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Extended Metaphors are the Home Runs of Persuasion: Don't Fumble the Phrase

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ABSTRACT

Metaphors pervade discussions of critical issues and influence how people reason about these domains. For instance, when crime is a *beast* people are more likely to suggest enforcement-oriented approaches to crime-reduction (e.g., by augmenting the police force); reading that crime is a *virus*, on the other hand, leads people to suggest systemic reforms for the affected community. In the current study, we find that extending metaphoric language into the descriptions of policy interventions bolstered the persuasive influence of metaphoric frames for important issues. That is, in response to a crime *virus* people were even more likely to endorse social reforms that were described as "treatments," while in response to a crime *beast* people were even more likely to endorse "attacking" the problem with harsh enforcement tactics. Of note, people were not simply drawn to extensions of previously instantiated metaphors: when extended metaphors were paired with a conceptually incongruent policy intervention (e.g., "treating" a crime [*virus*] by augmenting the police force), we found no preference for the policy response.

An economic system entails the production, distribution, and consumption of scarce resources. In natural language, though, economic systems are often described metaphorically, as *gardens* (e.g., "The *seeds* of economic *growth* were *planted* years ago. Today, they are just starting to *bear fruit*, and soon we will *reap* the rewards"), *vehicles* (e.g., "The economy is *off track* or *broken down*"), *bodies* (e.g., "The economy used to be *healthy* but is now *suffering*"), and *machines* (e.g., "The economy is *broken* and needs to be *fixed*").

Conventional metaphors make up as much as 10–20% of natural discourse (Steen et al., 2010) and can be useful tools for persuasion (e.g., Bosman, 1987; Mio, 1997; Sopory & Dillard, 2002; Voss, Kennet, Wiley, & Schooler, 1992). Metaphors highlight particular relationships in the domains they describe and, as a result, can encourage systematic patterns of inference (Lakoff & Johnson, 1980). For instance, if the economy is a *vehicle* and it is *broken down*, then getting it moving again might require a financial *jumpstart*. On the other hand, if the economy is a *stunted plant*, giving a momentary jolt of nutrients, sunlight, and water is unlikely to be an effective long-term solution for the health of the plant. Instead, the economy might be better served by consistent sunlight, water, nutrients, and a supportive environment (e.g., investments in education and job training to provide a strong workforce).

Recent work has found that these implicit structural entailments of metaphors affect how people reason about important issues (e.g., Hauser & Schwarz, 2015; Jia & Smith, 2013; Keefer, Landau, Sullivan, & Rothschild, 2011, 2014; Landau, Sullivan, & Greenberg, 2009; McGuire, 2000; Ottati, Rhoads, & Graesser, 1999; Reinsch, 1971; Robins & Mayer, 2000; Thibodeau & Boroditsky, 2011, 2013, 2015). For instance, a *war* metaphor for cancer makes for an excellent slogan and may facilitate

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fund-raising efforts at a societal level, but it also seems to downplay the role of relatively mundane behavior change in cancer prevention at an individual level (e.g., smoking less; Hauser & Schwarz, 2015); priming people to think of immigration as a type of bodily contamination leads people to adopt anti-immigration attitudes (Landau et al., 2009); and framing crime as a *virus* (rather than a *beast*) leads people to favor social reforms as a tool for crime-reduction over harsh enforcement and punishment (Thibodeau & Boroditsky, 2011, 2013, 2015).

One reason that scholars have been intrigued by the persuasive power of metaphor is that people often fail to realize that metaphors influence the way they think. The meaning of figurative language is processed automatically (Glucksberg, Gildea, & Bookin, 1982)—in the sense that people do not have to consciously decide to interpret an idiom or metaphor—and such tropes often go undetected in natural language (Thibodeau & Boroditsky, 2013). This means that some metaphors influence thought by serving as peripheral or heuristic cues, rather than through a process of conscious deliberation and rationalization (cf. Chaiken, Wood, & Eagly, 1996; Petty & Cacioppo, 1986; although deliberately invoked, explicitly instructive metaphors can also influence thought—see, e.g., Steen, 2008).

Here we ask whether extending metaphoric language into the description of candidate responses can facilitate (or inhibit) the persuasive influence of a previously instantiated metaphoric frame. Consider the example of crime for which a *virus* metaphor promotes an emphasis on social reform and a *beast* metaphor promotes an emphasis on enforcement (Thibodeau & Boroditsky, 2011, 2013). Will people be even more likely to support a proposal to reduce crime by focusing on the educational system when such a program is described as a "treatment" for a crime *virus*? Will people be even more likely to support a proposal to reduce crime by focusing on enforcement and punishment when these programs are described as a way to "attack" a crime *beast*?

Further, can metaphor framing effects be negated (or even reversed) when an extended metaphor is used to describe a proposal that would otherwise be incongruent with the metaphor frame, as in "The city should *treat* a crime [*virus*] by increasing the police force" (or "attack" a crime *beast* by focusing on education reform)?

Prior work has found that people prefer consistent extensions of metaphors in response time and decision-making tasks, even when a mixed metaphor expresses the same conceptual information (Nayak & Gibbs, 1990; Thibodeau & Durgin, 2008). For instance, reading a sentence that relates anger to heat in a pressurized container leads to faster processing of "I was *fuming* with anger" than "I was *bristling* with anger." In this case, "fuming" and "bristling" both identify the speaker as experiencing a particularly volatile and visceral form of anger. However, only "*fuming* with anger" extends the initial metaphor frame.

These findings are consistent with a recently coined "metaphoric fit" hypothesis (Keefer et al., 2014), which has been applied to embodied conceptual metaphors. According to the theory, problems that are described using a bodily metaphor will lead people to more favorable evaluations of solutions that also appeal to the same bodily metaphor. Keefer et al. (2014) investigated this theory by asking people to evaluate drugs for depression. They found that framing depression with a spatial metaphor (*depression is down*) led people to prefer a drug called "Liftix"; framing depression as *darkness*, on the other hand, led people to prefer "Illuminix."

The current study builds on these findings in three important ways. First, we investigate how (non-embodied) extended metaphors affect patterns of reasoning for policy interventions, risk management, and blame attribution. Although some studies of extended metaphor (e.g., Hauser & Schwarz, 2015; Keefer et al., 2014) use relatively "high stakes" contexts like mental illness, most are situated in relatively "low stakes" domains like abstract discussions of anger, hard work, or relationships (e.g., Keysar, Shen, Glucksberg, & Horton, 2000; Nayak & Gibbs, 1990; Thibodeau & Durgin, 2008). Using real-world social issues as a test-bed for studying the role of metaphor in reasoning is important both because metaphor pervades discussion of social policy and because people have prior knowledge, attitudes, and beliefs that moderate the influence of metaphor frames (e.g., Bosman & Hagendoorn, 1991, 2015; Thibodeau & Boroditsky, 2011, 2013).

