*Article*

# The Resonance of Metaphor: Evidence for Latino Preferences for Metaphor and Analogy

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## Abstract

People of different cultures communicate and describe the world differently. In the present article, we document one such cultural difference previously unexplored by psychologists: receptiveness to metaphors. We contrast Spanish-speaking Latinos with Anglo-Americans, Asian Americans, and Latinos who do not habitually speak Spanish. Across four experiments, we show that relative to these other groups, Spanish-speaking Latinos show stronger preferences for metaphoric definitions, better recall of metaphors, greater trust in both scientific and political arguments that use metaphor, and stronger liking for and desire to connect with persons who use metaphoric speech. Future directions and implications for improving cross-cultural communication in various settings are discussed.

Reality can be described in many different ways. Because cultures differ in their epistemologies, social norms, and guiding ideals, they also differ in the ways they communicate about the world. Researchers have, for example, distinguished cultures in terms of how much they rely on explicit versus implicit cues in communication (Hall, 1989; Ishii, Reyes, & Kitayama, 2003; Sanchez-Burks et al., 2003), highlight the person rather than the context in their grammar (Kashima & Kashima, 1998), and use vocabularies that are more or less gendered (Prewitt-Freilino, Caswell, & Laakso, 2012).

In the present studies, we explore the implications of what we believe is a previously undocumented cultural difference in communication. That is, we explore the relatively greater preference of Spanish-speaking Latinos (hereafter, SSLs) for metaphor versus the relatively greater preference for more straightforward, nonmetaphoric communication among their Anglo-American, Asian American, and non-SSL counterparts.

In this introduction, we briefly discuss some factors behind the hypothesized difference. Such factors include different understandings of what communication is for and how emotion can enhance or detract from those purposes and different epistemologies that stress metaphor's ability to enlighten versus obfuscate. Before doing so, we need to make a few clarifying points.

First, we are talking about *relative* differences. Of course, English speakers (and those of Asian-languages) use metaphoric descriptions. Similarly, Spanish speakers use straightforward descriptions most of the time. The studies below highlight relative preferences. Second, some authors argue that discussion of abstract concepts is implicitly and inherently metaphoric (because our understanding of the abstract is grounded in our concrete perceptual experiences; Lakoff & Johnson, 1980; Meier, Hauser, Robinson, Friesen, & Schjeldahl, 2007; Schilder, IJzerman, & Denissen, 2014). For example, people are "warm," they "contain" personalities, they have a surface that sometimes hides what is "deep inside." Others argue that thinking is implicitly and profoundly metaphoric/analogical because we assimilate what we learn to that which we already know. Still others point out the ubiquity of metaphors by showing how cliché-ridden our language is as we jump on bandwagons, beat dead horses, or cross Rubicons. We agree. However, our topic is only tangentially related to these points. What we are concerned with

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are relatively explicit metaphoric propositions that call attention to the way something "is" or "is like" something else. Unlike dead metaphors, these similes or metaphors are meant to actually evoke a similarity or an image rather than simply turn a phrase (Bowdle & Gentner, 2005). Unlike implicit understandings, they are explicitly used to explain through analogy how something works—and often, what something *feels* like.[1]

## Purposes of Communication

Much has been written about the purposes of linguistic communication. The most obvious, and universal, purpose is transferring information. Beyond that, however, linguistic communication serves other goals. Tannen's (1990) famous and now-clichéd example contrasted stereotypical masculine and feminine talk: the woman shares a difficulty or frustration to facilitate closeness, to request validation of her feelings, or to achieve some social-emotional end; her spouse, believing she is talking to convey information, offers a solution or passes judgment. Although an oversimplification, this example offers a useful analytic distinction between communication as a way of transferring information and communication as a way of emotional bonding.

To oversimplify, we suggest there are cultural differences that parallel this supposed gender difference. More specifically, we suggest that a particular style of Latino collectivism places a greater emphasis on evoking and sharing emotion, as compared with Anglo-American individualism or East Asian collectivism. Asian collectivism masks negative emotions that might create conflict and tamps down positive emotions that might look prideful or elicit envy. Ideal emotions are low-arousal emotions (Tsai & Clobert, 2018). Both positive and negative emotions are to be moderated, as emotions that are too strong lead to disruptions of the collective harmony (Matsumoto, Yoo, & Nakagawa, 2008; Mesquita & Leu, 2007).

Latino collectivism, on the other hand, works differently. Emotions, for the most part, are not meant to be stifled (Ruby, Falk, Heine, Villa, & Silberstein, 2012; Sanchez-Burks, Nisbett, & Ybarra, 2000; Triandis, Marín, Lisansky, & Betancourt, 1984; also Campos & Kim, 2017, on "convivial collectivism," and Holloway, Waldrip, & Ickes, 2009). Instead, emotions are the stuff of life, and they bond people together. Indeed, in each of the last three Gallup Global Emotions reports (asking respondents whether they felt five positive and five negative emotions yesterday), Latin American countries have occupied about eight of the Top 10 spots for the total number of emotions experienced (Gallup, 2015-2017).

In terms of language, metaphor—being one of the most evocative and picturesque ways of communicating—is an excellent tool for creating vividness and depth-of-feeling in the listener. In Latino culture, engaging speakers are effective speakers. They are capable of producing the shared experience of emotion with listeners, a shared experience that is vital to relationships in Latin America. Evocative metaphors create the emotions that create *resonance* between speaker and listener and strengthen the connections between them.

Attunement to emotion has long been seen as central to metaphor. As Hayakawa (1978) noted, when we make a simile, we are not often actually saying two things are similar. What is similar is the *emotions those things produce in us*. To say, for example, that "the criticism came like a tidal wave" does not imply that words are like water; it implies that the critical assault felt like *what we imagine* it feels like to be hit by a tidal wave.

Metaphors are well-suited to using connotation and conveying intensity of experience, and they use overstatement to make a point (Fainsilber & Ortony, 1987). When we say X is like Y, this is usually because Y more purely or vividly exemplifies what we want to convey. For example, we might say that a person has a temperament as relentless as a pitbull or an ego as big as Jupiter. This sort of vivid overstatement is useful for connoting and conveying feeling, but it is exactly what is *not* called for in cultures that (a) treat communication as primarily about conveying objective information (Anglo-American culture; Wierzbicka, 2006) or (b) tamp down intense emotion and require polite understatement, ambiguity, and adjustment to others' emotions rather than forceful expression of one's own (Asian cultures; Morling, Kitayama, & Miyamoto, 2002). In Anglo culture, information is best communicated through plain-speaking and avoiding hysterical overstatement. In "Just-the-facts, Ma'am"-speech, metaphor is best avoided. It exaggerates, saying something that is literally not true. In Asian culture, volatile emotions disrupt interpersonal harmony, and thus polite understatement is preferred to brash overstatement, especially in communicating with someone higher in the hierarchy. Granted, figurative language has its uses for communicating indirectly. However, metaphor usually intensifies one's tone and is often ill-suited for moderating and harmonizing.

## Enlightening Versus Obfuscating

The appeal to emotions is one reason Anglos may often regard metaphors with some suspicion. Deep strains in Anglo culture reflect this distrust. Wierzbicka (2006, p. 30-31), for example, notes Anglo speakers' emphasis on "rational, dispassionate, factually-based, precise, and accurate" speech—an emphasis she attributes to "the scientific revolution and to the intellectual climate that prevailed in its aftermath." Enlightenment thinker John Locke (1690)—ironically, known partly for his "tabula rasa" metaphor—believed metaphors and similes often clouded clearheaded thinking. Their function was to appeal to emotions and entertain, rather than inform, making them a useful tool for nefarious purposes. Metaphors and figurative language "are for nothing else but to insinuate wrong Ideas, move the Passions, and thereby mislead the Judgment" (p. 508). The British Royal Society of

**Table 1.** Examples of Preference Items for Metaphoric or Nonmetaphoric Descriptions and Sentences (Experiment 1).

| Task | Example text |
|---|---|
| Rating metaphoric and nonmetaphoric descriptions. | Courage enables people to do something without being intimidated. |
| | Courage is the rock that will not be moved. |
| | Courage is bravery and strength. |
| | Courage is the tidal wave that sweeps us to act. |
| Reading a story with metaphoric and nonmetaphoric sentences. | He had slept straight through the night. |
| | He slept through the night like a hibernating bear. |
| | John walked slowly, although he knew that he would be late for class. |
| | John walked like a turtle, although he knew that he would be late for class. |

*Note.* In the story-reading task, we measured reading speed, later memory for sentences, and preference for sentences.

**Table 2.** Examples of Questions With Either Metaphoric or Nonmetaphoric Stems (Experiment 2).

| E.g. | Condition | Example text |
|---|---|---|
| 1 | Metaphoric | Some people think that the federal and state governments should cut funding for nuclear energy. They think that playing with nuclear energy is like playing with fire in a forest, and that the dangers of nuclear energy can quickly go out of control just like forest fires quickly go out of control. |
| | Direct | Some people think that the federal and state governments should cut funding for nuclear energy. They believe that continuing to fund nuclear energy will result in an unsafe environment and that the dangers of nuclear energy cannot be controlled. |
| 2 | Metaphoric | Converting our economy to a system that isn't so dependent on foreign oil will be a difficult process. Some people favor a very rapid conversion (rather than a gradual conversion). A rapid conversion will cause pain in the short run. But they say that transitioning to a healthier economy is like pulling off a Band-Aid. It's best to do it in one quick rip, rather than pulling it off in a slow and ultimately more painful process. |
| | Direct | Converting our economy to a system that isn't so dependent on foreign oil will be a difficult process. Some people favor a very rapid conversion (rather than a gradual conversion). They say a rapid conversion will cause great difficulties in the short run, but it will ultimately be faster and less difficult in the long run. |

Science saw metaphors as so antithetical to reason that some wanted to ban their use in scientific writing. In a passage likely quoted because of the overwrought figurative language it rails against, Royal Society member Samuel Parker characterized metaphors as "wanton and luxuriant fancies climbing up into the Bed of Reason [that] do not only defile it by unchaste and illegitimate embraces, but instead of real conceptions and notices of things, impregnate the mind with nothing but air and subventaneous phantasms" (Draiisma, 2000, p. 55). To a rationalist mind, explicit metaphors can inspire distrust and make arguments seem muddled and less persuasive—particularly in matters that supposedly are exclusively the domain of reason, such as science.

