos (M = 566) is significant, $t(164) = 2.49$, $p < .05$. Additionally, the contrast between fluent Latinos (M = 529) and non-fluent Latinos (M = 592) is significant) $t(164) = 3.66$, $p < .01$. Primed fluent Latinos are faster to respond to metaphoric targets than non-fluent Latinos or Anglos. While we might expect

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differences in the reverse direction for reaction time to positive words as well, none of the planned contrasts produced meaningful results.

2.4 Discussion of Implicit Measures Task

In conclusion, it appears that when primed with language at home, Latinos who are fluent in Spanish are faster to recognize metaphoric descriptors of images as words while Anglos or non-fluent Latinos do not experience this increase. These results may indicate that fluent Latinos automatically begin processing ambiguous stimuli in terms of "what it looks like" or "what it is similar to" while Anglos do not automatically map ambiguous stimuli in such a way.

Whereas we found a significant interaction in the Flash condition, results were nowhere near significant for the Aloud condition condition ($p=.94$, see Tables 2.3 and 2.4 for the means). Possible explanations for this come from observations made by the experimenter during the study. Often a participant would still be describing a picture aloud when a word was presented on screen, and instead of immediately responding to the word, he or she would instead finish his thought before proceeding. If ambiguous images do evoke metaphoric descriptors in Latino populations, it's possible that their descriptions were longer and their thoughts were more likely to be cut-off. This could cause slower reaction times among Latino participants to metaphoric images. Future studies should examine this possibility by lengthening the time allotted for description or recording the descriptions for content analysis. The aloud descriptions by participants could produce meaningful results; a simple count of metaphoric descriptors given spontaneously by participants might differ between cultures.

CHAPTER 3

PROBLEM SOLVING TASK

3.1 Introduction

Because metaphor is the mapping of one concept onto a seemingly unrelated concept, we wanted to investigate the use of metaphor and analogy in problem solving and knowledge transfer. We adapted the "attack-dispersion" paradigm from Duncker (1945) and Gick and Holyoak (1980) in which participants read a story about a military officer who attacks a fortress by splitting his army into smaller troops and converging on the fortress from several different angles. Subjects are then asked for solutions to the following problem: a surgeon needs to operate on a tumor but the rays of the laser are too strong, so what can the surgeon do? Participants are expected to apply the solution of the military story to the seemingly unrelated surgical problem. A correct response to the tumor problem involves splitting a powerful laser into smaller, less powerful rays and converging on the tumor from different angles.

Research in the domain of stereotype threat and problem solving has shown that participants under threat are more likely to attempt a problem when they are motivated, when the problem is relevant to them, and when the problem is not stated as an intelligence test (Steele, Spencer and Aronson, 2002). To increase motivation, the experimenter informed participants that a lottery would be held at the end of the semester and that all participants who generated the correct response were entered in it for a chance to receive a $50 Amazon.com gift certificate. As all of our participants were college students at a large university, many of them were not familiar with military operations. To increase the relevance of Gick and Holyoak's military story to our participants, we changed the event from a sneak attack on a fortress to a surprise party to help

cheer up a friend. And in order to engage all participants in the problem solving task, we framed the task as one that is "really more about what some people call street smarts, others call practical intelligence, or practical know how, etc.".

Since our theory is that Latino cultures incorporate more metaphor into daily life and have more experience with this abstract mapping, perhaps rewriting Gick and Holyoak's stories using metaphoric terms would allow Latino participants to recognize connections between the surgical problem and the surprise party story. Entering into the metaphoric description of the first story might allow them to make the mapping to the second story. Because Anglo cultures may be less likely to actively engage with a metaphor, these cues would not cause the same transfer in Anglo participants. The metaphoric and straightforward surprise party stories read as follows:

Metaphoric Surprise Party Text

"Maria was planning a surprise party for her friend, Anna. Anna had been in bad emotional health. Her sadness was growing and was in danger of spreading and taking over her. It started small as just this little feeling inside her; but in the past week, it grew. The sadness spread to her legs and she could not run as fast. The sadness spread to her arms and she didn't hug like she used to. The sadness spread to her tongue and food didn't taste as good. It spread to her eyes and they didn't have their usual light. And it spread to her lips, which didn't smile as much.

Maria decided that what would help heal Anna and kill the sadness inside her was a surprise party.

