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Effects of Communication Modality and Speaker Identity on Metaphor Framing

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ABSTRACT
People regularly encounter metaphors in a variety of different communicative settings, but most studies of metaphor framing have relied exclusively on written materials. Across three experiments (N = 2399), we examined the relative power of metaphor framing in different communication formats. Participants read, heard, or watched someone report a series of metaphorically framed issues. They answered a target question about each issue by selecting between two response options, one of which was conceptually congruent with the metaphor frame. Results revealed a similarly-sized metaphor framing effect in each communication modality. Neither speaker gender nor race reliably moderated the effects of metaphor framing for audiovisual messages, though framing effects were stronger when the gender of the speaker and observer matched. We also replicated the finding that metaphors are more effective when they are extended into the response option language. These results provide new insights into the efficacy and generalizability of metaphor framing.

As Democrats and Republicans vie for public support during an especially contentious period in American politics, both parties have been quick to question the motives and sincerity of the other side. A popular, bipartisan way to castigate those across the aisle is to accuse them of engaging in *political theater*. For example, one recent headline read: *"Republicans slam Dems' 'political theater' amid battles over Mueller report, tax returns"* (Loiaconi, 2019), while another exclaimed: "*House Democrat Accuses Republicans of Engaging in Impeachment 'Political Theater'*" (Rosas, 2019). The POLITICS IS THEATER metaphor, which has deep historical roots (see Blackbourn, 1987), is intended to communicate the idea that the opposition party is simply *acting* outraged, *performing dramatic* but ultimately *fictional* grievances as a means of *attracting attention* while *distracting from reality*, which impedes any substantive legislating.

Metaphor framing in social communication

As the previous example illustrates, metaphors are useful rhetorical tools because they enable speakers to describe novel, complex, or abstract issues (like politics) in terms of relatively simple and more familiar domains (like theater; Lakoff & Johnson, 1980). This helps people quickly establish *common ground* (Clark, 1996) and efficiently communicate a range of structured attitudes and beliefs (Thibodeau, Matlock, & Flusberg, 2019). Studies have shown that framing a discussion of a complex issue with a metaphor can subtly influence people to reason about that issue in a metaphor-congruent fashion (e.g., Elmore & Luna-Lucero, 2017; Flusberg, Matlock, & Thibodeau, 2017; Keefer, Landau, Sullivan, & Rothschild, 2014; Thibodeau, 2016; Thibodeau & Boroditsky, 2011; Thibodeau, Crow, & Flusberg, 2017 ; Thibodeau & Flusberg, 2017). To take a few

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recent examples: (1) participants who read that depression is a state of being *down* were more likely to recommend a medication called "Liftix," while those who read that depression comprises a *dark* period were more likely to suggest a medication called "Illuminex" (Keefer et al., 2014); (2) when the federal budget was metaphorically compared to a household budget, people were more likely to say they would vote for a presidential candidate who had grown their own wealth (Thibodeau & Flusberg, 2017); and (3) when participants read that Republicans and Democrats had been *playing political theater* (as opposed to *fighting a battle*), they were more likely to suggest that ending the 24-hour media coverage of politicians would change the culture in Washington than forcing politicians to acknowledge their common obligations (Thibodeau, 2016).

Studies of metaphor framing generally find that metaphors are more effective when the metaphor appears at the beginning of a stimulus vignette (as opposed to the end; Sopory & Dillard, 2002; Thibodeau & Boroditsky, 2011), and when the metaphor is extended in the phrasing of a conceptually congruent response option (Keefer et al., 2014; Thibodeau, 2016). This helps situate metaphor framing in the context of basic discourse processing, which involves integrating linguistic input with prior knowledge (e.g., schemas, scripts, frames) in order to generate a *situation model*––an integrated mental representation of the issue under discussion (Graesser, Millis, & Zwaan, 1997; Zwaan & Radvansky, 1998). That is, metaphor framing works in part by activating a conceptual schema associated with the source domain that guides how people build up a representation of, and then draw inferences about the target domain (for a recent review of these issues, see Thibodeau et al., 2019).