## Present Research and a Note on Participants

### Outline of Experiments

The overview above provides a plausible rationale for why SSLs will be especially receptive to metaphor, as compared with their Anglo and Asian American and non-SSL counterparts. Metaphors are emotionally evocative and for SSLs can be especially useful when conveying one's internal experience. For Anglos and Asian Americans, metaphors can violate norms of plainspokenness or provoke distrust as either obfuscating or counter to reason, impeding clear thinking; they may also exaggerate or overstate when reserve and polite understatement are instead called for.

We examine preference for metaphorical definition and memory for metaphors in Experiment 1 (Table 1), the persuasiveness of metaphorical arguments in both politics and science in Experiments 2 and 3 (Tables 2 and 3), and the appeal of relationships with people who either use or do not use metaphoric speech in Experiment 4 (Table 4). All experiments involve participants from Latino, Anglo, and Asian American backgrounds. In the first two experiments, one purpose of using Asian Americans was to test a separate hypothesis that Asian Americans would prefer descriptions framed in the negative (defining something in terms of what it was not, arguing for what one should not do). This hypothesis was ultimately abandoned because of a lack of consistent evidence, and we thus collapse over positive and negative nonmetaphoric stimuli in these studies and treat Asian Americans simply as another group that SSLs are contrasted with. However, Asian Americans are also a useful control group because like Latino Americans they are also bicultural and some are bilingual. If bilingualism or biculturalism per se produced receptivity to metaphors—perhaps because bilinguals or biculturals have

**Table 3.** Examples of Scientific Findings Presented With and Without a Substantive Metaphor (Experiment 3).

| Condition | E.g. | Example text |
|---|---|---|
| Substantive metaphor | 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-referent only, no facts | 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." |
| Facts without substantive metaphor (without subheadline) | 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. |
| Facts without substantive metaphor (with subheadline) | 1 | Same as the "Facts without substantive metaphor (without subheadline)" condition. |
| | 2 | Same as the "Facts without substantive metaphor (without subheadline)" condition. |
| | 3 | Same as the "Facts without substantive metaphor (without subheadline)" condition. |

**Table 4.** Examples of Actors' Scripted Responses (Experiment 4).

| E.g. | Example text |
|---|---|
| 1 | I was afraid of swimming—actually let me correct myself there, I was afraid of drowning. I didn't want to get near the water—and it was because I didn't know how to swim, but then I got over it—because my sister was really good at swimming, and she taught me how to swim, and she would swim right alongside me at the pool at the Y. **You've seen those videos of you know, like mama orca and baby orca by her side? That was my sister and me.** |
| 2 | Growing up, I wanted to be a lawyer, courtroom dramas, you know all that, it's all over T.V., and it seemed really exciting, but then we had a career day in middle school where someone's dad came in to talk about being a lawyer, and the way he was describing it, it was basically filling out a lot of forms for people and then sending them to other people—and after that, I wasn't really interested in it anymore. **The way it sounded to me was like an assembly line: get a form, fill it out, send it on, get a form, fill it out, send it on [hand gestures]. It was just an assembly line with forms instead of cars. So, after that I sort of lost interest.** |
| 3 | Well I also have a brother, we were closer when we were younger, but then there was this period of 3 to 4 years, where we fought a lot as kids. We're pretty similar, my brother and me, and because of our similarities we were competitive, even as kids. Now we don't compete and we're really close. **It's like if you have two magnets. If you try to put the two positive sides together, you can't. They just push each other away. You try but they go like this. They're fighting. But then you figure things out and you just turn things a little and . . . click. [hand gestures]. That's my brother and me.** |
| 4 | "Hmmm. I'd say wasps, actually. I was out at the park one day with my mom and sister once when I was like five or six and I wandered away from my mom. I stepped on some sandy dirt over by this tree and I remember it going soft under me and then this huge swarm of wasps rushed out at me and started stinging me. And I remember I heard my mom scream and then suddenly I just totally lost consciousness. One minute I see what's going on and realize I'm in big trouble. Then all of the sudden, I passed out. Nothing." **Like a television that you pull the plug on and it suddenly goes blank. [Hand gestures and makes the sound of a TV/Computer when the "plug is pulled"]. Nothing.** |

*Note.* **Bold text** is stated only in the metaphoric condition.

to map concepts across cultures or languages—then Asian Americans who habitually speak an Asian language should look just like SSLs. Our results show no consistent evidence for this, making it unlikely that bilingualism or biculturalism per se can explain SSLs' preference for metaphor.

### Linguistic Practices

We suggest that preference for metaphor derives from SSLs' immersion in particular sorts of *cultural-linguistic practices* (Chiu, Leung, & Kwan, 2007; Heath, 1983; Loewenstein, 2019), privileging the sort of emotional resonance that

metaphors are so useful for creating. Thus, we compare SSLs with both non-Latinos and with Latinos who communicate primarily in English. Because the effect derives from participating in cultural-linguistic practices, we would not expect English-speaking-Latinos to share SSLs' preference for metaphor. We also would not hypothesize that knowing Spanish, by itself, is enough. Rather, it is SSLs' engagement in cultural-linguistic practices—such as those involved when sharing emotion with family and friends—that creates the preference and receptivity for metaphor in communication. Latinos who spoke primarily Spanish with family and friends were considered SSLs; those who spoke primarily English with family and friends were considered English-speaking Latinos.

### Participants

Experiments were run through the University of Illinois participant pool and were run for two semesters with an attempt to get at least 20 participants per cell. Exceptions were Experiment 2, involving a short questionnaire handed out in public places in the San Francisco Area, and Experiment 4, in which data collection at University of South Florida was run for two terms simultaneously with that at University of Illinois.

Across experiments, the language participants spoke was assessed by asking participants if they spoke another language and, if so (a) how often they spoke that language at home, and (b) how often they spoke that language with friends. The "home and friends" items were averaged and participants with averages at or above the midpoint of the scale were considered Spanish- or Asian-language-speaking.[2]

We should add that group labels collapse across a range of participants. For example, our "Latinos" cover a diverse group of people, though most were born in the United States and most had ancestry from Mexico (in studies where we asked about these topics). Our "Asian Americans" as well are diverse. Overall, about 40% were born in the United States and a plurality had ancestors from China, with Korea being second-most frequent (in studies where this question was asked; see Supplementary Materials).

### Analyses

The comparison of interest was SSLs versus non-Spanish-speaking groups. Comparisons were tested in each experiment through a contrast of SSLs versus all other groups (non-Hispanic Whites hereafter called "Anglos," English-speaking Latinos, English-speaking Asian Americans, and Asian-language-speaking Asian Americans; 4 -1 -1 -1 -1 contrast); this contrast gave all non-SSL groups equal weight. We also conducted a *t* test of SSLs versus all other groups collapsed together; this test implicitly weighted non-SSL groups by their *n* as the groups get collapsed together.

We then conducted a meta-analysis across experiments. For all experiments, Table 5 meta-analytically summarized the main contrast, along with tests of SSL versus each group individually, metaphoric versus nonmetaphoric comparisons among SSLs, and correlations between Spanish language use and the dependent variables among all Latinos. Effect sizes, expressed as *r*, with confidence intervals are shown. Figure 1 presents the data graphically with dependent variables standardized for ease of comparison. Figure 2 presents effect sizes meta-analytically across all studies.

## Experiment 1: Preferences, Recall, and Reading

Our first experiment explored the following hypothesis:

> **Hypothesis 1:** SSLs would show a relative preference for metaphoric description, compared with their peers.

We also gave participants a short story to read that contained metaphoric and nonmetaphoric sentences. Because we thought SSLs would be more practiced at metaphoric communication relative to their peers, we predicted the following:

> **Hypothesis 2:** SSLs would be more expert at processing metaphoric sentences as indicated by faster reading speed (e.g., Glucksberg, Gildea, & Bookin, 1982)—though we recognize the alternative hypothesis that SSLs might take longer because of enhanced lingering or appreciation for the metaphors (see Mar, Oatley, Djikic, & Mullin, 2011).
> **Hypothesis 3:** SSLs would have better memory for metaphoric sentences, due to greater appreciation, attention, and emotional resonance with such sentences (e.g., McGaugh, 2013).

### Method

*Participants.* Participants were 121 undergraduates ($M_{age}$ = 18.99 years, $SD_{age}$ = 1.31 years, 49.6% men, 20 SSLs, 18 English-speaking Latinos, 44 Anglos, 19 Asian-language-speaking Asian Americans, and 20 English-speaking Asian Americans).

### Measures

*Preferences.* The preferences index was constructed with measures from the two experimental tasks.