Anna would be working outside today. And Maria wanted all her friends to be able to jump out and yell "Surprise!" for Anna. The problem was how to get all the friends there without making Anna suspicious. If a big group of energized teenagers all came in from one direction, Anna would hear the buzz, the surprise would be ruined, and (additionally) all the flowers in the garden would end up trampled. After some thinking, Maria decided on a solution. She would have everyone come from 4 different directions and all converge on Anna and yell "Surprise." That way, Anna wouldn't be alerted beforehand and all the flowers in the garden wouldn't end up trampled. At 4:00, with surgical precision, everyone converged, Anna was totally surprised, and they had a great party. For at least this moment, the sadness inside Anna had been demolished."

Straightforward Surprise Party Text

"Maria was planning a surprise party for her friend, Anna. Anna had been feeling a bit bad emotionally and in the past week, her sadness had gotten worse. The sadness started to affect different aspects of her life. She could not run as fast, didn't hug like she used to, food didn't taste as good, her eyes looked sad, and she didn't smile as much.

Maria decided that what would help Anna's mood and eliminate her sadness was a surprise party.

Anna would be working outside today. And Maria wanted all her friends to be able to jump out and yell "Surprise!" for Anna. The problem was how to get all the friends there without making Anna suspicious. If a big group of celebrating teenagers all came in from one direction, Anna would hear them, the surprise would be ruined, and (additionally) all the flowers in the garden would end up trampled. After some thinking, Maria decided on a solution. She would have everyone come from 4 different direction and all converge on Anna and yell "Surprise." That way, Anna wouldn't be alerted beforehand and all the flowers in the garden wouldn't end up trampled. At 4:00, with great precision, everyone converged, Anna was totally surprised, and they had a great party. For at least this moment, Anna was not sad."

The tumor problem was described in the same way for all participants. The exceptions were that the powerful rays were described as "unwelcome" because they would "tear up" healthy organs in the metaphoric condition and as "problematic" because they would "harm" healthy organs in the straightforward condition (see Figure 3.1). Our hypothesis is that the metaphoric wording of the surprise party problem (and to a lesser extent, the tumor problem) should help Latinos bootstrap their way into the analogy, but the metaphoric wording should not help Anglo participants.

3.2 Procedure

After completing the reaction time task described previously, participants were asked to sit at a desk where the experimenter briefly introduced the next part of the study. The experimenter gave subjects an anagram task and instructed them to "fill this out to the best of your ability". The anagram task was designed as both a filler task as well as a self-esteem

boosting task – not only were the words relatively easy to unscramble, several were positive traits such as "smart" and "happy". Previous research has shown that students with higher self-esteem tend to persist and fare better on difficult problems (Wylie, 1979; Di Paula and Campbell, 2002). We hoped that this easy "filler" task would temporarily increase positive mood and self-efficacy so that all participants were equally motivated.

After participants finished the anagram task, the experimenter looked over their responses and said, "Finished already? Wow, that was really fast, great job!" regardless of the length of time the participants required. If the participant was unable to solve some of the anagrams, the experimenter told the subject, "Those ones are really tough, no one has been able to get them. But you got all of the others, which is really great!" The positive attitude of the experimenter and the explicit instructions to praise the participants regardless of performance attempted to induce positive mood and self-efficacy, which we hoped would increase motivation to solve the following problem.

The experimenter then handed the participant either the Metaphoric or Straightforward surprise party story, telling them that it was a reading comprehension task and that they would be asked to recall the story in as much detail as possible. Participants had three minutes to read through the story and then they received a lined sheet of paper to retell the story for five minutes. After the participant completed the recall or five minutes had passed, the experimenter gave the subject either the Metaphoric or Straightforward tumor problem (all participants received the tumor problem in the condition which corresponded to the surprise party story condition). The experimenter told the participant about the lottery and that the task was one of practical intelligence as she handed the problem to the subject.

The participant was given eight minutes to work on the problem. After eight minutes had passed, the experimenter interrupted by hinting, "Did you think about using the Surprise Party story that you read earlier to help solve the problem?" If the participant responded negatively, the experimenter then handed the subject a fresh sheet of paper to "Try and use the Surprise Party story to come up with a few more solutions." If the participant responded positively, the experimenter looked over the solution and if correct, allowed the participant to move on. If the answer was incorrect, the experimenter said, "Are there other ways you can think of to use the Surprise Party to come up with a few more solutions?" and the participant was given a fresh sheet of paper.