A second way in which the current work builds on prior research is by pairing extended metaphors with varying conceptual content. In prior work, researchers were careful to keep the meaning of contrasting metaphorical expressions constant (e.g., Nayak & Gibbs, 1990; Thibodeau & Durgin, 2008). For instance, "I was *fuming*" and "I was *bristling*" instantiate different conceptual metaphors for anger (as *heat in a pressurized container* or as *a ferocious animal*), but both express a similar magnitude and valence of emotion: an extreme and volatile form of anger. Similarly, "Liftix" and "Illuminix" draw from different source domains, but were carefully described as having similar effects on patients' mood and symptoms (Keefer et al., 2014).

By pairing extended metaphors with different conceptual content, we can begin to assess the separate lexical and conceptual contributions of metaphor on reasoning. Consider, again, the case of crime (Thibodeau & Boroditsky, 2011, 2013, 2015). On this approach, the relationship between a crime *virus* and reform-oriented responses (a crime *beast* and enforcement-oriented responses) reflects a conceptual mapping. Describing these response options using extended metaphors like "treat" or "attack" imparts a lexical relationship between the frames and response options.

We hypothesize that when an extended metaphor is paired with the conceptually congruent response (e.g., "treat" a crime *virus* with social reform or "attack" a crime *beast* with more police), people will be even more likely to show a metaphor framing effect. On the other hand, when the extended metaphor is paired with the conceptually incongruent response (e.g., "treat" a crime *beast* with social reform or "attack" a crime *virus* with more police), people will be less likely to show a metaphor framing effect.

There are several reasons why extended metaphors may facilitate persuasion. First, consistent extended metaphors may re-instantiate the initial frame and, in turn, further highlight the ways in which the congruent response maps on to the entailments of this frame. For instance, describing education reform as a "treatment" for a crime *virus* may emphasize the ways in which such a policy is similar to a treatment program for a disease (e.g., by focusing on the root cause of the problem). This would suggest that metaphors play an active role in shaping representations of complex problems and that this role can be facilitated by actively situating a response in relation to the conceptual entailments of the frame.

On the other hand, the extended metaphor may provide a lexical cue that links the frame to a response. People may be drawn to "treating" a problem that is framed as a *virus* because the *virus* frame serves as a lexical prime for other virus-related language. Lexical priming has been studied extensively in the context of literal text comprehension (e.g., Graesser & Bower, 1990) but much less in research on figurative language processing, which has tended to focus on investigating the basic capacity of metaphors to activate conceptual mappings (e.g., Bowdle & Gentner, 2005; Keysar et al., 2000; Thibodeau & Durgin, 2008; 2011; but see Patterson, 2014; for recent discussion of lexical priming in the context of metaphor comprehension). This is partly due to the fact that lexical priming is seen as a general phenomenon in language processing that is not unique to metaphor. Therefore, showing that metaphor processing can be facilitated by lexical priming would not be particularly novel or interesting for a theory of metaphor *per se* (see, e.g., McGlone, 2011).

For applied purposes (e.g., political or health related messaging campaigns), distinguishing between lexical and conceptual effects of metaphor on reasoning may be less relevant. If one could use an extended metaphor to persuade people to choose particular policy interventions, even through lexical priming, this would be an important and interesting result. It would suggest, for instance, that describing crime as a *virus* could promote a variety of policy interventions: both those that are conceptually congruent with the entailments of the metaphor and those that are not, simply by extending language that is consistent with the metaphor frame into the description of the response (e.g., "*Treat* the crime [*virus*] by increasing street patrols…").

Finally, a third way that the present work builds on previous findings is by investigating metaphor frames for a variety of target issues. Much of the recent work on metaphor framing has focused on a single domain like crime (Thibodeau & Boroditsky, 2011, 2013, 2015), depression (Keefer et al., 2014), or cancer (Hauser & Schwartz, 2015), and a small set of metaphor frames (e.g., *virus* and *beast*

for crime; *down* or *dark* for depression; *war* for cancer). For the present studies, we have designed two metaphor frames for each of 10 target domains, which cover a broad range of topics that include scenarios about cheating, crime, education, ecology, housing, income inequality, a medical mistake, partisan politics, science, and sports. That is, we not only compare *virus* and *beast* metaphor frames for crime, but also *factory* and *garden* metaphors for education, and *battle* and *theater* metaphors for partisan politics, and others (see Appendix). Although far from comprehensive, this effort helps to provide a broader and more general foundation for interpreting the results.

We present the three studies. In the first, we quantify the conceptual entailments of metaphor frames; in the second, we confirm that the extended metaphors match the consistent frame and not the inconsistent one; in the third, we present the results of a metaphor framing experiment.

Study 1: Conceptual congruence

Method

Participants

One hundred people from the United States were recruited and paid through Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011). We required that participants live in the United States and have a good performance record (greater than 90% approval on prior tasks). Data from one participant was excluded because an incorrect completion code was submitted. The final sample was 55% female with an average age of 37.2 (*median* = 34; *SD* = 11.65), of whom 39% identified as Democrats, 36% as Independents, and 24% as Republicans.

Materials and procedure

Stimuli consisted of 10 stories, each with two metaphorical frames and two candidate responses (see Appendix). Participants were asked to read a brief story about a target problem, like the one about crime below:

> Addison is a city with a crime problem. Five years ago Addison was in good shape, with no obvious vulnerabilities. Unfortunately, in the past five years the city's defense systems have weakened, and the city has succumbed to crime. Today, there are more than 55,000 criminal incidents a year—up by more than 10,000 per year. There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.
>
> The city's officials know that they have to change certain policies in response to the problem, but they aren't sure which policies to change or how much to change them.

Two metaphors for the target issue were then described:

> Two of the city's officials are leading this debate and they tend to talk about the problem in different ways.
>
> (1) One argues that "Crime is a virus infecting the city of Addison."
> (2) The other argues that "Crime is a beast preying on the city of Addison."

The participant's task was to match the policy responses to the metaphors:

> If you had to guess, which of the crime-reducing options listed below is supported by each of the officials?
>
> (a) Increase street patrols that look for criminals.
> (b) Reform educational practices and create after school programs.

The metaphor frames and candidate responses were adapted from news reports and other descriptions of the target issues. For instance, the cover story of a 2008 *New York Times Magazine* article asked, "Is urban violence a virus?" (Kotlowitz, 2008). Descriptions of crime as *chronic, epidemic*, and *plaguing* or *infecting* cities also illustrate this conventional metaphoric mapping.

For each issue we identified candidate responses that seemed to map onto different metaphor frames. For instance, a proposal to reform a city's educational system seemed more consistent with a crime *virus*—in which a city is a body that can be brought back to health by treating the root cause of the problem. A proposal to increase the police presence seemed more consistent with a *beast* metaphor—in which criminals are wild animals that need to be captured and caged (see also Thibodeau & Boroditsky, 2011, 2013).