*Definitions*. In the first task, participants saw a list of three rather abstract concepts (e.g., "Happiness"). They were shown a list of 10 definitions for each—about one-third of which used metaphoric language and two-thirds of which used nonmetaphoric language, (e.g., "Happiness is an emotion arising from good fortune or positive experience" vs. "Happiness is the emotional food and drink that nourishes us"). Participants were asked to rate each definition on an 11-point scale (0 = "*I would definitely NOT describe it in this way,*" 10 = "*I would definitely describe it in this way*"). After rating each definition, participants were asked to go back and indicate their top three definitions from the list. Participants' score on this task was the average of their

**Table 5.** Summary and Meta-Analytic Findings Across Five Studies.

| | Comparison groups | | | | | Within SSLs, metaphor vs. nonmetaphor | Correlation within Latinos between language use and DV |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | SSLs vs. all other groups | SSLs vs. Anglos | SSLs vs. English-speaking Latinos | SSLs vs. English-speaking Asian Americans | SSLs vs. Asian-language-speaking Asian Americans | | |
| **Experiment 1** | | | | | | | |
| Preferences | | | | | | | |
| Test statistic[a] | $t(116) = 1.82^†$ | $t(62) = 2.65^{**}$ | $t(36) = 1.00$ | $t(38) = 2.43^*$ | $t(37) = -0.03$ | $t(19) = -0.86^b$ | |
| Effect size (r) | .17 | .32 | .16 | .37 | 0.00 | | $r(36) = .21$ |
| 95% CI (r) | [−.01, .34] | [.08, .52] | [−.17, .46] | [.07, .61] | [−.32, .32] | | [−.12, .50] |
| Recall | | | | | | | |
| Test statistic | $t(107) = 3.18^{**}$ | $t(58) = 2.63^{**}$ | $t(31) = 2.24^*$ | $t(35) = 3.12^{**}$ | $t(31) = 2.38^*$ | $t(17) = 7.06^{***}$ | |
| Effect size (r) | .29 | .33 | .37 | .47 | .39 | | $r(31) = .10$ |
| 95% CI (r) | [.11, .45] | [.08, .54] | [.03, .63] | [.17, .69] | [.05, .65] | | [−.25, .43] |
| Reading | | | | | | | |
| Test statistic | $t(113) = 0.16$ | $t(61) = 1.02$ | $t(34) = 0.43$ | $t(37) = -1.26$ | $t(35) = 0.44$ | $t(18) = -1.26$ | |
| Effect size (r) | .02 | .13 | .07 | −.20 | .07 | | $r(34) = -.12$ |
| 95% CI (r) | [−.16, .20] | [−.12, .37] | [−.26, .39] | [−.48, .12] | [−.26, .39] | | [−.43, .22] |
| Composite | | | | | | | |
| Test statistic | $t(116) = 2.41^*$ | $t(62) = 2.97^{**}$ | $t(36) = 1.79^†$ | $t(38) = 1.95^†$ | $t(37) = 1.22$ | $t(19) = 1.65^b$ | |
| Effect size (r) | .22 | .35 | .29 | .30 | .20 | | $r(36) = .09$ |
| 95% CI (r) | [.04, .39] | [.11, .55] | [−.03, .56] | [−.01, .56] | [−.12, .48] | | [−.24, .40] |
| **Experiment 2** | | | | | | | |
| Persuasiveness | | | | | | | |
| Test statistic | $t(374) = 2.87^{**}$ | $t(226) = 2.04^*$ | $t(35) = 2.95^{**}$ | $t(70) = 2.22^*$ | $t(130) = 1.26$ | $t(29) = 2.02^†$ | |
| Effect size (r) | .15 | .13 | .45 | .26 | .11 | | $r(35) = .34^*$ |
| 95% CI (r) | [.05, .25] | [.00, .26] | [.15, .68] | [.03, .46] | [−.06, .28] | | [.02, .60] |
| **Experiment 3** | | | | | | | |
| Persuasiveness (Elaborate metaphor - other styles) | | | | | | | |
| Test statistic | $t(132) = 3.21^{**}$ | $t(73) = 2.58^*$ | $t(45) = 2.28^*$ | $t(31) = 3.06^{**}$ | $t(37) = 2.48^*$ | $t(18) = 2.69^*$ | |
| Effect size (r) | .27 | .29 | .32 | .48 | .38 | | $r(45) = .37^{**}$ |
| 95% CI (r) | [.11, .42] | [.07, .49] | [.04, .56] | [.16, .71] | [.07, .62] | | [.09, .59] |
| **Experiment 4** | | | | | | | |
| Ratings of persons | | | | | | | |
| Test statistic | $t(306) = 2.47^*$ | $t(168) = 2.18^*$ | $t(99) = 2.61^{**}$ | $t(80) = 1.49$ | $t(121) = 1.56$ | $t(54) = 2.74^{**}$ | |
| Effect size (r) | .14 | .17 | .25 | .16 | .14 | | $r(99) = .23^*$ |
| 95% CI (r) | [.03, .25] | [.02, .31] | [.06, .42] | [−.06, .36] | [−.04, .31] | | [.04, .41] |
| Memory for persons | | | | | | | |
| Test statistic | $t(306) = 2.09^*$ | $t(168) = 0.78$ | $t(99) = 1.34$ | $t(80) = 2.10^*$ | $t(121) = 2.14^*$ | $t(54) = 2.59^*$ | |
| Effect size (r) | .12 | .06 | .13 | .23 | .19 | | $r(99) = .15$ |
| 95% CI (r) | [.01, .23] | [−.09, .21] | [−.07, .32] | [.01, .43] | [.01, .36] | | [−.05, .34] |
| Composite | | | | | | | |
| Test statistic | $t(306) = 3.11^{**}$ | $t(168) = 2.03^*$ | $t(99) = 2.70^{**}$ | $t(80) = 2.44^*$ | $t(121) = 2.52^*$ | $t(54) = 3.53^{***}$ | |
| Effect size (r) | .18 | .15 | .26 | .26 | .22 | | $r(99) = .25^{**}$ |
| 95% CI (r) | [.07, .29] | [.00, .29] | [.07, .43] | [.05, .45] | [.05, .38] | | [.06, .42] |
| **Experiment 5 (see Supplemental Materials)** | | | | | | | |
| Course perceptions | | | | | | | |
| Test statistic | $t(184) = 1.67^†$ | $t(123) = 0.71$ | $t(51) = 2.29^*$ | $t(33) = 0.70$ | $t(40) = 1.71^†$ | $t(21) = 0.45$ | |
| Effect size (r) | .12 | .06 | .31 | .12 | .26 | | $r(51) = .29^*$ |
| 95% CI (r) | [−.02, .26] | [−.12, .23] | [.04, .54] | [−.22, .44] | [−.05, .52] | | [.02, .52] |
| Unweighted meta-analytic Z | 5.93*** | 4.62*** | 5.37*** | 4.64*** | 4.11*** | 4.62*** | 4.60*** |
| Mean effect size (r) | .19 | .20 | .33 | .29 | .24 | | .28 |
| Weighted meta-analytic Z | 5.56*** | 3.92*** | 5.03*** | 4.46*** | 3.56*** | 4.84*** | 4.54*** |
| Mean effect size (r) | .18 | .16 | .31 | .28 | .20 | | .27 |

*Note.* SSLs = Spanish-speaking Latinos; DV = dependent variable; CI = confidence interval.
[a]*r*s in the table are computed from sqrt($t^2/(t^2 + df)$), except for the column showing the within-subjects metaphor versus nonmetaphor comparison among SSLs. This column is excluded because there seems to be no clear consensus as to how within-subject effect sizes should be calculated and meta-analyzed across studies (cf. Baguley, 2009; Bakeman, 2005; Lakens, 2013; Westfall, 2016). Means and *SD*s are provided in the text for readers wanting to make various effect size estimates.
[b]Represents the arithmetic average of the relevant indicators (for the preference statistic, average of ratings of definitions and narrative sentences; for the composite, average of preferences, reading, and memory indicators).
$^†p \le .10.$ $^*p \le .05.$ $^{**}p \le .01.$ $^{***}p \le .001.$
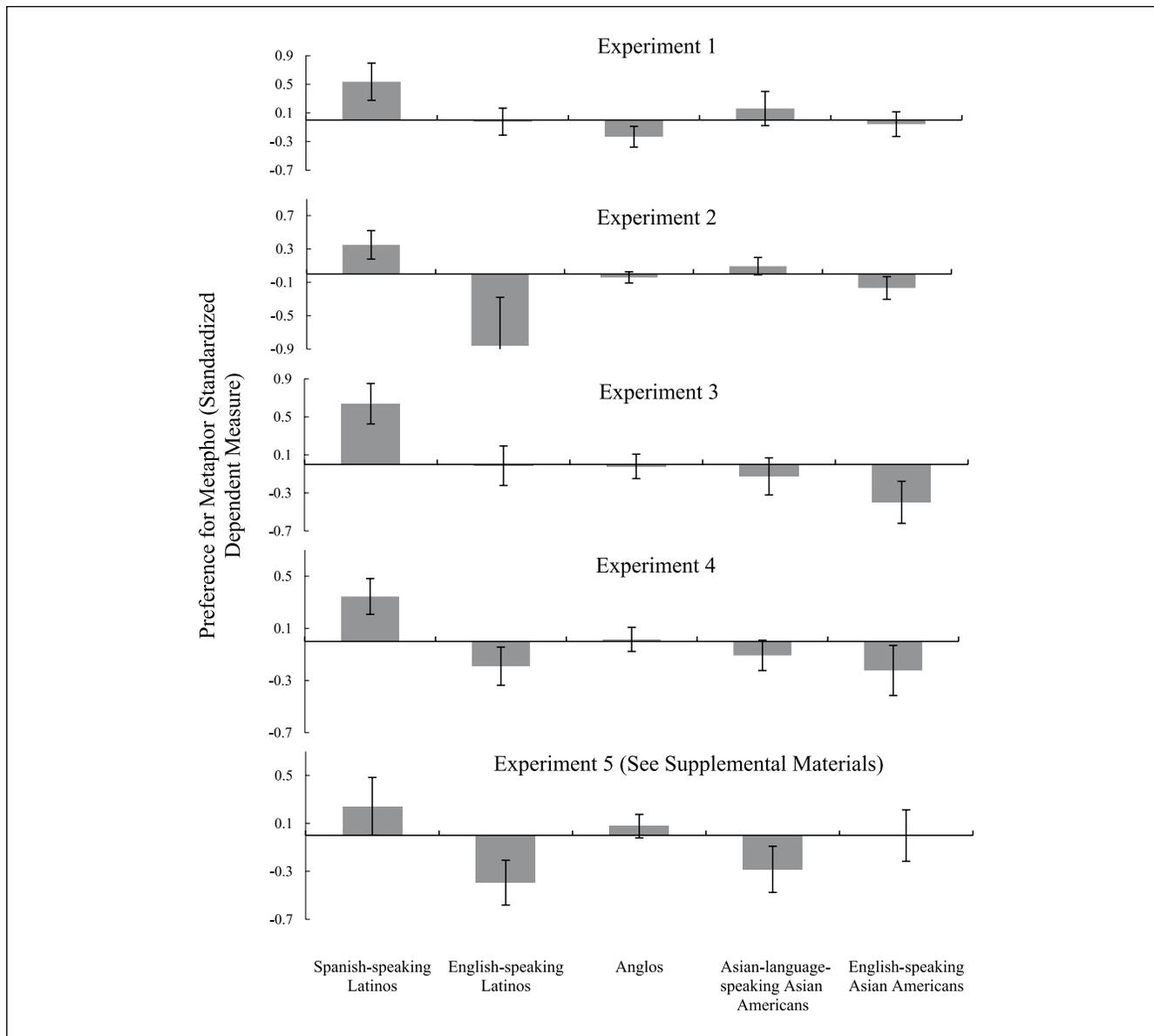
**Figure 1.** Standardized preferences for metaphor among different groups across experiments.