In order to ensure that either the Metaphoric or Straightforward tumor problem was not easier to solve, some participants were placed in a control condition in which the tumor problem was given before the surprise party story. After attempting to solve either the Metaphoric or Straightforward tumor problem for eight minutes, the participants in the control condition were then given the corresponding surprise party story, tested for recall, and given another chance to solve the tumor problem. No difference was found between the Metaphoric or Straightforward tumor problem solutions in the control condition, indicating that the problems were of similar difficulty.

After finishing the tumor problem, participants filled out demographic questionnaires including one assessing their use of English or other language across different domains, such as home, school, and with friends. Participants were debriefed, thanked for their time, and dismissed.

3.3 Results

Participants' solutions were scored by two judges who were blind to the condition of the participant. A correct solution involved using low intensity rays from multiple angles. Subjects received two points if they got both components before a hint, one point if they got both components after a hint, and zero points if they never got both components. Any discrepancies were reconciled through discussion or by a third independent rater.

ANOVA testing confirmed that the two stories were of equal difficulty, as no significant differences existed in solution scores for the metaphoric control condition (M = .92, SD = .77) and the straightforward control condition (M = .90, SD = .82), F(1,101) = .013, p > .90. There was a main effect of ethnicity, however, in that Anglo participants scored higher (M = 1.04, SD = .83) than Latino participants (M = .67, SD = .71), F(1, 205) = 11.53, p = .001.

Within each ethnicity, the straightforward condition also did not differ significantly from that of the control conditions, F(1, 135) = .013, p = .91. This indicates that participants are just as likely to answer correctly in the straightforward condition when they do not receive the Surprise Party story as when they do receive the story first. These results are in line with Gick and Holyoak's (1980) original findings that in general, people do not naturally transfer knowledge between two unrelated domains. Thus, we collapsed across the straightforward condition and the control conditions and chose to examine the metaphoric condition compared to all other conditions.

An ANOVA test comparing ethnicity of participant and metaphoric content of the story (metaphor condition vs. all else) showed an interaction between ethnicity and metaphor, such that Anglo performance was relatively better on non-metaphoric (M = 1.13, SD = .79) compared to metaphoric stories (M = 0.89, SD = 0.89), while Latino performance was relatively better on

metaphoric stories (M = 0.75, SD = 0.74) compared to non-metaphoric ones (M = 0.64, SD = 0.7), $F(1, 188) = 3.97$, $p < .05$. The interaction is significant. Planned contrasts show that the difference between Anglo scores in the metaphoric and straightforward conditions approaches significance, $t(118) = 1.62$, $p = .10$ though the difference in Latino scores did not, $t(85) = .58$, $p > .20$. See Table 3.1 and Figure 3.2 for a summary of these findings.

For Study 2, there were no main effects of either prime or fluency, and neither of these variables interacted with whether the problem was described in a metaphoric way or not (all ps for these main effects and their interactions with metaphor wording were not significant). This is not surprising, however, as the language prime question was asked twenty minutes prior to the start of this task and participants had completed a cognitively taxing lexical decision task between the language prime and the beginning of Study 2. We would expect that an additional prime before the start of the problem solving task may intensify the interaction and create even larger differences between the primed Latinos and Anglos.

3.4 Discussion of Problem Solving Task

Because only the planned contrast between Anglo scores was significant, the results from Study 2 may suggest that using metaphor actually decreases the likelihood that Anglo participants solve the problem. While the metaphor usage between the story and problem appeared to prevent Anglo participants from connecting the two stories, Latinos were relatively more likely to connect the Surprise Party story with the Tumor Problem when both were metaphorically phrased (although not significantly so). Our findings imply that our elaborate metaphor hampered Anglos but did not handicap Latino participants in the same way.

One concern to this point is that these findings may be applicable to any bilingual population. Perhaps simply learning another language allows you to make connections between unrelated concepts or causes faster associations between images and words that describe what those images are like (as opposed to just what they are). In addition to expanding possible applications of this phenomenon, we needed to investigate if this preference for metaphor was limited to Latinos or could be explained by acquisition of two languages.