Open questions

One critical limitation in the experimental study of metaphorical framing is that it has relied almost exclusively on written materials (Brugman, Burgers, & Vis, 2019; Van Stee, 2018); in each of the studies described above, for example, participants had to read a brief paragraph that included the metaphorical frame before responding to a target question. This is notable because, in the real world, people encounter linguistic metaphors in a variety of different social and communicative settings. In addition to reading metaphors printed in newspapers and in articles online (*written* format), we listen to people using them on the radio and in podcasts (*auditory* format), and we see and hear politicians and broadcasters using them in televised speeches and newscasts (*audiovisual* format).

This raises an important series of questions: Are metaphors equally effective at shaping attitudes and beliefs in different modes of communication? If not, which formats tend to yield stronger framing effects, and why? When metaphorically framed messages are presented audiovisually, for example, does the speaker's identity (e.g., their gender) affect the likelihood the listener will be impacted by the metaphor frame? Or is it the *relationship* between speaker and listener identity that matters (e.g., whether or not they both identify as the same gender)? The present set of studies set out to systematically investigate these questions by adapting a recently developed metaphor framing paradigm (Thibodeau, 2016).

Framing across communication modalities

The impact of different communication modalities on metaphor framing has only received limited attention in the literature to date. In a recent meta-analysis of persuasive metaphors in advertising (see Van Stee, 2018), auditory appeals were found to be more effective than written appeals, possibly because auditory appeals limit opportunities for counterarguing. Of note, however, most studies in the review used a written format (k = 34), rather than a visual format (k = 6) or multiple formats (k = 6).

More generally, classic research on persuasive messaging suggests that communication modality can influence how people process information, which has downstream consequences for comprehension, retention, and persuasion (Chaiken & Eagly, 1976, 1983; Furnham & Gunter, 1989; Sparks, Areni, &

Cox, 1998). For example, likeable communicators are more persuasive in auditory and audiovisual modes of presentation, while unlikable communicators are more persuasive in print (Chaiken & Eagly, 1983). This seems to result from the fact that communicator cues are more salient––and therefore play a larger role in attitude change––in recordings as compared to writing. In addition, information presented in multiple formats (e.g. visually *and* verbally) typically results in enhanced recollection, a result consistent with "dual-coding" theories of memory and cognition (see Paivio, 1991).

Some studies, though, have found that people remember the contents of linguistic messages better when they are presented in print than in an audio or audiovisual recording (Furnham & Gunter, 1989; Furnham, Gunter, & Green, 1990). This may be because written information can be processed at the observer's own preferred pace and without the distraction of supplementary communicator cues. However, this picture is complicated by the observation that factors like age and message content moderate the effects of communication modality on memory. In one study, for instance, people recalled health warning messages equally well in written and auditory formats, though both of these conditions yielded better recall than an audiovisual one (Corston & Colman, 1997). Another study found that 11- and 13-year-old children remembered more content from a news story when it was presented on television than in print, though adults showed no such bias (Furnham, De Siena, & Gunter, 2002).

Taken together, this literature generates competing predictions about the ways in which communication modality might affect metaphor framing. On the one hand, since printed messages sometimes result in better comprehension and retention compared to recordings, metaphor framing might be most effective for written materials, allowing for deeper processing of the metaphor frame itself (cf. Hauser & Schwarz, 2015). On the other hand, printed messages do not always yield enhanced recall, especially for younger individuals, which adds uncertainty to the proposition that metaphors will always be processed more deeply in writing. Since metaphor framing can be thought of as a form of persuasive communication, it could actually be the case that a (relatively likeable) speaker will produce a larger metaphor framing effect in an auditory or audiovisual mode of presentation compared to print, as these formats limit opportunities for counter-arguing by forcing people to process the language at the speaker's preferred pace (cf. Van Stee, 2018). Finally, communication modality might not moderate metaphor framing effects much at all as long as participants are able to perceive and process the metaphor frame at a sufficient level of depth.