*Note.* For ease of comparison across studies, bars for each group represent scores on the standardized dependent variable. Higher numbers indicate greater preference for metaphors. In Experiments 1 and 4, the dependent variable displayed is the composite across outcome measures (as indicated in Table 5). Error bars represent standard errors of the means. The lower-bound standard error bar for English-speaking Latinos in Experiment 2 is not shown to conserve space. Also note that Experiment 5 is not presented in text; this experiment is detailed in the Supplementary Materials.

ratings for the metaphoric minus nonmetaphoric definitions and whether participants chose a metaphoric definition as one of their top three (both indicators standardized before averaging).[3]

For half the participants, the three concepts to define were love, wisdom, and anger. For the other half, the three were happiness, jealousy, and courage. The concepts for which participants did not receive definitions were then given to participants, who were asked to supply open-ended definitions. So few definitions were metaphorical (below 1%) that we did not analyze this measure.[4]

*Story preference.* Participants next read a story, constructed from 29 sentences presented individually. For 18 of these sentences, participants were randomly assigned either a nonmetaphoric version (e.g., John "walked to the bus stop slowly") or a metaphoric version (e.g., John "crawled slowly like a turtle to the bus stop").

After completing the recall task (described below), participants were shown each sentence again and asked to rate how much they liked the sentence. Preference score for the story was the average of ratings for metaphoric sentences minus ratings for nonmetaphoric sentences. This measure
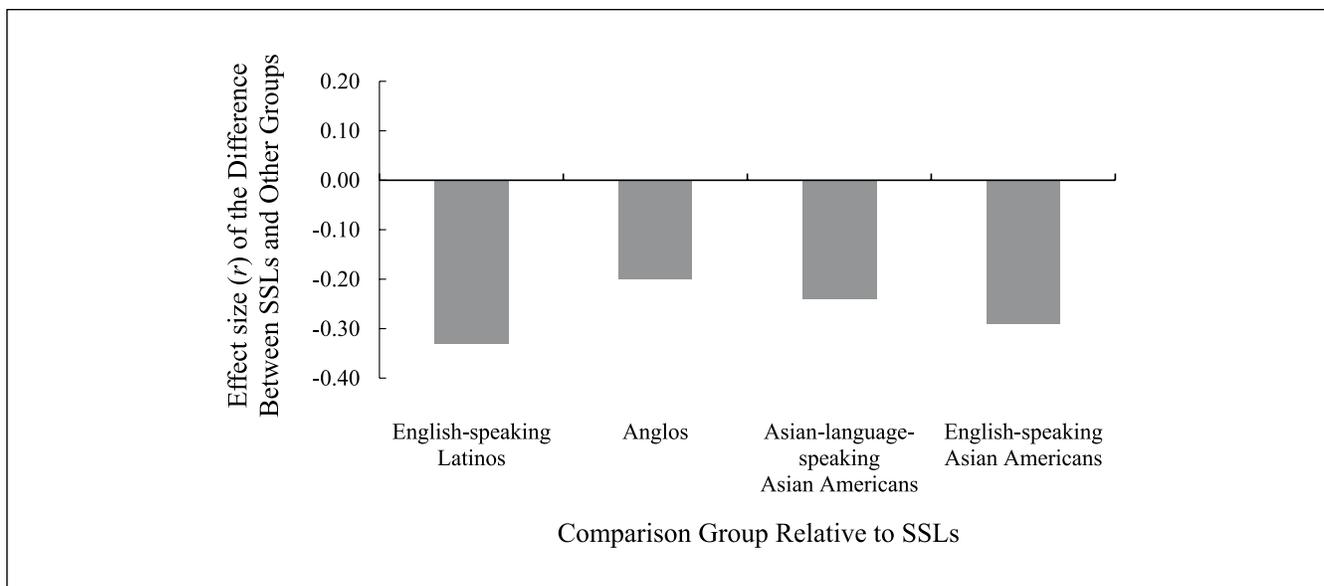
**Figure 2.** Meta-analytic summary of differences between SSLs and other groups across Experiments 1 to 5.
*Note.* SSL = Spanish-speaking Latino.

was standardized and averaged with the measure from the definitions task described above.[5]

*Reading speed.* As they read the story, participants pressed the spacebar to advance to the next sentence. Reading speed for metaphoric versus nonmetaphoric sentences was measured.

*Recall.* After reading the story, participants were shown sentences on the screen, representing the possible versions of the sentence they were randomly assigned to read. As quickly as possible, participants had to identify which version of the sentence they saw. Because there may be a speed-accuracy trade-off, reaction times were transformed into Inverse Efficiency Scores (IES) by dividing response times by the proportion of questions correctly answered (Townsend & Ashby, 1978). For example, a person who got all questions correct would have a score equal to their reaction time, whereas a person who got 80% correct would have a score of their reaction time divided by .8. Participants' recall score was their score for nonmetaphoric items minus their score for metaphoric items, with higher numbers indicating better memory for metaphoric sentences.[6] After tasks were completed, participants completed a demographics questionnaire and were debriefed.

### Results and Discussion

*Preferences.* SSLs showed a greater relative preference for metaphor, as compared with other groups (SSL $M = 0.43$ $SD = 0.74$ vs. English-speaking Latinos $M = 0.12$, $SD = 0.90$, Anglos $M = -0.26$, $SD = 0.99$, Asian-language-speaking Asian Americans $M = 0.44$, $SD = 1.24$, English-speaking Asian Americans $M = -0.31$, $SD = 0.88$). The contrast

of SSL versus the other four groups separately (4 -1 -1 -1 -1) was $t(116) = 1.82$, $p = .072$, effect size $r = .17$; for $t$ test of SSL versus all others, $t(119) = 2.07$, $p = .040$.[7] Surprisingly, Asian-language-speaking Asian Americans also showed a relatively high preference for metaphors (though as will be seen, this effect does not recur elsewhere).

*Reading speed.* Groups did not differ in their relative speed of reading metaphoric versus nonmetaphoric story sentences (standardized metaphor reading time – nonmetaphor reading time for SSL was $M = -0.07$, other groups = 0.02). The contrast of SSL versus all others, $t(113) = -.16$, $p = .87$.

*Recall.* SSLs showed greater relative recall for sentences with metaphors, compared with other groups. The standardized difference between IES scores for recall of metaphor versus nonmetaphor sentences: SSL $M = 0.71$, $SD = 1.25$ versus English-speaking Latino $M = -0.06$, $SD = 0.85$, Anglos $M = -0.03$, $SD = 1.06$, Asian-language-speaking Asian American $M = -0.10$, $SD = 0.86$, English-speaking Asian Americans $M = -0.30$, $SD = 0.65$. The contrast of SSL versus the other four groups separately (4 -1 -1 -1 -1) was $t(107) = 3.18$, $p = .002$, effect size $r = .29$; for $t$ test of SSL versus all others, $t(19.17) = -2.56$, $p = .019$, equal variances not assumed.[8,9]

*Summary.* SSLs showed a preference for metaphors used in definitions and story narratives. Unexpectedly, Asian-language-speaking participants also showed a relative preference for metaphoric sentences. Furthermore, though SSLs did not read metaphoric sentences more quickly, they did have better recall for the metaphoric sentences of the story. Figure 1 displays the data graphically using a composite of the preference, reading, and memory data. Overall,

Experiment 1 lends preliminary support to the hypothesis that SSLs will be relatively more receptive to metaphoric expression, as compared with their non-SSL peers.

## Experiment 2: Political Persuasion

Experiment 1 showed that SSLs prefer metaphors and find them more memorable, relative to other groups. In Experiment 2, we investigated whether SSLs' preferences for metaphor extended to persuasion as well.