CHAPTER 4

PERSUASION AND ARGUMENTATION TASK

4.1 Introduction

Because Latinos value simpatía and metaphor evokes imagery and emotional resonance, we hypothesize that using metaphor in argumentation would be more persuasive with Latino participants than straightforward arguments. Conversely, Anglos should respond more favorably to straightforward persuasion, as metaphoric terms may seem "unscientific" and therefore less argumentatively sound. After presenting participants with an argument in either metaphoric or straightforward terms, we asked a series of questions designed to measure how persuasive the argument had been. We hypothesize that Latino participants will rate metaphoric arguments as more persuasive, while Anglo participants will rate straightforward ones as more persuasive. For this study, we've also included both monolingual and bilingual Asian participants to address concerns of bilingualism. We hypothesize that the preference for metaphor is not universal to all bilinguals, and that Asian participants will rate the straightforward arguments as more persuasive than the metaphoric ones.

4.2 Procedure

Participants entered the lab and were seated at a desk and asked to sign informed consent documents. The experimenter handed participants a survey packet and instructed them to read the scenarios carefully. Because we wanted to know how participants would respond to each type of argument if found in a reputable source (as opposed to being related by a friend or family member), we included the following instructions on the first page of the packet:

"Newspaper and magazine stories often report on scientific research findings. **Please read the following stories as if you were reading them in a reputable newspaper or magazine.** After each story, there will be a series of short questions that ask for your reactions to and evaluations of the story."

The packet was comprised of four initial arguments, a short filler task in the middle, and four more arguments followed by demographics. There were four types of argument – straightforward, elaborated metaphor, metaphoric headline, and metaphor only. Each "newspaper article" included a headline as well as a description of a fictional doctor or professor's research project.

The straightforward condition presented a headline followed by only the facts – "Talking to your baby can increase his/her intelligence" followed by three statements presented as fact, such as "The more parents used a greater variety of words, the higher children's intelligence scores were." The metaphoric headline condition is identical, except for the addition of a sub-headline which alluded to a metaphoric relationship between cause and effect – "Words and conversation are like 'nourishment' for the brain". This sub-headline was also repeated in the text without elaboration – "According to Dr. Ramos, words and conversation are like 'nourishment' for the brain". The three facts that followed were identical to those of the straightforward argument. In the elaborated metaphor condition, in addition to the metaphoric headline, each of the facts presented in the story were connected to the metaphor, thus allowing the metaphor to be elaborated on: "It's important to feed a child with a variety of foods. Similarly, the more parents used a greater variety of words, the higher children's intelligence scores were." We also wanted to evaluate if the presence of any metaphor at all would have an effect on persuasion or if the metaphor needed to make sense in the context of the argument, and

connect to actual facts. Thus, we included a metaphor only condition in which no factual information related to the explicit argument was presented – "It's important to feed a child with a variety of 'foods'" with no explanation that the variety of "food" could be mapped on to variety of words.

A short questionnaire followed each story. The participants were asked to rate how scientific, how wise, how logical, and how much they personally believed the results for each story on a 1-11 scale. The last question asked participants to predict their own behavior relating uniquely to each argument – "How many minutes on average will you spend talking to your child each day during his or her first year?" See Figure 4.1 for sample arguments and the measure of persuasion.

The eight stories were presented in the same order for each participant; however the type of argument was counterbalanced across participants. Every subject received two arguments of each type, one of each in the first four arguments and then one of each in the last four arguments.

Upon completion of the argument evaluation, participants filled out a demographic questionnaire, were debriefed and thanked for their time.

4.3 Results

154 undergraduates at the University of Illinois completed the study for course credit. Age ranged from 18 to 25 (mean of 19). Eleven participants failed to indicate ethnicity or complete the study, so of the 143 remaining participants, 56 indicated ethnicity as Caucasian, 41 were Latino/a, 33 were Asian, and 13 indicated that they were multi-racial or "other". Those indicating ethnicity as multi-racial or other will be excluded from these analyses. Using the same criteria for fluency described in Study 1, 21 Latinos and 21 Asians were considered fluent

in a second language. Only 1 Anglo responded that he or she spoke English infrequently at home.

The mean score for each participant on each story was calculated. As each participant read two of each argument type, we then computed an average score for each participant using the means of each type. Therefore, each participant received a mean straightforward score, a mean elaborated metaphor score, a mean metaphoric headline score, and a mean metaphor only score.