Present research

We directly addressed these divergent predictions across three experiments by exposing participants to an identical series of metaphorically framed messages either in a written, auditory, or audiovisual format. After each message, participants selected from two response options for addressing a target question about the issue, one of which was conceptually congruent with the initial metaphor frame they received. We further explored several possible moderating factors, including whether or not the metaphor frame was extended into the language of the response options, whether or not a participant could recall the metaphor frame, the identity of the speaker (and its relationship to the participant's identity), and a range of participant demographic variables. The results of these experiments help illuminate the relative efficacy of metaphor framing in different modes of communication and provide new insights into the generalizability of metaphor framing. Materials and data for all experiments are available on the Open Science Framework: osf.io/gb9mx

Experiment 1

Methods

Participants

We recruited 609 participants (42% female) from Amazon's Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011), using the CloudResearch/TurkPrime platform (Litman, Robinson, & Abberbock, 2017).

We aimed for a sample size of 200 individuals per condition to be consistent with past research on metaphor framing (e.g., Bultmann, Wheeler, Jimenez, & Arndt, 2019; Elmore & Luna-Lucero, 2017; Landau et al., 2019; Thibodeau, Crow, & Flusberg, 2017). All participants were at least 18 years of age ($M = 34.3$, $SD = 10.2$), lived in the US, and had a good performance record on previous tasks (minimum 85% approval rating). See Table 1 for demographic data from all experiments.

Materials & procedure

The experiment was created using Qualtrics online survey software and consisted of four metaphor framing trials drawn from Thibodeau (2016), presented in a randomized order. Each trial consisted of a brief vignette describing an issue framed using one of two metaphors. For example, in one vignette crime was framed as either a *virus plaguing* or a *beast preying on* a city. The three other vignettes described politics (as *theater* or a *battle*), research (as *working on a puzzle* or *climbing a mountain*), and sport (a billiards player was framed as a *sniper* or *detective*). We selected these four vignettes because they elicited the strongest and most reliable metaphor framing effects in prior work (see Thibodeau, 2016), which increases our ability detect any small differences across conditions. See Appendix A for the full text of the paragraphs and response options. The particular metaphor a given participant was exposed to on each trial was randomly selected from the two possible options.

We used a between-subjects design. Participants were randomly assigned to one of three communication format conditions: (1) a *Written* condition, where they read the vignettes on the screen, (2) an *Audiovisual* condition, where they watched videos of a relatively likeable,[1] 30-something Caucasian male with glasses (the first author) presenting the vignettes, or (3) an *Auditory* condition, where they listened to the audio portion of these recordings but did not view the accompanying video. The videos were filmed using an Android smartphone and depicted the speaker from the shoulders up against a black backdrop wearing a blue button-down shirt and green corduroy blazer.

After reading, watching, or listening to each metaphorically framed vignette, participants were asked to respond to a target question about the issue by selecting one of two response options. Each response option was designed to be conceptually congruent with one of the two metaphor frames and included phrasing that extended the metaphor (see Thibodeau, 2016). For example, on the *Politics* trial, participants were asked, *"Which of the following do you think would be more likely to change the culture in Washington?"* The response options included (1) *"Close the curtain on the saga by ending the 24-hour media coverage of politicians"* (congruent with the *theater* metaphor), and (2) *"Bring a truce to the war by forcing politicians to acknowledge their common obligation"* (congruent with the *battle* metaphor). The response screen was presented in a written format for all participants.

After responding to all four metaphor framing trials, participants completed a basic demographics questionnaire and were thanked for their participation.

Results

We calculated the proportion of times each participant responded in a metaphor-congruent manner across the four framing trials. Because there were only two response options, the mean congruence score expected due to chance was 0.5.