Recent research has shown that framing communication in a way that implicitly evokes a metaphor can activate concepts that are subsequently applied to judgments in the new domain (Landau, Sullivan, & Greenberg, 2009; Ottati, Rhoads, & Graesser, 1999; Thibodeau & Boroditsky, 2013). This work frequently utilizes relatively subtle metaphors, typically by inserting or altering a single or few words in a sentence, such as framing crime as a "beast" (Thibodeau & Boroditsky, 2013) or the nation as a body (Landau et al., 2009). Subtle metaphoric expressions are pervasive in everyday language—so much so that subtle metaphoric terms and expressions may even go unnoticed.

However, the present research does not involve "stealth" metaphors that might fly under the radar. Instead, the metaphors are explicit. To the extent that SSLs regard metaphors as providing a better grasp of an issue, they should also find explicit metaphors more persuasive. Conversely, if other groups regard explicit metaphors with suspicion, they should find them relatively less persuasive.

### Method

*Participants.* Participants were 379 persons ($M_{age}$ = 23.85 years, $SD_{age}$ = 6.54 years, 43.2% men) recruited from public places in the San Francisco Area. There were 30 SSLs, 7 English-speaking Latinos, 198 Anglos, 102 Asian-language-speaking Asian Americans, and 42 English-speaking Asian Americans.[10]

*Procedure and issues presentation.* Participants completed a survey about political issues. Within the stem of each question was a brief argument about the issue, phrased in either metaphoric language, as in the following example,

> Some people think the government should minimize interference with the economy. They say that the economy works like a thermostat. With a thermostat, when it gets too hot, it will start to cool down. If it gets too cool, it will then heat up. Similarly, the economy has its own automatic adjustment mechanisms. Too much playing with the thermostat or too much playing with the economy will lead to problems of overcorrection.

or nonmetaphoric language, as in the following example,

> Some people think the government should not interfere with the economy too much. They say that if the government does interfere, this will just cause problems with overcorrection and will not allow the economy to automatically adjust itself to the appropriate level of production.

Participants' attitudes toward the issue were then measured with two questions. For the six different issues, participants read two stems with metaphoric arguments and four stems with nonmetaphoric arguments. Which type of argument was assigned to which issue and whether the argument was pro- or con- was counterbalanced across participants. The dependent variable was participants' agreement with metaphoric arguments minus their agreement with nonmetaphoric arguments. After tasks were completed, participants filled out a demographics questionnaire and were debriefed.

### Results and Discussion

SSLs were more persuaded by metaphoric arguments than by other types of arguments, as compared with their counterparts, SSL $M$ = 1.36, $SD$ = 3.68, English-speaking Latinos $M$ = −3.39, $SD$ = 6.03, Anglo $M$ = −0.17, $SD$ = 3.68, Asian-language-speaking Asian Americans $M$ = 0.35, $SD$ = 4.14, English-speaking Asian Americans $M$ = −0.67, $SD$ = 3.46. The contrast of SSL versus the other four groups separately (4 -1 -1 -1 -1) was $t(374)$ = 2.87, $p$ = .004, effect size $r$ = .15; for $t$ test of SSL versus all others, $t(377)$ = 2.05, $p$ = .041. Experiment 2 thus extended the results of Experiment 1 by demonstrating that in addition to increased preferences and memory for metaphor, SSLs (compared with other groups) also found metaphors to be relatively more persuasive in political arguments.

## Experiment 3: Scientific Persuasion

Experiment 3 extended findings of Experiment 2 by examining whether SSLs would regard metaphors as more persuasive in a different context: science. Again, if SSLs find that metaphor helps deepen one's understanding, they should find a scientific argument supported by facts and a substantive metaphor to be more persuasive than one not supported by a substantive metaphor (or not supported by facts). In contrast, if non-SSLs regard metaphors with some suspicion, they might distrust them, *especially* in the context of science, where metaphors would act as "wanton and luxuriant fancies climbing up into the Bed of Reason [that] . . . defile it by unchaste and illegitimate embraces" (Draiisma, 2000, p. 55)—that is, they are unscientific.

### Method

*Participants.* Participants were 137 undergraduates ($M_{age}$ = 19.05 years, $SD_{age}$ = 1.22 years, 38% men, 19 SSLs, 28 English-speaking Latinos, 56 Anglos, 20 Asian-language-speaking Asian Americans, and 14 English-speaking Asian Americans).

*Stimulus materials.* Participants were asked to carefully read through a packet containing eight scientific articles as they might appear in a reputable newspaper. The articles were

made up for the experiment and participants were told this. Each news article presented a scientific finding, with quotes from a researcher. The articles presented the finding in one of four styles (counterbalanced across article topics): substantive metaphor, facts, facts with metaphoric-headline only, and metaphoric-referent only.

The "substantive metaphor" style presented the results of a study, elaborated upon through the use of an extended metaphor. For example, one article was headlined "Talking to your baby can increase his/her intelligence" with a subhead of "Words and conversation are like 'nourishment' for the brain." The metaphoric subhead was repeated in the text of the article and attributed to the scientist, who fleshed out the metaphor, mapping it on to the study's actual results (e.g., "According to Dr. Ramos, words and conversation are like nourishment for a child's brain . . . 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" and "[just as] 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.") The "facts with metaphoric-headline only" style included the facts of the study. It left the subhead alluding to the metaphoric relationship and repeated it once in the text. However, it took out anything that actually elaborated on the metaphor and connected it to the study's results. The "facts only" style included the facts but removed even the passing mention of the metaphor. Finally, "the metaphoric-referent only" style elaborated on the metaphoric-referent but did not map it on to any of the study's results because no results were actually given (e.g., "It's important to feed a child with a variety of 'foods'" with no explanation that "foods" mapped onto the variety of words and sentences and predicted intelligence scores measured at the age of 3 years).

A short questionnaire followed each story. For example, participants rated how scientific [the researcher] Dr. Ramos' study was, how wise Dr. Ramos is, how logical the research findings were, and how much they personally believed the results of the study. The last question asked participants to predict their own behavior relating uniquely to each argument, for example, "How many minutes on average will you spend talking to your child each day during his or her first year?" Items were all put on a 1 to 11 scale and summed into a persuasiveness index (higher numbers indicating greater belief in, and intention to behave in accordance with, the researcher's conclusions).

The eight stories were presented in the same order; however, the style of the story was counterbalanced across participants. Each participant received two articles in each style, one of each in the first four articles and one of each in the last four. After finishing article evaluations, participants completed a demographic questionnaire and were debriefed.

## Results and Discussion

Each participant gave ratings for two articles presented in the substantive metaphor, facts only, facts plus metaphoric-headline only, and metaphoric-referent only style. The key prediction was that SSLs would be more persuaded when the scientific argument was supported by a substantive metaphor. We thus computed scores on the persuasiveness index for the substantive metaphor arguments versus the other three styles of arguments. As expected, SSLs were significantly more persuaded by scientific arguments supported by a substantive metaphor (vs. other types of arguments), as compared with their non-SSL counterparts. Scores for SSL were $M = 0.90$, $SD = 1.45$, English-speaking Latinos $M = -0.12$, $SD = 1.72$, Anglos $M = -0.13$, $SD = 1.50$, Asian-language-speaking Asian Americans $M = -0.30$, $SD = 1.37$, and English-speaking Asian Americans $M = -0.72$, $SD = 1.29$. The contrast of SSL versus the other four groups separately was $t(132) = 3.21$, $p = .002$, effect size $r = .27$; for $t$ test of SSL versus all others, $t(135) = 3.04$, $p = .003$.

*Further analyses.* Besides this overall test pitting scientific arguments with substantive metaphors versus other types of arguments, two comparisons are particularly informative. The first is between the substantive metaphor arguments versus fact-based arguments without such substantive metaphors (where study results are given either with no metaphor or with only a metaphoric subhead that is not mapped onto the facts). This first comparison shows whether an elaborated metaphor enhances or detracts from a fact-based scientific argument. A second relevant comparison is the one between the substantive metaphor style versus the no facts, metaphoric-referent only style (where the metaphoric-referent is elaborated but there is no connection to study results because no results are actually given). This second comparison examines whether an elaborated metaphor so undermines the persuasiveness of an argument that not even adding factual results from the study can redeem it.

For the first comparison (persuasiveness index for the substantive metaphor style – the factual styles), analyses indicated that elaborating upon the facts with a substantive metaphor enhanced how convincing SSLs found the research, relative to all other groups. Scores for SSLs were $M = 0.90$, $SD = 1.71$, English-speaking Latinos $M = -0.27$, $SD = 1.83$, Anglos $M = -0.31$, $SD = 1.67$, Asian-language-speaking Asian Americans $M = -0.35$, $SD = 1.27$, and English-speaking Asian Americans $M = -1.04$, $SD = 1.48$. The contrast of SSL versus the other four groups separately was $t(132) = 3.35$, $p = .001$; for $t$ test of SSL versus all others, $t(135) = 3.18$, $p = .002$. Further analysis showed that (a) for SSLs, the difference between the substantive metaphor and the factual styles was significantly positive, $t(18) = 2.29$, $p = .035$). By contrast, the difference for non-SSLs was significantly negative, $t(117) = -2.61$, $p = .010$). To our knowledge, this finding among non-SSLs is one of the few findings to demonstrate

that the use of a metaphor can actually undermine the credibility of a scientific argument (among non-SSLs).