The straightforward and metaphoric headline conditions were rated equally across all stories (all p values > .10). Because these conditions had equal factual information and no elaborated upon metaphor, we collapsed the results from these two conditions and will focus on the difference between the elaborated metaphor condition and these collapsed factual conditions. We analyzed the difference between average ratings of the elaborated metaphor argument and the collapsed factual arguments (elaborated metaphor ratings – factual ratings) as a function of culture and fluency using a linear regression analysis including interaction terms. Results indicate a significant main effect of culture (Latino vs. all others) on the dependent variable ($b =$ .33, $SE = .15$, $p < .05$). Latino participants prefer the elaborated metaphor arguments while Anglo participants prefer factual ones. No main effect of Asian culture was found ($b = -.13$, SE $= .19$, $p = .49$). A summary of these findings can be found in Table 4.1 and Figure 4.2.

We also analyzed ratings to elaborated metaphoric, factual, and only metaphor arguments as a within-subject variable using MANOVA and further breaking down by fluency as defined in Studies 1 and 2. Focused contrasts showed the difference between the ratings of elaborated metaphor arguments and factual arguments to be significant for fluent Latinos, t(128) = 2.05, p < .05. Fluent Latinos preferred the elaborated metaphor argument to the other argument types.

Both Anglos and Asians showed a preference for the fact arguments over the elaborated metaphoric arguments. Though the difference was not significant for each group considered separately, the pattern was significant when Anglo and Asian ratings were collapsed together, $t(128) = 2.64$, $p < .01$. Asian and Anglo participants preferred the factual arguments to the metaphoric ones and did so to approximately equal degrees (Asian vs. Anglo X Argument type interaction p>.60).

When one includes the arguments containing only metaphor, an interesting pattern emerges. For the Anglo and fluent Asian participants, average ratings of the elaborated metaphor condition (6.4 and 6.2, respectively) do not differ from their ratings of the metaphor only condition (6.3 and 6.5). For these participants, a metaphor without the facts is not more persuasive than a metaphor with the facts. However, the fluent Latino participants rate the metaphor only arguments on par with the factual ones (M = 6.47 and 6.43). Thus, it is the combination of fact and metaphor – rather than metaphor alone or facts alone – that made these particular arguments especially persuasive to Latinos.

4.4 Discussion of Persuasion Task

Results from this study added to the previous studies in a few important ways. First, Latino preference for metaphor was extended to a different domain, that of argumentation and persuasion. Given a logically identical argument framed either in metaphoric or non-metaphoric terms, a Latina participant is more likely to agree with the metaphoric argument over the non-metaphoric one. The converse was true for Anglo and Asian participants – given two logically identical arguments, these participants preferred the non-metaphoric framing over the metaphoric one. Relatedly, it is important that this study showed no preference for metaphor in a bilingual

(non-Latino) population (Asians), indicating that this phenomenon is not simply a product of being bilingual or bicultural. This finding makes sense if preference for metaphor is, as we propose, indeed fueled by both linguistic and cultural practices, not bilingualism per se.

CHAPTER 5

OVERALL DISCUSSION

The results from Studies 1-3 are a promising start to exploring the Latino preference for metaphor. Our findings support the notion that this metaphoric association is relatively automatic (the RT task) and applicable to diverse domains; Latino participants preferred metaphoric arguments in the context of persuasion and they were not hampered by metaphor in problem solving as their Anglo counterparts were. These results have strong implications for multiple fields. In education, for example, English as Second Language teachers could use a Latino preference for metaphor in order to help knowledge in one language transfer to another – concepts that are clear in Spanish could be made clear in English via use of metaphor. More generally, teachers of any subject could use metaphor to bootstrap learning a new concept. If early childhood educators relied more heavily on metaphor in their classrooms, Spanish-speaking children could benefit from the boost that comes simply from the teacher speaking in this particularly appealing style. Further research could also explore issues of health and safety. Would a safety or health message posed metaphorically increase the likelihood that Latinos would adhere to it? If we liken the effects of smoking cigarettes to having "teeth like pieces of corn" or "lungs like charred hamburger", would Latinos be less likely to engage in the risky behavior? Our results from Study 3 indicate that this indeed might be the case, but future studies should confirm this prediction, perhaps using engagement in safety or health behavior as a dependent variable.

It would be interesting to see what effect a stronger prime may have on our participants. A simple question ("What languages are spoken in your family?") asked directly before beginning the computer task had a significant effect in this study. Perhaps conducting the study

in Spanish or including a different type of stronger prime would contribute to a greater effect.