Experiment 1 served as a manipulation check for these intuitions. Each participant was asked to match responses to frames for each of the 10 issues. The order of the issues, frames, and candidate responses was randomized across participants.

Results and discussion

Participants were instructed to match response options to metaphor frames. The extent to which the sample displays similar patterns of matching behavior is taken to reflect the degree to which the mappings between the metaphor frames and response options are conceptually congruent. Highly consistent matching at a group level indicates clear conceptual relationships between the metaphor frames and response options. Less consistent matching would indicate weaker conceptual relationships between the metaphor frames and response options.

The results of this task revealed that there were clear mappings between the responses and frames, consistent with the design of the materials—81.1% consistent on average (*95%CI*: .786, .834; range: 68.7% for a discussion of a state park to 94.9% for a discussion of a failing education system; see Table A1.). Analyzed separately (i.e., with 10 separate chi-square tests of independence), we found a significant difference in how the responses were matched to the frames for each issue, $\chi^2[1, N = 99]s > 13$, $ps < .001$, confirming that participants matched the response options to the frames at a rate much higher than chance (50%).

This suggests that our intuitions as researchers about the conceptual relationship between the metaphoric frames and responses options were consistent with the population from which the sample in the experiment will be drawn.

Study 2: Lexical congruence

In the experiment described in the following section, we implemented a 3 frame (metaphor A, metaphor B, no metaphor) by 3 extended metaphor (*consistent, inconsistent, no extended metaphor*) design, thereby creating nine versions of each stimulus item. In the *consistent* condition, we paired extended metaphors with their conceptually congruent response (e.g., "treat" with "education reform" and "attack" with "increasing police"). In the *inconsistent* condition, we paired extended

Table 1. Examples of consistent and inconsistent uses of extended metaphor in the description of response options to an issue that described a crime problem. Italics added to highlight the extended metaphoric language.

Consistent
Treat the problem by reforming educational practices and creating after school programs.
Attack the problem by increasing street patrols that look for criminals.
Inconsistent
Attack the problem by reforming educational practices and creating after school programs.
Treat the problem by increasing street patrols that look for criminals.

Table 2. Similarity scores between metaphor frames and extended metaphors as measured by LSA. For this issue (about crime), "virus"–"treat" and "beast"–"attack" were designed to be *consistent* whereas "virus"–"attack" and "beast"–"treat" were designed to be *inconsistent*.

	Treat	Attack
Virus	.28	.24
Beast	.18	.26

metaphors with their conceptually incongruent response (e.g., "treat" with "increasing police" and "attack" with "education reform"; see Table 1).

In this section we confirm that the extended metaphors did, in fact, extend the initial frames *consistently* and *inconsistently* by using latent semantic analysis (LSA; Landauer & Dumais, 1997). LSA is a tool that measures the similarity of words, phrases, and texts as a function of their contextual co-occurrence and has been shown to, among other things, reliably predict response times in for lexically primed target words in a lexical decision task (Hutchinson, Balota, Cortese, & Watson, 2008).

To conduct this analysis, we identified the words that were used to instantiate the initial metaphor frames for each issue (e.g., "virus plaguing" and "beast preying") and the words used to insatiate the extended metaphors in the description of the responses (e.g., "treat" and "attack"). Then we entered these word pairings into the LSA database, which yielded four similarity scores per issue (see Table 2). In every case two were designed (expected) to be *consistent* (more similar) and two were designed (expected) to be *inconsistent* (less similar).

For each issue, we averaged ratings of similarity between the two *consistent* and the two *inconsistent* pairings. For instance, in the crime case the average cosine (LSA's metric of similarity) between the *consistent* pairings was .27 and the average cosine between the *inconsistent* pairings was .21. A paired *t*-test revealed that the *consistent* matches ($M = .261$, $SD = .139$) were more similar than the *inconsistent* matches ($M = .167$, $SD = .134$), $t[9] = 5.018$, $p < .001$, confirming the design of the materials.

The average similarity between the *consistent* matches was greater than the average similarity between the *inconsistent* matches for all of the ten issues except one. The one issue that yielded anomalous results described a medical clinic that had made a mistake in filling prescription medication. One metaphor framed the clinic as an *ecosystem* and was extended with the word "interactive"; the other framed the clinic as an *assembly line* and was extended with the word "station." LSA revealed that the relationship between the *consistent* pairings was the same as the relationship between the *inconsistent* pairings in this case.

The lack of a difference between the *consistent* and *inconsistent* extended metaphors for this issue raises a larger issue about metaphor frames that has so far been overlooked: sometimes a metaphor frame can be extended in multiple ways. For instance, in the crime context, the word "treat" was found to be more similar to the *virus* than *beast* frame; the word "attack" was found to be more similar to *beast* than *virus* frame. However, *viruses* can be "attacked" and *beasts* can be "treated." For this reason we divided the issues into two groups: those that were more ambiguous (less distinct or specific) with respect to the similarity between the initial frames and extended metaphors (i.e., cases where the initial frames were similar to both extended metaphors) and those that were less ambiguous (more distinct or specific) with respect to the similarity between the initial frames and extended metaphors. We will consider this dichotomy in analyzing the results of the experiment presented below. It may be the case that the extended metaphors are especially likely to facilitate (or inhibit) the effect of the initial frame when the similarity between the frame and extended metaphoric language is less ambiguous (more specific).

The difference in similarity between the initial frames and metaphor extensions was significantly higher for the five items that were identified as less ambiguous (more distinct and specific; $M = .143$, $SD = .037$) than for the five items that were identified as more ambiguous ($M = .046$, $SD = .027$), $t[8] = 4.733$, $p = .001$.

Together, the two norming studies validate the experimental design. For each issue, there were systematic conceptual and lexical relationships between the metaphor frames and candidate responses. A group of naïve participants in Study 1 confirmed that the two response options for each issue mapped on to the conceptual entailments of different metaphor frames. Study 2 used LSA to confirm that the *consistent* extended metaphors were more similar to the initial frames than the *inconsistent* extended metaphors. In the following experiment, we will test whether people are sensitive to these relationships when metaphor frames are embedded in the description of a target issue and when extended metaphors are used to describe the response options.

Study 3: Framing experiment

Methods

Participants

One thousand people from the United States were recruited and paid through Mechanical Turk, using the same inclusion criteria as Study 1. Twelve participants in Study 3 had participated in Study 1; these data were excluded from the analysis of Study 3. The final sample was 51% female with an average age of 33.2 (*median* = 30; *SD* = 11.38), of whom 40% identified as Democrats, 42% as Independents, and 18% as Republicans.