Table 1. Demographic data for all experiments.

	Experiment 1	Experiment 2	Experiment 3
N	609	603	1187
% female	42.2%	47.6%	41.7%
mean age (*SD*)	34.3 (10.2)	35.3 (11.1)	37.3 (12.1)
% white/black	74.2/9.2%	79.4/5.8%	72.1%/12.5%
% democrat/republican	46.1%/19.4%	44.6%/21.2%	45.9%/24.2%

[1]Likeability was indexed by past student teaching evaluations as well as ratemyprofessor.com scores.

Consistent with previous research, a single sample t-test comparing mean proportion metaphor-congruent responding to chance levels revealed a reliable, moderate-sized effect of metaphor framing, as participants responded in a metaphor-congruent fashion on average 56.7% of the time, $t(609) = 6.63$, $p < .001$, $d = 0.27$. A one-way ANOVA revealed that this effect did not differ by condition, $F(2, 607) = 0.62$, $p = .54$. In other words, the magnitude of the metaphor framing effect did not significantly differ across communication modalities. See Figure 1.

Discussion

In Experiment 1, participants completed four trials of a basic metaphor framing task in either a written, auditory, or audiovisual format. Results revealed a reliable metaphor framing effect that was consistent with the results of previous studies (Thibodeau, 2016) but that did not differ in magnitude across communication format conditions. This suggests that communication modality does not reliably moderate the effect of metaphor framing, at least for some communicators and issues.

One noteworthy methodological issue in this study is that the metaphor frames were extended into the phrasing of the response options and were always presented in a written format on the screen. This was done to maximize the size of the metaphor framing effect and so that we would have a greater chance of observing differences across conditions (see Thibodeau, 2016). However, presenting the extended metaphor in writing for all participants introduces some problems as well––it becomes difficult to assess which instance of the metaphor contributed more to the observed framing effects and we may have inadvertently obscured the very differences between the conditions that we had hoped to engender, since all participants read a printed metaphor in these responses. A related concern is that by extending the metaphor into the response options, the observed effects may have had more to do with lexical priming than metaphor processing (McGlone, 2007). In other