Our participants were also all undergraduates at a Midwestern university, indicating high levels

of English proficiency. We also would expect greater effects with a monolingual Spanish

speaking population with a study carefully cross-translated into Spanish. Also, although we did

not replicate the metaphor preference with our bilingual Asian participants in Study 3, a different

population must be studied to see if the effect might generalize to speakers of verb-framed

languages (French or Italian, for example) or if the culture of simpatía and interpersonal

emotional resonance is an integral piece of the theory.

Our results suggest that a Latino preference for metaphor is real, particularly for fluent

Spanish-speakers. Conversely, an Anglo preference for the straightforward (or a distrust of

metaphor) emerges in each of our studies. Taken together, these three studies form a multi-

method approach to studying a phenomenon that is likely the interaction of cultural and linguistic

forces. How magical could metaphor be? If properly explored and extended, this proclivity for

metaphor could narrow the education gap between Latinos and Anglos in the United States and

lead to better public health interventions in Latino communities, making equality in education

and quality of life less magical, and more realistic.

TABLES AND FIGURES

Figure 2.1 – Examples of stimuli in Study 1

a) Straightforward Target: Dog   b) Straightforward Target: Cloud
   Metaphoric Target: Mop   Metaphoric Target: Waves

Table 2.1 – Mean RTs to Metaphoric Targets in Flash Condition (ms)

	No language prime	Language prime	Difference in mean RTs across language prime conditions
Anglos	575 (n=51)	566 (n=43)	-9
Non-fluent Latinos	564 (n=18)	592 (n =19)	+28
Fluent Latinos	586 (n = 13)	529 (n = 16)	-57

Table 2.2 – Mean RTs to Positive Targets in Flash Condition (ms)

	No language prime	Language prime	Difference in mean RTs across language prime conditions
Anglos	560 (n = 51)	551 (n = 43)	-9
Non-fluent Latinos	555 (n = 18)	534 (n = 19)	-21
Fluent Latinos	549 (n = 13)	542 (n = 16)	-7

Table 2.3 – Mean RTs to Metaphoric Targets in Aloud Condition (ms)

	No language prime	Language prime	Difference in mean RTs across language prime conditions
Anglos	682 (n=50)	719 (n=44)	+37
Non-fluent Latinos	702 (n=18)	740 (n =17)	+38
Fluent Latinos	708 (n = 14)	737 (n = 15)	+29

Table 2.4 – Mean RTs to Positive Targets in Aloud Condition (ms)

	No language prime	Language prime	Difference in mean RTs across language prime conditions
Anglos	665 (n=50)	641 (n=44)	-24
Non-fluent Latinos	685 (n=18)	672 (n =17)	-13
Fluent Latinos	679 (n = 14)	659 (n = 15)	-20

Figure 3.1 – Metaphoric and Straightforward Tumor Problems

a) Straightforward Tumor Problem

A man was admitted to the hospital and he was terribly sick. There was a cancerous tumor located in the interior of the patient's body, in the heart. He would die unless he was treated, so intervention was needed immediately.

The chief doctor at the hospital was permitted to use all the hospital's resources to take care of the patient. The doctor knew that he had to destroy the tumor, before the cancer cells spread to other organs in the body. The doctor knew he could destroy the tumor by using lasers.

The problem was that the doctor needed to prevent the laser rays from destroying the healthy tissue that it would pass through before it reached the tumor. The high intensity rays would be unwelcome, though, and would harm all the organs and tissues they would hit along the way to the tumor. As a result, high intensity lasers could not be applied to the tumor along one route, because they would tear up the organs on the way to their destination. However, high intensity rays were needed to destroy the tumor. So applying one low intensity ray would be insufficient and would not succeed in destroying the tumor and bringing the heart back to its normal, lively state.

b) Metaphoric Tumor Problem

A man was admitted to the hospital and he was terribly sick. There was a cancerous tumor located in the interior of the patient's body, in the heart. He would die unless he was treated, so intervention was needed immediately.

The chief doctor at the hospital was permitted to use all the hospital's resources to take care of the patient. The doctor knew that he had to destroy the tumor, before the cancer cells spread to other organs in the body. The doctor knew he could destroy the tumor by using lasers.

The problem was that the doctor needed to prevent the laser rays from destroying the healthy tissue that it would pass through before it reached the tumor. The high intensity rays would be problematic, though, and would harm all the organs and tissues they would hit along the way to the tumor. As a result, high intensity lasers could not be applied to the tumor along one route, because they would harm the organs on the way to the tumor. However, high intensity rays were needed to destroy the tumor. So applying one low intensity ray would be insufficient and would not succeed in destroying the tumor and bringing the heart back to its normal, healthy state.