Materials and design

Nine versions of each of 10 stimulus items were created by crossing the three framing conditions (metaphor A, metaphor B, none) with the three extended metaphor conditions (*consistent, inconsistent, no extended metaphor*). Participants were presented with one version of each of the 10 issues. Their task was to answer a follow-up question for each issue, for which there were two candidate responses. The follow-up question was designed to reveal whether people were sensitive to implicit conceptual entailments of the metaphor frames. In some cases, the follow-up question asked the participant to choose between policy responses (e.g., as in the case of crime); in other cases the follow-up question asked participants make a blame attribution or speculate on some other aspect of the target domain (e.g., for the issue that described a mistake at a medical clinic, participants were asked whether the "nurse who administered the medicine" or the "computer system that relayed messages between the nurse and pharmacist" was more responsible for the mistake; see Appendix).

In the *consistent* and *inconsistent* conditions, metaphoric language was used to describe both of the response options, thereby affording careful control over the experimental manipulation. That is, participants who read that crime was a *virus* were *not* asked to choose between the following two response options in the *consistent* intervention pairing condition:

(1) Increase street patrols that look for criminals.
(2) *Treat the problem by* reforming educational practices and create after school programs.

Such a design would allow for a test of the hypothesis that extended metaphors facilitate persuasion but is confounded by the fact that metaphorical language is used in only one of the two response options. Instead, metaphoric language was inserted into descriptions of both responses (e.g., "*Treat the problem by* reforming…" and "*Attack the problem by* increasing…"; see Table 1 and Appendix).

This design further differentiates the present work from related studies on metaphor framing in which only one response option in a forced choice task re-instantiated a metaphor frame. For instance, Keefer et al. (2014) found that people presented with a spatial metaphor for depression preferred a drug called "Liftix" to a drug called "Effectrix" and that people presented with a darkness metaphor for depression preferred a drug called "Illuminix" to "Effectrix." In both of these cases, only one of the response options instantiates a metaphor.

Our contention, in designing the present stimuli, is that a better test of something like the metaphoric fit hypothesis would include metaphorical descriptions of both candidate responses: participants primed to think of depression as being *down* should prefer "Liftix" to "Illuminx"; participants primed to think of depression as *darkness* should prefer "Illuminix" to "Liftix." This controls for idiosyncratic variability associated with any particular metaphor and for the possibility of a general preference for metaphorical language over non-metaphorical language (Thibodeau & Boroditsky, 2015).

Each participant was exposed to one of the nine versions of each stimulus item. The order and version of the stimuli was randomized. At the end of the experiment, participants were asked demographic questions, including their age, gender, language history, educational history, political affiliation—Democrat, Independent, or Republican—and political ideology—on a 101-point scale (from 0, "very liberal," to 100, "very conservative").

Congruence

To analyze data from the conditions that included a metaphoric frame, we coded responses as "congruent" or "incongruent" with the given frame. For instance, in the context of the crime example, "Increase street patrols…" was coded as congruent with the *beast* frame and incongruent with the *virus* issue frame, regardless of whether the descriptions of the responses included an extended metaphor.

This approach captures the joint effects of the pairs of metaphor frames and is consistent with prior work on metaphor framing (e.g., Robins & Mayer, 2000, 2015; Thibodeau & Boroditsky, 2011, 2013). One advantage of such a coding scheme is that it provides a clear metric for interpreting the degree to which metaphors influence judgments. Metaphor frames that do not systematically influence the way people think about an issue will yield a congruence score close to .5; metaphor frames that influence people to choose the response option that is consistent with the frame's entailments will yield a congruence score above .5; and metaphors that influence people to choose the response option that is inconsistent with the frame's entailments will yield a congruence score less than .5.

For instance, the results of the current experiment found that people were more likely to think that a city should focus on education reform in response to a crime *virus* (59.0%; *no extended metaphor condition*) than *beast* (51.9%; *no extended metaphor condition*). Since the shift is consistent with the predicted effects of the metaphor, the congruence score for this item is greater than .5 (.590 + (1–.519) = 1.071; 1.071/2 = .536). In other words, 53.6% of responses to this item were congruent with the metaphor frame.

Note that if everyone, in both framing conditions, thought that the city should increase the police force in response to the crime problem, the congruence score would be .5: all of the responses in the *beast* condition would be coded as congruent with the frame but none of the responses in the *virus* condition would be coded as congruent with the frame (1 + 0 = 1; 1/2 = .5). In this way, transforming participants' judgments into a congruence score allows for clear comparison across issues with different metaphor frames and response options.

Coding responses as congruent or incongruent with the metaphor frame requires that we collapse over the two metaphor frames for a given issue. As a result, congruence cannot be computed when the issue is presented without an initial metaphor (i.e., for the no metaphor trials).

For the present article, results by issue will not be discussed in detail. Instead, we will highlight comparisons between framing and extended metaphor conditions. In some places below, the pattern of results for particular issues is presented for illustrative purposes.

Results

We found that participants chose the congruent response option 54.9%, 51.3%, and 50.1% of the time in the *consistent, no extended metaphor*, and *inconsistent* extended metaphor conditions, respectively (see Table A1 for congruence scores by issue and extended metaphor condition). We

fit a mixed ANOVA on the mean congruence ratings for the 10 issues with *extended metaphor* condition treated as a factor and *issue* as a repeated measure. The results indicated a statistically significant difference in the degree to which people chose the congruent response by extended metaphor condition, $F[2, 18] = 4.011$, $p = .036$.

Due to the relatively small number of items, no pairwise differences between extended metaphor conditions were significant in post-hoc testing. However, the pattern of results suggested extending *consistent* language into the description of the response options made people more likely to choose the congruent response whereas extending *inconsistent* language into the description of the response options made people less likely to choose the congruent response. We present additional analyses that help to distinguish between the conditions below.

Did the specificity of the extended metaphors matter?

In order to test whether the quality of the relationship between the initial frame and the extended metaphor affected this pattern of behavior, we added an additional factor into this analysis: whether LSA scored the relationships between the initial frames and extended metaphors as more ambiguous (i.e., both frames were similar to both extended metaphors) or less ambiguous (i.e., the frames were selectively more similar to the *consistent* extended metaphors than the *inconsistent* extended metaphors).

The result was a statistically significant interaction between this factor and the extended metaphor condition, $F[2, 16] = 3.872$, $p = .043$. As shown in Figure 1, differences in congruence between the *no extended metaphor, consistent* extended metaphor, and *inconsistent* metaphor conditions were greater for items that were less ambiguous, $F[2, 8] = 7.137$, $p = .017$, than for items that were more ambiguous, $F[2, 8] = .134$, $p = .877$.