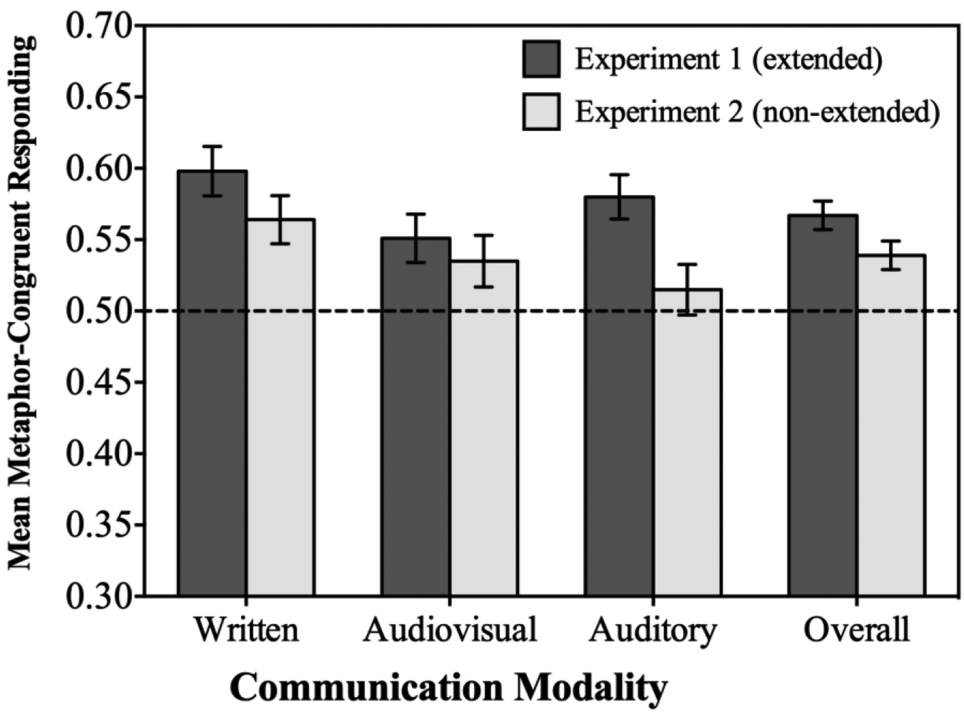

Figure 1. Mean proportion of metaphor-congruent responses overall and by condition for Experiments 1 (metaphor extended into language of response options) and 2 (metaphors not extended). Dotted line represents chance level responding, while error bars represent standard errors of the mean.

words, participants may have been drawn to a response option not because it was *conceptually* congruent with a metaphorical representation of the target issue, but because a keyword in the response was processed more fluidly due to lexical association (e.g., "*truce*" to "*battle*"). Thus, the methodological decision to extend the metaphor frame into the phrasing of the response options represents a potential confound for interpreting our results.

In order to address this issue, we replicated this basic study in Experiment 2 using response options for the target questions that did not extend the metaphor frames (see Appendix A and Thibodeau, 2016). The design and hypotheses for Experiment 2 were pre-registered on the Open Science Framework: osf.io/gb9mx.

Experiment 2

Methods

Participants

We recruited 603 new participants (48% female) via MTurk. All participants were at least 18 years of age (M = 35.3, SD = 11.1), lived in the US, and had a good performance record on previous tasks (minimum 85% approval rating). See Table 1.

Materials & procedure

Experiment 2 was identical to Experiment 1 with one critical exception: the phrasing of the response options on each trial did *not* extend the metaphor frames associated with the vignettes. For example, whereas in Experiment 1 the response options on the *Politics* trial read (1) *"Close the curtain on the saga by ending the 24-hour media coverage of politicians"* and (2) *"Bring a truce to the war by forcing politicians to acknowledge their common obligation,"* in Experiment 2 the response options for this trial read (1) *"End the 24-hour media coverage of politicians"* and (2) *"Force politicians to acknowledge their common obligation."* Note that these response options are still *conceptually* congruent with each of the two metaphor frames (POLITICS IS THEATER and BATTLE, respectively), even though they no longer extend the metaphorical language. See Appendix A for full text of all response options, and see Thibodeau (2016), for discussion of and evidence for the conceptual congruence of these stimuli.

The only other change in Experiment 2 was that after participants completed the metaphor framing trials, we probed their memory for the metaphor frames they received. We did this by presenting the first sentence of each vignette in a written format on the screen with a blank where the metaphorical phrasing would go (e.g., *"The Democrats and Republicans have been [ ]"*). Participants had to type what they remembered about the sentence they had observed into a box below each prompt. We included this memory probe in order to explore whether memory for the initial metaphor frame predicted whether or not participants responded in a metaphor-congruent manner on a given trial.

Results[2]

Consistent with what we observed in Experiment 1, a single sample t-test comparing mean metaphor-congruent responding to chance levels revealed a small but significant effect of metaphor framing: participants responded in a metaphor-congruent fashion 53.9% of the time overall, $t(602) = 3.81$, $p < .001$, $d = 0.16$. A one-way ANOVA revealed that this effect did not differ by condition, $F(2, 600) = 2.05$, $p = .13$. In other words, as in Experiment 1, the magnitude of the metaphor framing effect did not significantly differ across communication modalities. See Figure 1.

[2]Our statistical analyses largely followed the plans laid out in our pre-registration, with some minor exceptions. In order to improve statistical power, for example, we postponed our analysis of the effects of political orientation on metaphor framing until we had collected all of our participant data after Experiment 3. We also added the mixed effects model in the analysis of the memory data, which confirmed the results of our pre-registered analysis while controlling for individual differences in metaphor recall rates.