For the second comparison, we analyzed how convincing participants found the substantive metaphor style versus the metaphoric-referent only style, in which the metaphoric-referent was unconnected to any of the studies' findings because no facts were presented. As expected, SSLs were not just drawn to empty metaphors; rather, the metaphors had to be connected to actual findings from the study. The difference between the substantive metaphor versus metaphoric-referent only style was as follows: SSLs $M = 0.90$, $SD = 1.47$, English-speaking Latinos $M = 0.17$, $SD = 1.76$, Anglo $M = 0.21$, $SD = 1.69$, Asian-language-speaking Asian Americans $M = -0.20$, $SD = 1.90$, English-speaking Asian-Americans $M = -0.10$, $SD = 1.33$. The contrast of SSL versus the other four groups separately was $t(132) = 2.07$, $p = .041$; for $t$ test of SSL versus all others, $t(135) = 1.94$, $p = .054$. Further analysis showed that (a) for SSLs, the difference between the substantive metaphor and the no-fact, metaphoric-referent only style was significantly positive, $t(18) = 2.66$, $p = .016$. However, for non-SSLs, not even adding the facts (in the substantive metaphor condition) could redeem a metaphor-based argument; the persuasiveness of the substantive metaphor argument was not significantly greater than that of the metaphoric-referent only (no facts) argument, $t(117) = 0.62$, $p = .54$.

*Summary.* In evaluating scientific research, SSLs were more convinced by findings explained with a metaphor versus either findings presented without a metaphor or metaphors presented without findings, as compared with other groups. Among non-SSLs, the use of a metaphor actually undermined the credibility of the scientific argument—to our knowledge, one of the few findings to demonstrate this phenomenon. However, for SSLs, rather than making research "unscientific," the use of the metaphor connected to facts from the study enhanced SSLs endorsement of the scientists' conclusions.

## Experiment 4: Preference and Memory for People

Experiment 4 tried to extend findings from Experiments 1 through 3 to person perception. We have argued that Spanish speakers are drawn to metaphors because the emotions that metaphors evoke when shared can facilitate interpersonal connection. We tested this interpersonal function more directly in this experiment, as we had participants watch videos of two men answering questions about various childhood experiences. The actors spoke either using relatively direct or metaphoric language. We hypothesized that relative to other groups, SSLs would be more favorable toward, and have better memories for, men who used metaphor in their answers.

### Method

*Participants.* Participants were 311 undergraduates ($M_{age} = 19.34$ years, $SD_{age} = 1.54$ years, 33.1% men, 207 from University of Illinois and 104 from University of South Florida). Participants from Illinois who reported they knew the actors socially were excluded. There were 55 SSLs, 46 English-speaking Latinos, 115 Anglos, 68 Asian-language-speaking Asian Americans, and 27 English-speaking Asian Americans.

*Procedure.* Participants completed a survey, during which they watched two approximately 5-min videos of a person being interviewed (actually scripted actors). After each video, they gave their impressions of the interviewee. After ratings for the second interviewee were completed, participants also answered some questions asking for forced-choice assessments between the two actors (e.g., "Which would you rather be friends with? Person A or Person B": on a 1-6 scale with no midpoint).

*Conditions.* The same questions were asked in the same order for both actors.[11] However, their answers were different depending on whether the actor adopted Persona A or Persona B and whether they used metaphoric or direct language.

Participants always saw one video in which an actor answered questions using metaphor and analogy and another video in which a different actor answered questions using direct language. Participants thus saw two of eight possible videos (Metaphoric vs. Direct Answers x two Actors x Persona A vs. Persona B). For example, a participant who first randomly saw the Metaphoric Language/Actor 1/ Persona B video then saw the Direct Language/Actor 2/ Persona A video. This design allowed us to analyze data within-subjects, counterbalancing actors and personas across metaphoric and direct conditions.

### Measures

*Perceptions.* Our main dependent variable was an index of participants' perceptions of the actors on 41 different measures, including ratings of the individual actors and comparative forced choices, alpha = .96.

*Qualities of each actor.* For each video, participants answered 29 items about the interviewee (e.g., ratings of him as charming, trustworthy, insightful, and a few items about their overall positive or negative feeling toward the person). All ratings were on a scale from 1 (*not at all*) to 7 (*extremely*), except the last question that went from 0 (*very negative feeling*) to 100 (*very positive feeling*). For each item, a difference measure was calculated by subtracting the perception of the direct-speaking actor from the perception of the metaphoric-speaking actor. All items were then scored such that positive numbers indicated a greater positive valuation of the metaphoric actor.

Participants also rated interviewees in terms of how "emotional" they were. By itself, the word "emotional" has both positive and negative connotations, and its *average* valence is neutral (Warriner, Kuperman, & Brysbaert, 2013), so it is not included in the index. As expected, participants rated the metaphoric actor as more emotional than the direct actor, $t(321) = 5.46$, $p = .001$.

*Forced choice.* After watching both videos, participants were shown side-by-side photographs of the actors, labeled Person "A" and "B" and completed 12 forced-choice questions ("If you had to choose, who would you rather . . .") ranging from 1 ("*very much Person A*") to 6 ("*very much Person B*"). Questions were meant to capture several domains in life including friendship ("who would you want to . . . 'meet', 'be friends with,'"), school ("work on a group project with," "be lab partners with,"), family ("marry or have someone in your family marry"), dependability in a crisis ("be in a life or death situation with"), or in business ("be business partners with"). The 12 questions ($\alpha = .91$) were averaged and coded so that higher numbers indicated greater preference for the metaphoric-speaking actor.

Difference scores on the individual ratings and forced-choice items were correlated, $r = .70$. To combine the two indices together and preserve the ability to interpret the absolute score, both indices were put on a 0 (*complete preference for direct actor*) to 1 (*complete preference for metaphoric actor*) scale and averaged. We then subtracted .5, making 0 the indifference point between preferences for the direct versus metaphoric interviewee.

*Memory.* At the end, participants were given a surprise test to see how well they remembered the interviewees' answers. Participants answered three five-item multiple-choice questions for each actor ("What was the childhood fear discussed by Person A[B]?"). Participants' memory for metaphor was indexed as the number of correct responses about the metaphor-speaking actor minus correct responses for the direct-speaking actor. We expected SSLs to have relatively better memory for the metaphoric actor, compared with other groups.

## Results and Discussion

*Overall index.* Our main hypothesis was that relative to the other groups, SSLs would show a greater preference for actors using metaphor in their answers. As expected, SSLs were indeed more favorable toward the metaphoric-speaking person, compared with other groups, $t(306) = 2.47$, $p = .014$, effect size $r = .14$, SSLs $M = 0.05$, $SD = 0.13$ versus Anglos $= 0.00$, $SD = 0.15$; English-speaking Latinos $= -0.02$, $SD = 0.14$; Asian-language-speaking Asian Americans $= 0.01$, $SD = 0.10$; English-speaking Asian Americans $= 0.00$, $SD = 0.15$; $t$ test of SSL versus all others, $t(309) = 2.47$, $p = .014$. In fact, SSLs were the only group to show a significant preference for the metaphor speaker ($p = .008$); the score for all other groups was not significantly different from the

indifference point of 0 (all $p$s > .30). Figure 1 displays a composite of this preference variable and the memory variable below.

*Memory.* As expected, SSLs (vs. other groups) remembered significantly more about the metaphor-speaking person than the direct-speaking person $t(306) = 2.09$, $p = .037$, effect size $r = .12$, SSLs $M = 0.27$, $SD = 0.78$ versus Anglos $= .17$, $SD = 0.69$; English-speaking Latinos $= 0.07$, $SD = 0.74$; Asian-language-speaking Asian Americans $= -0.03$, $SD = 0.93$; English-speaking Asian Americans $= -0.11$, $SD = 0.75$; $t$ test of SSL versus all others, $t(309) = 1.75$, $p = .082$. SSLs and Anglos were the only groups who remembered significantly more about the metaphor-speaker versus the direct speaker, $t(54) = 2.59$, $p = .012$ and $t(114) = 2.70$, $p = .008$, respectively.

It should be noted that there was an Experiment location × SSL versus non-SSL interaction on the memory variable, $F(1, 307) = 4.86$, $p = .028$. Among Illinois students, SSLs had greater memory for the metaphoric speaker, compared with non-SSLs ($M$s $= 0.38$ vs. 0.01, simple effect $t(307) = 2.69$, $p = .007$). However, among South Florida students, SSLs were not different from non-SSLs and the trend was nonsignificantly reversed ($M$s $= 0.00$ vs. 0.18, simple effect $t(307) = 0.86$, $p = .39$). Whether this interaction represents a real effect or whether it represents sampling error as there were only 16 SSLs in the University of South Florida sample is unknown.

*Further analyses.* We attempted to explore the preference of SSLs (vs. other groups) for the metaphoric speaker. A principal-axis factor analysis with varimax rotation suggested five factors among the 41 items: one concerned a desire for an interpersonal social-emotional connection (e.g., "Who would you like to be related to as a sibling, like to marry or have marry into your family, like to be friends with?"). Another concerned a desire for interpersonal partnership (e.g., "Who would you like to work on a group project with, be in a life-or-death situation with, be business partners with, have as commander of your military unit?"); this factor seemed to involve more instrumental goals but involved a very high degree of interpersonal trust. A third might be characterized in terms of the actor's warmth or charm (e.g., ratings for warmth, empathy, social skills, charm). A fourth concerned intelligence (e.g., ratings for intelligence, wisdom, competence, foolishness). A fifth involved negative attributes (e.g., ratings for dishonesty, manipulativeness, tendency to drone on). The contrast between SSLs and the other four groups showed up most strongly in the desire for an interpersonal social-emotional relationship factor (contrast $p = .012$; $t$ test of SSL vs. all others, $p = .018$), desire for interpersonal partnership (contrast $p = .052$; $t$ test of SSL vs. all others, $p = .039$), and ratings of the actor's warmth or charm (contrast $p = .070$; $t$ test of SSL vs. all others, $p = .084$). Differences were not significant for the wisdom and negativity factors (contrast $p = .15$, $p = .41$; $t$ test $p = .17$ and $p = .33$,

respectively). These findings are consistent with SSL-preferences for metaphor rooted in a concern for social-emotional connection. However, one should not try to distinguish too much between these five factors as the average correlation between them was $r = .59$ ($r$s ranging from .43 to .74), consistent with an SSL-preference centered on social-emotional connectedness with metaphor speakers, but then spreading outward toward a more general positivity in a "halo effect."