This analysis suggests that the degree to which extended metaphors facilitate the persuasive influence of a frame depends, in part, on the specificity of the extended metaphor. For instance, although the word "treat" fits a *virus* frame better than it fits a *beast* frame (and the word "attack" fits a *beast* frame better than a *virus* frame), "treat" can also be used in reference to a *beast* (similarly, the

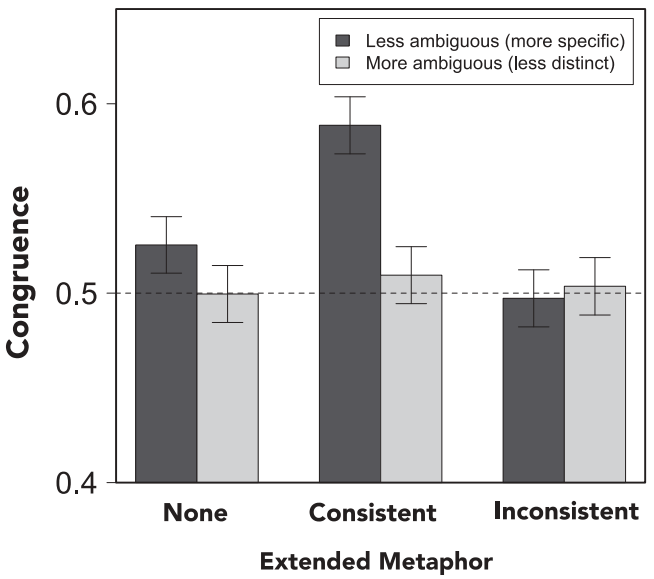

Figure 1. Proportion of congruent responses by extended metaphor condition for items with a less ambiguous relationship between the initial frame and extended metaphor (more specific to the *consistent* extended metaphor) and for items with a more ambiguous relationship between the initial frame and extended metaphor (indicating that the extended metaphor may be somewhat appropriate in the context of both frames).

Table 3. Proportion of participants who preferred a proposal to reduce crime through education reform over a proposal to reduce crime by increasing the police force. Proportions are split by the initial frame (row) and extended metaphor (column). The bottom row collapses over the metaphor framing conditions; the rightmost column collapses over the extended metaphor conditions.

	Education police	Treat w/education Attack w/police	Attack w/education Treat w/police	Mean
Crime as problem	.527	.500	.530	.519
Crime as *virus*	.590	.505	.591	.562
Crime as *beast*	.512	.409	.569	.499
Mean	.543	.471	.563	

word "attack" can be used in reference to a *virus*). For this issue, people chose the congruent option more in the *consistent* than *inconsistent* extended metaphor conditions (55% compared to 51%); however, this difference is relatively small when compared to the effects of the extended metaphors in the context of an issue that described a research scientist: in which the relationships between the initial frames (*climbing a mountain* or *working on a puzzle*) were more specifically related to one, and not the other, extended metaphor ("gains ground by…" or "looks for connections by…"; 72% congruent in the *consistent* condition compared to 50% congruent in the *inconsistent* condition). Not only was the relationship between a given frame and the matched extended metaphor relevant to participants' judgments, but the relationship between the frame and the alternative extended metaphor mattered as well.

Did altering the language of the candidate responses matter?

This analysis raises an additional question about the effect of the metaphor frames: to what extent did adding extended metaphors to the language of the response options, in themselves, affect participants' judgment of the response options? That is, people may prefer a response to crime that emphasizes social reform over a response that would increase street patrols, in general. But adding metaphorical language to the description of these response options may change this dynamic: for instance, people may prefer "attacks" against crime compared to "treatments" for crime.

We found some evidence that adding extended metaphoric language to the descriptions of the responses shifted preferences for the responses, for two of the 10 issues: crime and partisan politics. In the case of crime, the data suggested that people preferred responses that included the word "attack" (see Table 3). For this issue, "education reform" was preferred over "increasing police" when it was described without an extended metaphor (54%) or when it was described as an "attack" against crime (56%—the *inconsistent* extended metaphor condition) but not when it was described as a "treatment" (47%—the *consistent* extended metaphor condition). This may reflect participants' sensitivity to the valence of the extended metaphors, as the word "attack" seems to connote a more urgent and forceful response to the crime problem than the word "treat." Similarly, for the description of partisan politics, people were more likely to prefer a response (regardless of the frame) when it was described as an attempt to "bring a truce" rather than "close the curtain" on the problem. This may reflect a preexisting tendency for participants to think of politics as war (Lakoff, 2002).

Since both extended metaphors ("attack" and "treat," "bring a truce" and "close the curtain") were included in descriptions of the response options, regardless of the initial frame, such a shift does not affect the measure of congruence.

For both issues (crime and partisan politics), people were more likely to select the congruent response in the *consistent* extended metaphor condition (55% and 60% for crime and partisan politics, respectively) than in the condition that did not include an extended metaphor (54% and 54%) or in the condition that extended the metaphor *inconsistently* (51% and 52%). This suggests that changes in participants' behavior (i.e., more congruent responding in the *consistent* condition and less congruent responding in the *inconsistent* condition) were the result of the relationship between the initial frame and the extended metaphor.

How strongly did the metaphors affect judgments?

So far, we have shown that people were more likely to choose the conceptually congruent response when it was described using *consistent* extended metaphoric language and that the specificity of the relationships between the initial frames and extended metaphors moderated this effect. However, we have not tested whether people chose the conceptually congruent response more often than one would expect by chance in any of the three conditions.

Here, we use mixed-effect logistic regression to test this important question and to make further comparisons between the conditions. On this approach, analyses are conducted at the level of the individual trial, rather than by averaging data over items or participants (i.e., by fitting a single model to participants' binary judgment for each issue; Bates, Maechler, Bolker, & Walker, 2014; Jaeger, 2008). This allows us to take advantage of the statistical power afforded by the relatively large sample and increases the reliability of the results (by reducing the probability of a Type 1 or Type 2 error; Jaeger, 2008). In the model, we included random effects for participant and issue to simultaneously account for error variance associated with these factors (i.e., participant and issue were treated as repeated measures; cf. Clark, 1973). An additional advantage of this approach is that it allows us to compare across all three levels of the framing manipulation (metaphor frame A, metaphor frame B, and no frame) as well as all three levels of the extended metaphor manipulation (*consistent, inconsistent*, and *no extended metaphor*).

We first confirmed the results presented above by testing for an interaction between the framing and extended metaphor manipulations. We compared two models[1]: one that included predictors for interactions between these factors and one that did not. We found that including predictors for the interactions significantly improved the fit of the model, $\chi^2[4] = 11.378$, $p = .023$. Post-hoc testing (Bonferroni-corrected $\alpha = .017$) revealed that participants were more likely to choose the congruent response in the *consistent* extended metaphor condition than in the *inconsistent* metaphor condition, $\chi^2[1] = 10.410$, $p = .001$, or the *no extended metaphor* condition, $\chi^2[1] = 7.608$, $p = .006$. There was no difference between the *inconsistent* and *no extended metaphor* conditions, $\chi^2[1] = .646$, $p = .422$.