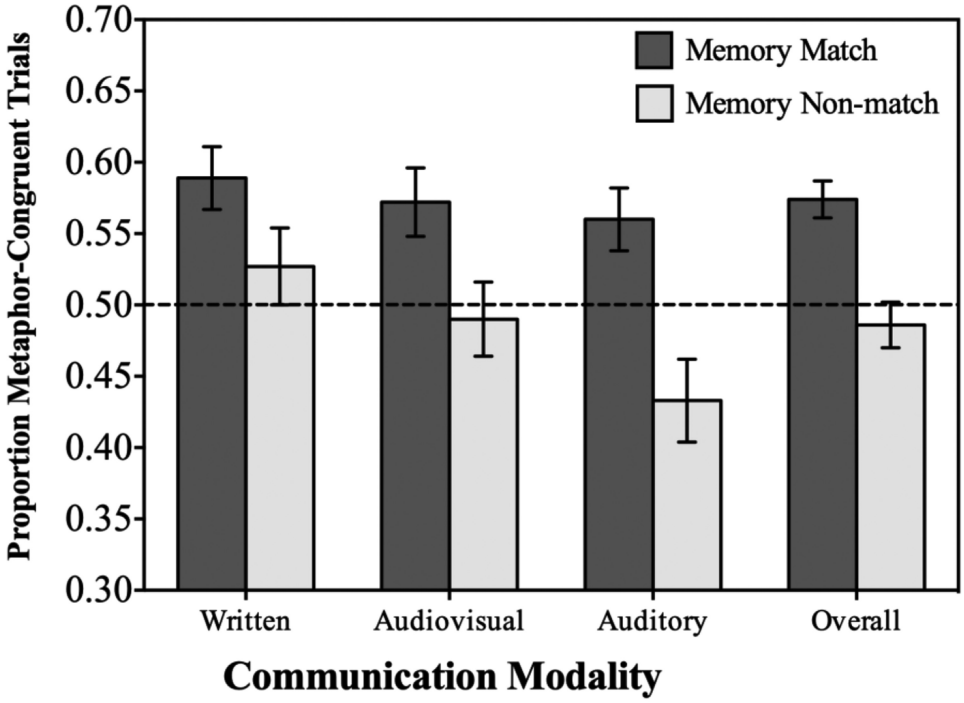

Figure 2. Proportion of trials where participants gave a metaphor-congruent response in Experiment 2, overall and by condition, split by trials where participants accurately remembered the metaphor frame (memory match) and where they did not (memory non-match). Dotted line represents chance level responding, while error bars represent standard errors of the proportions.

Memory analysis

We then coded whether or not responses to the memory probe matched the metaphor frame that each participant was exposed to on a given trial. Responses were coded as *matching* as long as they included a word or phrase that was conceptually consistent with the metaphor source domain. For example, if the participant received the POLITICS IS A BATTLE frame, then for the free response prompt, *"The Democrats and Republicans have been [ ],"* we coded the response as a *match* for phrases including "fighting a battle," "warring," "fighting," "combative," and "at war" (but not for phrases like "quarreling" or "arguing," which lack the violent connotations of the battle frame). If the participant left the response field blank, we coded it as a non-match, as we assumed that they did not remember the metaphor. Note that participants were presented with the metaphor framing trials in a randomized order, and with the memory probes in a randomized order in the subsequent section of the study. Therefore, while the amount of time between initial exposure to the metaphor frame and the test probe of that metaphor varied across participants, this time would average out to be roughly equivalent.

First, we tested whether participants recalled the metaphor frame at different rates for the four issues. We found that they did, $\chi^2(3) = 319.95$, $p < .001$. As shown in Table 2, participants were more likely to remember the metaphor frame they encountered for the stories about politics, research, and billiards. They were less likely to remember the frame for crime, which may be because this was the longest vignette and only included a single instantiation of the metaphor.