Table 3.1 – Mean Solutions to Tumor Problem (scored from 0 to 2)

Mean Solutions to Tumor Problem (scored from 0 to 2)	Metaphor Condition	All Other Conditions
Anglos	.89 (n = 44)	1.13 (n = 75)
Latinos	.74 (n = 23)	.63 (n = 62)

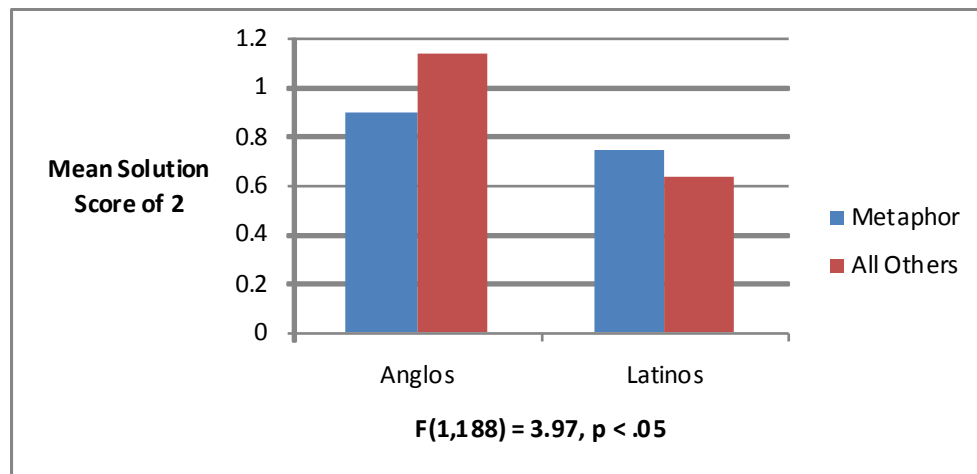Figure 3.2 – Mean Solutions to Tumor Problem (scored from 0 to 2)

Figure 4.1 – Argument Examples

Straightforward:

Talking to your baby can increase his/her intelligence

Parents talking to their children can increase their children's intelligence. Talking to your child during the first year of life increases the child's intelligence at age 3.

Dr. Ramos found that:

1) The more often parents conversed with the child in the first year, the higher the child's intelligence scores were at age 3.

2) The more parents used a greater variety of words, the higher children's intelligence scores were.

3) Parents need to increase the complexity of the words they use. So, the more complex the parents' words and sentences were, the higher children's intelligence scores were.

Headline:

Talking to your baby can increase his/her intelligence

Words and conversation are like "nourishment" for the brain

Parents talking to their children can increase their children's intelligence. Talking to your child during the first year of life increases the child's intelligence at age 3.

According to Dr. Ramos, words and conversation are like nourishment for a child's brain.

Following the "words and conversation as nourishment" metaphor, Dr. Ramos found that:

1) The more often parents conversed with the child in the first year, the higher the child's intelligence scores were at age 3.

2) The more parents used a greater variety of words, the higher children's intelligence scores were.

3) Parents need to increase the complexity of the words they use. So, the more complex the parents' words and sentences were, the higher children's intelligence scores were.

Figure 4.1 (cont.)

Elaborated Metaphor

Talking to your baby can increase his/her intelligence

Words and conversation are like "nourishment" for the brain

Parents talking to their children can increase their children's intelligence. Talking to your child during the first year of life increases the child's intelligence at age 3.

According to Dr. Ramos, words and conversation are like nourishment for a child's brain.

Following the "words and conversation as nourishment" metaphor, Dr. Ramos found that:

1) Food nourishes the body. Similarly, words and conversation nourish the child's brain. The more often parents conversed with the child in the first year, the higher the child's intelligence scores were at age 3.

2) It's important to feed a child with a variety of foods. Similarly, the more parents used a greater variety of words, the higher children's intelligence scores were.

3) And, parents start feeding the baby with baby food and then move to more complex foods. Similarly, parents need to increase the complexity of the words they use. So, the more complex the parents' words and sentences were, the higher children's intelligence scores were.

Metaphor Only

Talking to your baby can increase his/her intelligence

Words and conversation are like "nourishment" for the brain

Parents talking to their children can increase their children's intelligence. Talking to your child during the first year of life increases the child's intelligence at age 3.