We then tested whether people were significantly more likely than chance (50%) to choose the congruent response option for each of the three extended metaphor conditions. We found that the metaphor frames affected participants' judgments when the candidate responses were described with *consistent* extended metaphors, $\chi^2[2] = 25.812$, $p < .001$, and when the candidate responses were described with *no extended metaphors*, $\chi^2[2] = 13.203$, $p = .001$. However, the metaphor frames did not affect participants' judgments when the candidate responses were described with *inconsistent* extended metaphors, $\chi^2[2] = 3.963$, $p = .138$.

In sum, these analyses confirmed the omnibus difference in participants' likelihood of choosing a congruent response by extended metaphor condition. It also revealed that people were more likely to choose the congruent response than one would expect by chance in the *consistent* and *no extended metaphor* conditions but not in the *inconsistent* extended metaphor condition.

In other words, we find evidence of a simple metaphor framing effect when the candidate responses were described without extended metaphors, which was amplified (facilitated) when the candidate responses were described with *consistent* extended metaphors. This effect was not negated (inhibited) when the candidate responses were described with *inconsistent* extended metaphors.

Were some people more likely than others to show a metaphor framing effect?

Finally, we included individual difference measures in the model to test whether variability in the age, educational history, political ideology, or gender of participants moderated the effect of the metaphor frames. We found an effect of age, $\chi^2[1] = 13.577$, $p < .001$, which suggested that older participants were more likely than younger participants to choose a response that was consistent

[1]The deviance between the models (i.e., difference in likelihood ratios) is reported as an index of model fit: model deviance approximates a chi-square distribution with the number of added parameters as its degrees of freedom (Menard, 2002).

Table 4. Best fitting logistic regression model. Extended metaphor condition and age were significant predictors of congruence—a measure of the influence of the metaphor frames.

Predictor	β	SE	p
Intercept	.197	.058	<.001
Inconsistent extended metaphor	−.197	.061	.001
No extended metaphor	−.146	.061	.017
Age	.054	.025	.030

Note. The *inconsistent* and *no extended metaphor* conditions are being compared to the *consistent* metaphor condition in this model. Participants chose the congruent response option less often in both of these conditions relative to the *consistent* extended metaphor condition, as evidenced by the negatively signed coefficients. There was no difference between the *inconsistent* and *no extended metaphor* conditions.

with the frame (see Table 4 for best fitting model). We did not find evidence of differences by the educational history, political ideology, or the gender of participants.

Note that this analysis tests for an influence of the individual difference measures on the metaphor framing effect across all of the issues. One possibility is that certain groups of people were more or less likely to show a metaphor framing effect for some of the issues but not others. For instance, prior work has found that the *virus* and *beast* frames for crime are more likely to influence judgments of Democrats and Independents than Republicans (Thibodeau & Boroditsky, 2011, 2013, 2015). We find a similar pattern of results for the crime issue in the present study. Overall, Democrats and Independents were more likely to emphasize education reform than increasing police (55% and 58%, respectively), regardless of the extended metaphor condition. Republicans, on the other hand, were less likely to emphasize education reform (38%), regardless of extended metaphor condition.

Democrats and Independents were also more likely to be influenced by the frame than Republicans. When crime was framed as a *virus*, regardless of extended metaphor condition, Democrats, Independents, and Republicans judged education reform to be a better crime-reduction program 59%, 62%, and 36% of the time. When crime was framed as a *beast*, on the other hand, these preferences shifted to 51%, 53%, and 40%. That is, we found shifts of 8 and 9 percentage points in the predicted direction for Democrats and Independents; we found a shift in the opposite direction of 4 percentage points for Republicans.

This suggests that peoples' sensitivity to metaphor framing effects may differ as a function of the target domain. When people have strong prior attitudes and beliefs about a given issue (like crime) they may be less susceptible to a metaphor framing effect.

General discussion

The results of this study indicate that metaphor framing is especially persuasive when consistent metaphoric language is extended to descriptions of candidate responses. Although people are more likely to endorse approaches to crime-reduction that emphasize social reform when crime is framed as a *virus*, they are even more likely to do so when the reform is described as a "treatment" (i.e., in the context of a re-instantiation of the initial metaphor frame).

We found differences of about 10 (54.9% congruent) and 3 (51.3% congruent) percentage points in the *consistent* and *no extended metaphor* conditions that were attributable to the metaphor frame. Of note, we also found that the specificity of the extended metaphor mattered. Extended metaphors that were specifically related to the matching frame, and distinct from the non-matching frame, were most likely to facilitate persuasion (58.9%; a shift of about 18 percentage points). For instance, the facilitative effect of the extended metaphor was less pronounced in the context of crime because *viruses* and *beasts* can both be "treated" and "attacked."

For comparison, in prior work, we have found shifts on the order of 15 percentage points in a free response task and 8 percentage points in a forced choice task, when response options were described without extended metaphors (Thibodeau & Boroditsky, 2011, 2013); in a meta-analysis of metaphor

framing studies conducted between 1983 and 2000, Sopory and Dillard (2002) find that a metaphor frame is associated with a shift of about 6 percentage points. One notable difference between the present work and prior studies is the use of multiple target domains and pairs of metaphor frames. As shown in **Table A1**, there was variability in the persuasiveness of the metaphor frames by issue, which may be attributable to features of the metaphor frames (e.g., their conventionality or aptness; Bowdle & Gentner, 2005), prior attitudes toward the target issues or candidate responses, or a variety of other important variables. Future work will aim to further explore the boundary conditions of metaphor framing effects (Steen, Reijnierse, & Burgers, 2014).

The full scope of the findings seem conclusive in one respect—that extended metaphors can facilitate the persuasive influence of metaphor frames—and yet raise a number of fundamental questions about metaphor and language processing. To name just two: How closely must a response map onto the conceptual entailments of a metaphor frame in order for the frame to affect judgment? And how closely must an extended metaphor match the related frame in order to facilitate a metaphor framing effect?

Studies 1 and 2 represent attempts to quantify the conceptual and lexical similarity between the frames and responses. Indeed, one goal of the current paper is to show that such methods—gauging intuitions of naïve participants about conceptual mappings and using a metric of similarity from a database of contextual co-occurrence—can help to make principled and reliable predictions about the capacity of metaphor to influence high-level judgments and reasoning. Although we used our intuitions to develop the materials, we recognize that our experience thinking about metaphor and the psychology of language may bias our judgments (e.g., see Keysar & Bly, 1995). Gauging the intuitions of a broader base of people about the conceptual entailments of the frames—from the population that was sampled in the subsequent experiment—helps to establish the validity of the design, as does the use of LSA in verifying that the extended metaphoric language did, in fact, match the related metaphor frames. Further, the use of LSA helped reveal an important dichotomy in our materials, and, in turn, to test a hypothesis about extended metaphors that was borne out in the data.