Breaking the data up differently by separating the forced-choices questions from the trait ratings, we found that SSLs (vs. other groups) preferred relating to the metaphor speaker when they had to make a forced choice, contrast $t(86.26) = 2.60$, $p = .010$, and rated the metaphor speaker higher on qualities connoting warmth, contrast $t(306) = 1.99$, $p = .048$, with differences not significant on factors related to wisdom or negative qualities factors ($p$s > .15).

*Summary.* Watching people talk about their lives, SSLs showed a reasonably strong preference for those who used metaphors in their speech. In fact, they were the only group that showed such a preference. Participants in each of the four other groups were indifferent between speakers who used metaphors and those who did not. SSLs seemed to particularly favor the metaphor speaker on ratings of the speaker's warmth or forced choices about who one wanted to develop a social-emotional relationship with and whom one would trust in various partnership roles (be a business partner with, be in a life-or-death situation with, etc.)

Consistent with Experiment 1, SSLs (compared with non-SSLs) also showed greater memory for answers given by metaphoric speakers as opposed to nonmetaphoric speakers. It should be added that there was an interaction with experiment location, however, because this memory effect did not occur among University of South Florida students.

## Meta-Analytic Results

Across the four studies presented above, there were some inconsistencies in the data. As shown in Table 5, comparisons between SSLs and specific groups varied from experiment to experiment, as did the SSL preference for metaphoric versus nonmetaphoric stimuli in absolute terms (column 6). Furthermore, in an experiment not reported here (but reported in the Supplementary Materials), we tested the hypothesis that SSLs would find science, technology, engineering, and mathematics (STEM) classes more appealing if they were taught through analogy; however, SSLs' relative preference for classes taught through analogy was only marginally significantly greater than that of non-SSLs (Table 5).

To summarize the data and, perhaps more importantly, to give us more statistical power to examine alternative interpretations, the bottom rows of Tables 5 and 6 present meta-analytic results. For all the relevant contrasts, weighted and unweighted meta-analytic $Z$s and effect sizes are given. (Experiments 1 and 4 had more than one dependent variable;

so in those cases, only the tests of the composite variable were included in the meta-analysis).

First, we summarize results relevant to the hypothesis about SSLs' greater preference for metaphor. As may be seen in the first column of Table 5, the main SSL versus non-SSL contrast was significant ($Z$s ≥ 5.56). Further as seen in columns 2 through 5, SSLs showed a greater preference for metaphor compared with each group taken separately ($3.56 ≤ Z$s ≤ 5.37). As seen in column 6, SSLs also preferred metaphoric to nonmetaphoric communication in an absolute sense ($Z$s ≥ 4.62). And as seen in column 7, among all Latinos, the more participants spoke Spanish with their family and friends, the stronger their preference for metaphor was ($Z$s ≥ 4.54; see also column 3). The general pattern is thus consistent with our hypothesis.

However, there are alternative hypotheses and the meta-analysis provides us greater power to examine those. One alternative hypothesis is that effects might derive less from cultural-linguistic practices among SSLs and instead might reflect a broader distinction between English-speakers (who have an antipathy toward metaphor) and non-English-speakers (who do not). Indeed, a test pitting SSLs and Asian-language-speaking Asian Americans against all other groups would be significant (unweighted and weighted meta-analytic $Z$s ≥ 3.35; column 1, Table 6). However, this does not seem to be a compelling explanation for the data because the effect is solely driven by SSLs. Whereas SSLs are different from all other groups taken singly and together, this is not true of Asian-language-speaking Asian Americans (columns 4 and 5, Table 6). The only significant difference between Asian-language-speaking Asian Americans and any other group is that they (like all other groups) are significantly less receptive to metaphor than SSLs are (column 5, Table 5).

Another alternative hypothesis is that the cultural-linguistic patterns of SSLs are irrelevant, and the Latino versus non-Latino distinction is sufficiently parsimonious. And indeed, a Latino versus non-Latino contrast would be either significant or marginally so (column 2, Table 6; $1.87 ≤ Z$s ≤ 2.26). But again we do not find this a compelling interpretation because English-speaking Latinos are significantly less receptive to metaphor than SSLs and also are not significantly more receptive than any other group.

A somewhat different conception would hold that references to cultural-linguistic practices are superfluous because the language variable may be merely acting as a *marker* of general acculturation (Marin & Marin, 1991). This is certainly a plausible and potentially parsimonious hypothesis. However, we prefer an interpretation based on cultural-linguistic practices (rather than general acculturation) because of data collected in some (but not all) of our studies. As seen in Supplementary Materials, speaking Spanish among family and friends does correlate with an assortment of other acculturation variables (e.g., identification with Latino culture, place of birth, mass media consumption, and the use of Spanish outside of the family-and-friends context, with $r$s ranging from .08 to .73). But none of these other acculturation variables are significantly

**Table 6.** Supplementary Comparisons.

| | | | Comparison groups | | | |
|---|---|---|---|---|---|---|
| Supplementary Comparisons | Non-English speakers vs. English speakers | Latino vs. non-Latino | Anglos vs. all others | Asian-language-speaking Asian Americans vs. all others | Asian-language-speaking Asian Americans vs. English speakers | SSLs vs. English speakers |
| Study 1 | | | | | | |
| Preferences | $t(119) = 3.38^{***}$ | $t(119) = 2.03^*$ | $t(119) = -2.29^*$ | $t(119) = 2.06^*$ | $t(99) = 2.46^*$ | $t(100) = 2.74^{**}$ |
| Recall | $t(110) = 2.03^*$ | $t(110) = 2.19^*$ | $t(110) = -0.41$ | $t(110) = -0.53$ | $t(93) = 0.00$ | $t(94) = 3.06^{**}$ |
| Reading | $t(116) = 0.06$ | $t(116) = 0.07$ | $t(116) = -1.67^†$ | $t(116) = -0.30$ | $t(97) = -0.24$ | $t(98) = .34$ |
| Composite | $t(119) = 2.67^{**}$ | $t(119) = 1.95^†$ | $t(119) = -2.14^*$ | $t(119) = 0.70$ | $t(99) = 1.32$ | $t(100) = 2.90^{**}$ |
| Study 2 | | | | | | |
| Persuasiveness | $t(377) = 2.24^*$ | $t(377) = 0.80$ | $t(377) = -0.77$ | $t(377) = 1.15$ | $t(347) = 1.54$ | $t(275) = 2.36^*$ |
| Study 3 | | | | | | |
| Persuasiveness | $t(135) = 1.72^†$ | $t(135) = 2.01^*$ | $t(135) = -0.38$ | $t(135) = -0.71$ | $t(116) = -0.23$ | $t(115) = 2.91^{**}$ |
| Study 4 | | | | | | |
| Ratings of persons | $t(309) = 2.07^*$ | $t(309) = 0.77$ | $t(306) = -0.75$ | $t(309) = 0.17$ | $t(254) = 0.80$ | $t(241) = 2.45^*$ |
| Memory for persons | $t(309) = -0.01$ | $t(309) = 1.13$ | $t(309) = 1.17$ | $t(309) = -1.62$ | $t(254) = -1.23$ | $t(241) = 1.48$ |
| Composite | $t(309) = 1.41$ | $t(309) = 1.29$ | $t(309) = 0.27$ | $t(309) = -.96$ | $t(254) = -0.27$ | $t(241) = 2.70^{**}$ |
| Study 5 | | | | | | |
| Course perceptions | $t(187) = 0.12$ | $t(187) = -0.90$ | $t(187) = 1.52$ | $t(187) = -1.22$ | $t(165) = -1.08$ | $t(167) = 1.16$ |
| Unweighted meta-analytic Z | $3.65^{***}$ | $2.26^*$ | $-0.67$ | $-0.47$ | $0.57$ | $5.35^{***}$ |
| Weighted meta-analytic Z | $3.35^{***}$ | $1.87^†$ | $-0.41$ | $-0.19$ | $0.81$ | $4.93^{***}$ |

*Note.* SSL = Spanish-speaking Latino.
$^†p ≤ .10.$ $^*p ≤ .05.$ $^{**}p ≤ .01.$ $^{***}p ≤ .001.$

positively related to our preference-for-metaphor dependent variables (*r*s ranging from –.47 to .18). Thus, we suggest that the nexus of cultural-linguistic practices involved in communicating and sharing emotion among family and close friends is what is likely to be particularly important in socializing SSLs' receptivity to metaphor. Other variables and distinctions—bilingualism, biculturalism, English- versus non-English-speaking distinctions, Latino versus non-Latino distinctions, and general acculturation variables—do not provide compelling explanations for the data.

## General Discussion

Over the years, scholars have described cross-cultural differences in language patterns that are direct versus indirect, emphasize persons versus contexts, or are relatively gendered (Hall, 1989; Ishii et al., 2003; Kashima & Kashima, 1998; Prewitt-Freilino et al., 2012; Sanchez-Burks et al., 2003). The present work adds to this literature on cross-cultural language differences, showing that there are also differences in how responsive people are to metaphor.