According to Dr. Ramos, words and conversation are like nourishment for a child's brain.

Following the "words and conversation as nourishment" metaphor, Dr. Ramos found that:

1) "Food" nourishes the child.

2) It's important to feed a child with a variety of "foods."

3) And, parents should start feeding the baby with baby "food" and then move to more complex "foods."

Figure 4.1 (cont.)

Measure of Persuasion for Study 3

1. How scientific do you think Dr. Ramos's study was:

      1   2   3   4   5   6   7   8   9   10   11
    very   very
 unscientific   scientific

2. How wise is Dr. Ramos:

      1   2   3   4   5   6   7   8   9   10   11
  not at all   very
    wise   wise

3. How logical are the research findings:

      1   2   3   4   5   6   7   8   9   10   11
  completely   completely
   illogical   logical

4. How much would you personally believe Dr. Ramos's results:

      1   2   3   4   5   6   7   8   9   10   11
  would not   would
   believe   completely
   at all   believe

5. If you have a child, please guess how many minutes you will spend talking to that child *each day* during the child's first year? (The average number of minutes spent talking to a child per day is about 100) _____

Table 4.1 – Mean responses to arguments across cultures

	Elaborated Metaphor Argument	Factual Arguments	Metaphor Only Argument
Anglo (n = 55)	6.38	6.74	6.21
Non-fluent Latinos (n = 20)	6.33	6.60	6.09
Fluent Latinos (n = 21)	**7.21***	6.47	6.43
Non-fluent Asians (n = 12)	6.36	7.06	6.39
Fluent Asians (n = 21)	6.26	6.81	6.47

*Indicates result which differs significantly from others in row (p < .05)

Figure 4.2 – Difference in preference for Elaborated Metaphor arguments and Factual Arguments
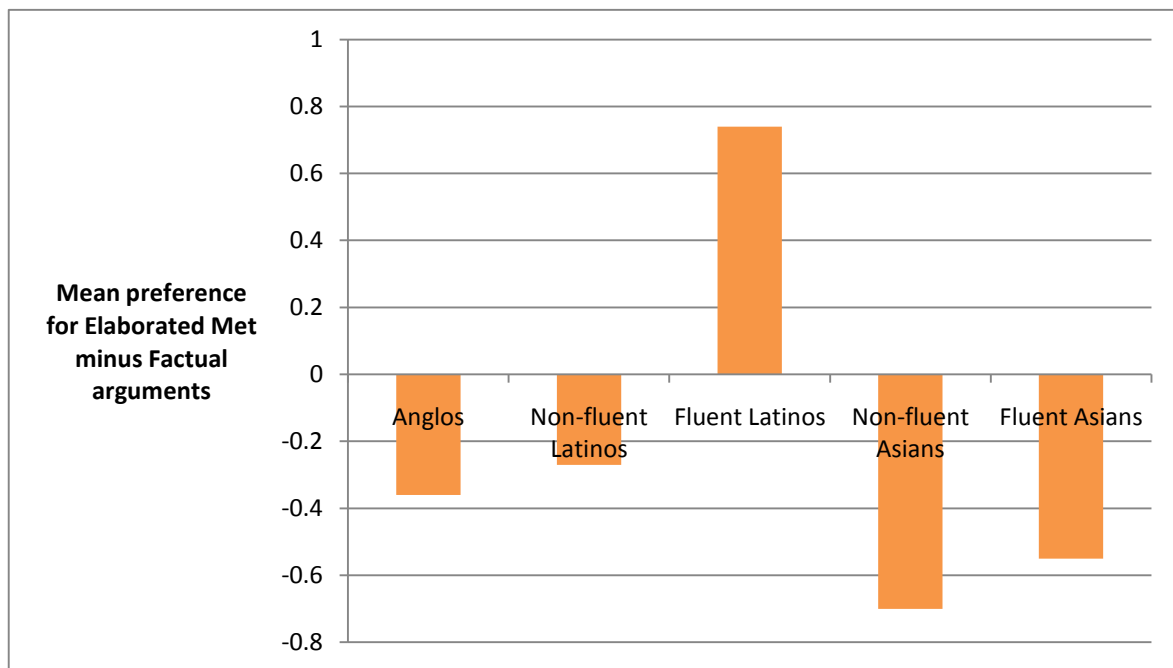
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