However, the work does not provide a definitive answer to these questions, nor does it address a variety of related questions about metaphorical reasoning. For instance, Study 1 showed that the metaphor frames and response options used in the experiment had distinct conceptual mappings. However, it did not reveal the precise nature of the entailments. That is, what does it really mean to think of crime a as a *virus* or *beast*? What aspects of a *virus* or *beast* schema transfer to the domain of crime?

Some have argued that comparing metaphorically framed to non-metaphorically framed issues can help to address this question (e.g., Reijnierse, Burgers, Krennmayr, & Steen, 2015; Steen et al., 2014). On such a view, a non-metaphorically framed description of the target issue is thought to serve as a *baseline* for comparison with the metaphorically framed conditions. However, non-metaphoric frames often differ from metaphoric frames along a variety of linguistic dimensions (e.g., valence, arousal, imagery), which can be difficult to control for and make such comparisons difficult to interpret (see Thibodeau & Boroditsky, 2015, for an extended discussion of this issue).

Further, although we have argued that the metaphors used in the study are conceptual in the sense that they have implicit entailments that influence how people think, it does not seem appropriate to describe them as embodied conceptual metaphors (Lakoff & Johnson, 1999) or even to describe them as conceptual in the sense that people use these metaphors in normal circumstances to think about the target domains that were described. People may think of partisan politics as *war* or *theater* in their everyday lives, but they may not think of nature reserves as *backbones* or *gems* of their communities in the absence of such a description.

For these reasons it may be more appropriate to describe the effect of these metaphors in terms of the role that they play in communication rather than the role they might play in structuring the long-term representation of conceptual knowledge (Thibodeau & Durgin, 2008): for instance, in terms of schematic knowledge structures (Bransford & Johnson, 1972; Thibodeau & Boroditsky, 2011).

This account has a variety of important implications. It suggests that the influence of the frame will be affected by participants' prior knowledge of and attitudes toward the source and target domains (Philip, 2011). People who believe strongly that crime is a symptom of underlying social problems are unlikely to be swayed toward enforcement-oriented approaches by a *beast* frame. Similarly, a *virus* frame may be less likely to lead people to endorse social reform as a means of crime-reduction if discussions of Ebola are prominent in the media—in that case, people may call to mind the need for a quarantine for the infected city.

These questions apply to the relationships between the initial frames and extended metaphors as well. Consider the title of this article: "Extended metaphors are the home runs of persuasion: Don't fumble the phrase." For some, this will read as a consistent extended metaphor. The phrase "home runs" and the word "fumble" are both related to sports. However, "home runs" are scored in baseball whereas "fumbles" occur in American football. As a result, people who are highly familiar with sports may read it as an ironic mixed metaphor (albeit forced).

This example also helps to illustrate a distinction that has been made between conceptual and lexical information in the extended metaphors. An alternative title might substitute the word "touchdowns" for "home runs" (an effective way to score points in American football). Such a title might have similar conceptual entailments (e.g., extended metaphors are effective) but might have different lexical associations (e.g., for people who know a lot about baseball and football, there might be a stronger lexical association between "fumbles" and "touchdowns").

As noted in the introduction, prior work suggests that people are sensitive to the conceptual entailments of metaphors and idioms (e.g., Nayak & Gibbs, 1990). In some experiments the lexical relationships between a metaphor and response (e.g., target sentence in a response time task or candidate response in a forced choice task) have made it difficult to identify whether people are influenced by the conceptual or lexical features of a given metaphor (see, e.g., McGlone, 2011), although several studies seem to provide convincing evidence that the structural entailments of metaphor, and not just their lexical associations, shape thought (e.g., Fuhrman et al., 2011; Gibbs, 2011).

The present work suggests that the conceptual entailments and lexical associations of metaphors are mutually beneficial sources of information (see, e.g., Patterson, 2014), as people were most likely to be influenced by the metaphor frame when the conceptually related response option was described with a matching extended metaphor. People learn about abstract concepts like time and complex issues like crime through language—language that is suffused with metaphors that have conceptual entailments and lexical associations (Lakoff & Johnson, 1980). Although it is valuable to think about how these distinct sources of information contribute, separately and in combination, to long-term and on-line representations, it may not be possible to dissociate them completely. Further, at a process level, both of these sources of information can be can be modeled as a spreading activation in an associative network (Flusberg, Thibodeau, Sternberg, & Glick, 2010; Rogers & McClelland, 2008; St. John, 1992).

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Appendix

Stimulus Materials

(1) **Cheating**

The principal at Wayne is {goalkeeper defending his school against, a boxer fighting against; concerned about} cheating, which has become a nemesis for the school. National media outlets report that several students have been caught taking money to impersonate classmates on standardized tests like the SAT. The principal has the Teachers Union, the school's honor council, and the test administrators {on his team; in his corner; are working together on the problem}. Who or what do you think is more to blame?

(i) **Baseline**
  (i) The culture of cheating at the school
  (ii) The students who cheated

(ii) **Consistent**
  (i) The organized culture of cheating at the school
  (ii) The student foes who cheated

(iii) **Inconsistent**
  (i) The culture of cheating that has become a foe at the school
  (ii) The organized students who cheated

(2) **Crime**

Crime is {a virus plaguing, a beast preying on, a problem in} the city of Addison. Five years ago Addison was in good shape, with no obvious vulnerabilities. Unfortunately, in the past five years the city's defense systems have weakened, and the city has succumbed to crime. Today, there are more than 55,000 criminal incidents a year—up by more than 10,000 per year. There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop. The city's officials know that they have to change certain policies in response to the problem, but they aren't sure which policies to change or how much to change them. Which of the following crime-reducing options do you think would be more likely to reduce crime?

(i) **Baseline**
  (i) Reform educational practices and create after school programs
  (ii) Increase street patrols that look for criminals
(ii) **Consistent**
  (i) Treat the problem by reforming educational practices and creating after school programs
  (ii) Attack the problem by increasing street patrols that look for criminals
(iii) **Inconsistent**
  (i) Attack the problem by reforming educational practices and creating after school programs
  (ii) Treat the problem by increasing street patrols that look for criminals

(3) **Education**

Schools are {gardens, factories, institutions}, attempting to {nurture, mold, teach} young minds. However, Norwalk is a city with an education problem. Historically, the schools have been excellent. Unfortunately, in recent years, there have been cuts to the budget, which have forced the city to fire teachers and eliminate extracurricular activities. Each year a smaller and smaller number of students have graduated who {reach, fulfill, realize} the standards that city officials hope to achieve. A recent assessment found that a minority of students were able to read at their grade level and that more and more are dropping out. The city's officials know that they have to change certain policies in response to the problem, but they aren't sure which policies to change or how much to change them. Which of the following should officials emphasize to improve school performance?