We found that SSLs show a relatively greater resonance with metaphoric language, compared with their Anglo, Asian American, and English-speaking Latino peers. Specifically, SSLs display a relative preference for metaphors in defining abstract constructs, demonstrate enhanced memory for metaphors in narratives, regard metaphors as more persuasive in political argumentation and science, and want to be involved in relationships with people who used metaphors, as compared with those who did not. This receptiveness among SSLs contrasts with the relative distrust of metaphors, preference for nonmetaphoric communication, and indifference to metaphor speakers among the other groups we examined.

In reviewing metaphor research, Holyoak and Stamenković (2018) noted that most work on metaphor and analogy has focused on "cold" cognitive processes and has largely ignored topics of culture and language. The present studies thus add to existing metaphor research by bringing language and culture to the fore and examining variation in the appeal of metaphors, their suitability in argumentation, and their social/interpersonal power.

To our knowledge, these experiments are among the first that (a) demonstrate a systematic cross-cultural difference in the appeal of metaphor, (b) establish this difference between SSL and non-SSL groups in particular, (c) show the use of metaphor actually undermining the credibility of scientific arguments among non-SSL groups, and (d) demonstrate, among SSL, a desire to establish social-emotional or trusting connections with someone based on their use of metaphor in speech.

### Limitations, Directions, and Applications

*Limitations.* The present research has its limitations and needs qualifications. First, it is important to note that several of the differences we have shown were *relative* differences. For example, people from all groups were quicker to recall metaphors in narratives, and they were likely to prefer nonfigurative definitions of abstract constructs (Experiment 1). People from all groups will find metaphors more suited to some purposes than others, more appropriate in some contexts rather than others. Thus, we might not be surprised if there is near-universal approval of metaphor in, say, literature or in cases where embellishment is often accepted (humor). However, whether people of different cultures will find metaphor desirable in the context of political debate, scientific reasoning, and everyday conversation is another matter altogether.

Second, we note the limitation that the data have some inconsistencies from study-to-study. The general pattern in Table 5 is quite clear. Nevertheless, replications with larger and more diverse samples of Latinos, Asian Americans, and Anglos will be useful.

Third, it will be helpful to collect data that can either further support or refute some of the tenets of our hypotheses. For example, it will be useful to collect data directly measuring cultural practices of using metaphor when talking with family and friends. Currently, we only have data on how much participants self-report speaking Spanish with family and friends, and we are inferring that these are the sorts of emotion-sharing conversations in which evocative metaphors are used. However, direct, naturalistic observation of metaphor use in this context would be helpful, as would experiments that (a) manipulate *interaction partners and setting*, with participants speaking either to family and friends versus transitory strangers or (b) manipulate participants' goals (e.g., emotional bonding/appearing trustworthy/appearing "rational"/appearing humble).

*Implications for cross-cultural communication.* The present work complements past research on cross-cultural communication and adds implications for making such communication go more smoothly. Interactions between Anglos and Latinos are sometimes undermined by various cultural differences in expression. Latinos, for example, are more likely to embrace or use touch when communicating (Andersen, 1999), tend to be more emotionally expressive (Campos & Kim, 2017), and may have more negative interpretations of conversational silence (Albert & Ha, 2004). Taken together with findings that Latinos are more collectivistic than Anglos (Oyserman, Coon, & Kemmelmeier, 2002), it is no surprise that Anglos may come off as socially cold, aloof, or unfriendly to Latinos, whereas Latinos may be perceived by Anglos as too emotional, too likely to overshare, or too likely to cross professional boundaries (Uhlmann & Sanchez-Burks, 2014). Obviously, cross-cultural communicators wanting to make their interactions go more smoothly can alter the *content* of their communication, but the present research suggests they might also alter their linguistic *style* of communication to be more effective in conversations with one another.

*Intervention.* In addition, in persuasive campaigns such as those in public health, education, and development economics, there is evidence for successful messaging producing behavioral change; the results, however, are often underwhelming (Banerjee & Duflo, 2011). Although we do not want to minimize the very real impediments to behavior change, we also think that tailoring messages in particular ways, using metaphors among cultural groups that are especially receptive to them, is worth doing. It would be unrealistic to hope that a memorable and captivating metaphor would produce consistently large effects on behavior, but interventions and "nudges" that change behavior by a few percentage points can have big practical payoffs (Banerjee & Duflo, 2011; Landau, Oyserman, Keefer, & Smith, 2014).

## Conclusion

Returning to the more immediate focus of this article, the present research suggests a potentially important distinction to explore regarding cultural differences in language use. More specifically, the studies suggest that SSLs show a relative preference for defining abstract concepts through metaphors, remember metaphors better, are more persuaded by metaphors, believe scientific arguments more when metaphor is used, and want to create socio-emotional relationships with speakers of metaphors, compared with their Anglo, Asian American, and English-speaking Latino peers. Metaphors are an attempt to communicate about something, but the very use of a metaphor can itself communicate a message about the speaker's believability, rationality, relatability, and depth of understanding—and this latter message seems to be heard differently by people from different cultures.

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### Notes

1. Obviously, the distinction between a fresh versus dead metaphor is a matter of degree. For studies here, we tried to create or use relatively novel metaphors (see Supplementary Materials), though we acknowledge others may have different opinions of our literary style. Furthermore, there are distinctions between metaphors, similes, and analogies, but for simplicity, we call all these "metaphor" here.
2. These were the two items we asked consistently across studies. For some studies, we asked participants extra questions that varied across studies (e.g., How often they dreamed in the language? listened to it on the radio? spoke it at work?)

There were very slight differences in the two key questions across studies (as seen in the Supplementary Materials). Experiments 1, 3, and 4 used a 1 to 5 scale; Experiment 2 used a 0 to 100% scale. For most studies, dividing Latinos and Asian Americans by whether they were at or above the midpoint on these items split the sample approximately equally between Spanish-speaking Latinos (Asian-language-speaking Asian Americans) versus English-speaking Latinos (English-speaking Asian Americans.)

3. Whether a definition was in the top three could logically be derived from the ratings. Dropping this variable does not change conclusions, contrast SSL versus other four groups, $t(116) = 1.96$, $p = .053$; $t$ test of SSL versus all else, $t(119) = 2.22$, $p = .028$.
4. There are several plausible explanations for the low frequency of spontaneously-generated metaphors. First, participants may have approached the task in a technical, straightforward way, different from how they might describe their experiences to a friend. (e.g., the way someone in love describes her feelings toward her partner may differ from the way she describes her feeling on a questionnaire.) Second, the task might have been too rushed for participants to spontaneously generate original metaphors. Third, such original metaphors may be relatively uncommon, even setting aside task demands here (Pinker, 2007).
5. The results of a $t$ test on the difference between ethnic groups for the difference score of metaphoric versus non-metaphoric stimuli are the same as that for an interaction between Ethnic group × Metaphoric versus Nonmetaphoric stimuli (as a within-subjects variable). For simplicity, we present the $t$ test.
6. Inverse efficiency scores combine speed and accuracy into one score. A multivariate analysis examining reaction-time speed and accuracy gives a result similar to that above (effect of SSL vs. all others, $F(1, 107) = 8.35$, $p = .005$. Follow-up univariate tests indicated that for reaction time, the SSL versus all others comparison was $F(1, 107) = 9.49$, $p = .003$); for accuracy, $F(1, 107) = 1.23$, $p = .27$.
7. Note these are relative preferences. For definitions, participants overall preferred nonmetaphoric to metaphoric definitions (Metaphor – Nonmetaphoric score mean for SSL = −0.72, all others = −1.42). For sentences of the story, metaphor preference – nonmetaphor preference mean for SSL = 0.03, all others = −0.07). Index scores in the text are positive because subindices were standardized before being combined into the preference index.
8. As reaction-time data can have high variance, reaction-time values outside Tukey's "inner fences"—1.5 × interquartile range below the 25th and above the 75th percentile—were excluded. Results change somewhat for the recall data if these cases are not excluded as means change a relatively small amount but variances increase dramatically, $p = .043$ for the five-group contrast, $t(21.72) = 1.46$, $p = .16$ for $t$ test of SSL versus all else, equal variances not assumed. Note also these are relative differences. Overall, all groups recalled metaphoric sentences faster.
9. There were three areas of interest in the present experiment. Standardizing and combining the three DVs into one composite variable produces SSL $M = 0.32$ versus all other groups = −0.09, contrast of five groups $t(116) = 2.41$, $p = .018$; $t$ test of

SSL versus all else, $t(119) = 2.65$, $p = .009$. A MANOVA gives similar results, overall MANOVA $p = .001$ with univariate $p$s of .024 for preferences, .002 for recall, and .359 for reading time.

10. A clerical error led to age, gender, and language data not being collected from participants in one San Francisco Area location. This meant that Latinos and Asian Americans in that location could not be classified into English-speaking versus Spanish-/Asian-language-speaking. Anglo-Americans from that location are included in the analyses in the text. Excluding them would make effects slightly larger (effect size $r = .17$, $p = .004$ for (4 -1 -1 -1 -1) contrast, $p = .045$ for $t$ test of SSL vs. all others).

11. One exception was that the direct condition included the additional question "What was one of your earliest memories?" This question was added to make the duration of videos in each condition comparable, thus minimizing any influence of mere exposure. This was necessary because videos in the metaphoric condition were, on average, slightly longer than those in the direct condition (348.5 vs. 303.0 s). Overall, the difference in length between the metaphoric and nonmetaphoric videos was not significantly related to either participants' preferences ($r = .07$, $p = .19$) or memory ($r = -.05$, $p = .36$).

## Supplemental Material

Supplemental material is available online with this article.

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