(i) **Baseline**
  (a) Extracurricular activities like music and athletics
  (b) A common curriculum
(ii) **Consistent**
  (a) Nourish students with extracurricular activities like music and athletics
  (b) Upgrade schools with a common curriculum
(iii) **Inconsistent**
  (a) Upgrade schools with extracurricular activities like music and athletics
  (b) Nourish students with a common curriculum

(4) **Ecology**

The city of Avon has recently decided that it is too expensive to maintain a local nature reserve. The nature reserve is {the backbone of the state parks, a gem of the state parks, an important state park}—{a central and foundational, a shining and pristine, an excellent} resource for the community. The expansive park is widely used because it is easily accessible from the city but isolated at the same time. As a result, a number of officials have spoken out against the city's decision to release the land for commercial development. On which of the following will the city see the bigger impact of its decision regarding the park?

(i) **Baseline**
  (a) The city's tourist industry that benefits from the reserve
  (b) The animal and plant species living in the reserve
(ii) **Consistent**
  (a) The multi-faceted tourist industry that benefits from the reserve
  (b) The exquisite animal and plant species living in the reserve
(iii) **Inconsistent**
  (a) The exquisite tourist industry that benefits from the reserve
  (b) The multi-faceted animal and plant species living in the reserve

(5) **Housing**

At a town hall meeting, a community member noted that a house on the block is not being cared for. It was abandoned during the mortgage crisis and no one has stepped in to care for the property and has become a {failing organ in the body of, blemish on the face of, problem for} the neighborhood. Which of the following do you think is a more likely to be negatively affected by the current situation?

(i) **Baseline**
  (a) Relationships between residents in the neighborhood
  (b) The value of the houses adjacent to the abandoned home
(ii) **Consistent**
  (a) The balance of relationships between residents in the neighborhood
  (b) Smudge the value of the houses adjacent to the abandoned home
(iii) **Inconsistent**
  (a) Smudge the relationships between residents in the neighborhood
  (b) The balance of values of the houses adjacent to the abandoned home

(6) **Income inequality**

Income inequality has {destabilized, split, affected} the economy. The {imbalance, gap, difference} between rich and poor has widened in recent years. According to a recent report, "During the first two years of the nation's economic recovery, the mean net worth of households in the upper 7 percent of the wealth distribution rose by an estimated 28 percent, while the mean net worth of households in the lower 93 percent dropped by 4 percent." In your opinion, which of the following suggestions represents a better way of approaching the income disparity problem?

(i) **Baseline**
  (a) Income inequality is complex and will decrease when the economy recovers
  (b) Raise the minimum wage
(ii) **Consistent**
  (a) Income inequality is complex and will return to equilibrium when the economy recovers
  (b) Narrow inequality by raise the minimum wage
(iii) **Inconsistent**
  (a) Income inequality is complex and will narrow when the economy recovers
  (b) Return inequality to equilibrium by raising the minimum wage

(7) **Medical mistake**

The municipal medical clinic {is an ecosystem that, is a manufacturing plant that, NA} recently had a breakdown {in the network, in the assembly line, NA}. Last week at the clinic one hundred and forty-four young children were affected in a medicine mix-up, causing them to suffer from diarrhea and vomiting. Who or what do you think is more to blame?

(i) **Baseline**
  (a) The computer system
  (b) The nurse who administered the medicine
(ii) **Consistent**
  (a) The interactive computer system
  (b) The nurse who administered the medicine in that station
(iii) **Inconsistent**
  (a) The computer system in that station
  (b) The interactive nurse who administered the medicine

(8) **Partisan Politics**

The Democrats and Republicans have been {playing political theater, fighting a battle, interacting} with each other in which {both parties seem more interested in performing dramatic monologues than, both parties seem more interested in attacking their opponent than, neither party seems interested in} engaging with difficult policy questions. Congress has passed roughly 80% fewer bills in recent terms than it did in the '70s and '80s. Which of the following do you think would be more likely to change the culture in Washington?

(i) **Baseline**
  (a) End the 24 hour media coverage of politicians
  (b) Force politicians to acknowledge their common obligations
(ii) **Consistent**
  (a) Close the curtain on the saga by ending the 24 hour media coverage of politicians
  (b) Bring a truce to the war by forcing politicians to acknowledge their common obligations
(iii) **Inconsistent**
  (a) Bring a truce to the war by ending the 24 hour media coverage of politicians
  (b) Close the curtain on the saga by forcing politicians to acknowledge their common obligations

(9) **Science**

Dr. Roy is a cancer researcher. {When she does her work, she imagines herself working on a puzzle— pondering how to make the pieces fit together; scaling a mountain—slowly but surely planting one foot in front of the other; She works incredibly hard on her research problems}. She seeks to make a positive impact on the scientific community—to extend our understanding of the disease and methods for treatment. Which of the following would you predict of the researcher?

(i) **Baseline**
  (a) Tests completely novel theories
  (b) Uses methods that are simple to follow
(ii) **Consistent**
  (a) Looks for connections by testing completely novel theories
  (b) Gains ground by using methods that are simple to follow
(iii) **Inconsistent**
  (a) Gains ground by testing completely novel theories
  (b) Looks for connections by using methods that are simple to follow

(10) **Sports**

Aaron is {the detective of the billiards world, the sniper of the billiards world, an excellent billiards player}. He feels like he can {be a sleuth uncovering clues to unlock a game, eye the table like an assassin targeting a line of shots, win any game}. He can often sink several balls in a row, winning before their opponent has any real chance to take a shot of their own. What do you think the player is more likely to focus on when he's playing?

(i) **Baseline**
  (a) Setting up a sequence of several shots
  (b) Making the current shot
(ii) **Consistent**
  (a) Deciphering a sequence of several shots
  (b) Locking the current shot in his crosshairs
(iii) **Inconsistent**
  (a) Locking a sequence of several shots in his crosshairs
  (b) Deciphering the current shot

Table A1. The degree to which people matched response options to frames consistently in Study 1 and the proportion of congruent responses by extended metaphor condition in Study 3.

	Study 1	Study 3: Congruence		
Issue	Matching	Baseline	Consistent	Inconsistent
Cheating	0.737	0.468	0.489	0.535
Crime	0.798	0.536	0.548	0.511
Ecology	0.687	0.523	0.509	0.482
Education	0.949	0.496	0.479	0.531
Housing	0.859	0.498	0.523	0.486
Income inequality	0.717	0.452	0.525	0.482
Medical mistake	0.768	0.476	0.523	0.459
Partisan politics	0.879	0.542	0.596	0.521
Science	0.848	0.604	0.723	0.500
Sports	0.869	0.531	0.579	0.498
Mean	.811	0.513	.549	.500
(*SD*)	(.083)	(.044)	(.071)	(.024)