Second, we tested whether, on a given trial, a participant's memory matching the metaphor frame (or not) was predictive of their giving a metaphor-congruent response (or not). Collapsing the data across all participants, conditions, and trials, we conducted a 2 (metaphor-congruent response: yes vs. no) X 2 (metaphor memory match: yes vs. no) chi-square test of independence. This analysis revealed that memory for the metaphor frame was associated with choosing a metaphor-congruent response option, $\chi^2(1) = 17.51$, $p < .001$, $V = 0.086$. Specifically, participants selected the metaphor-congruent response

Table 2. Recall rates for the metaphor frames by issue, and patterns of congruent responding among participants who did and did not recall the metaphor frame.

Issue	Metaphor Frame recall	Congruence among participants who recalled frame	Congruence among participants who did not recall frame
Billiards	67%	54%	56%
Politics	63%	58%	42%
Crime	41%	55%	46%
Research	67%	61%	53%

option on 57.4% of trials where they accurately remembered the metaphor frame (*memory match*), but on only 48.6% of trials where their memory was inaccurate (*memory non-match*). This basic pattern was present in each communication modality. See Figure 2.

Analyses using mixed effect logistic regression models, which controlled for participants' general ability to remember the frames and respond congruently (Jaeger, 2008), revealed the same patterns of results. That is, recall for the metaphor frame predicted congruent responding (B = 0.325, SE = 0.086, p < .001), $\chi^2(1)$ = 14.31, p < .001. Memory for the frame did not interact with communication modality Condition, $\chi^2(2)$ = 1.93, p = .381, but it did interact with Issue, $\chi^2(3)$ = 9.84, p = .020. For three of the four issues (politics, crime, research), memory for the frame was associated with more congruent responding. But for one of the issues (billiards), memory for the frame was not associated with more congruent responding (see Table 2).

Combined analysis

Next, we combined the datasets from Experiments 1 and 2 ran a 2 (Experiment: 1 vs. 2) X 3 (Communication Modality: Written vs. Audiovisual vs. Auditory) factorial ANOVA with proportion metaphor-congruent responding as the dependent variable. This analysis replicated the results of previous work (e.g., Keefer et al., 2014; Thibodeau, 2016), showing that participants were more likely to be influenced by the metaphor frame when the metaphor was extended into the language of the response options. That is, there was a significant (albeit small) main effect of Experiment, as participants had a higher average proportion of metaphor-congruent responding in Experiment 1 compared to Experiment 2, $F(1, 1207)$ = 4.01, p = .045, η^2 = 0.003. Neither the main effect of Condition, nor the interaction between Experiment and Condition were statistically significant, suggesting that the overall pattern of responding in the two experiments was similar across communication modalities (F's < 1.65, p's > 0.19).

Discussion

The results of Experiment 2 replicated what we observed in Experiment 1, as we found a reliable metaphor framing effect that did not significantly differ across communication modalities. Since the response options in Experiment 2 did not extend the metaphor frames we used in the messages, this particular methodological concern cannot account for the results of our two studies. This provides stronger evidence that the efficacy of metaphor framing does not reliably differ across communication modalities.

We also replicated the results of previous studies that have shown that metaphor framing effects are stronger when the metaphor frame is extended into the language of the response options (Keefer et al., 2014; Thibodeau, 2016). In this case, the proportion of metaphor-congruent responding was significantly higher in Experiment 1 (56.7%), where the metaphors were extended, than in Experiment 2 (53.9%), where they were not.

Finally, the results also showed that, at the trial level, the ability to consciously recall the metaphor frame was reliably associated with metaphor-congruent responding. This suggests that metaphors may be more effective when they are processed at a deeper level (i.e. at a level which leaves an explicit memory trace; cf. Reijnierse, Burgers, Krennmayr, & Steen, 2015; Steen, 2008). This is an interesting finding that went against our pre-registered predictions, as previous research has found that metaphors may covertly influence reasoning in the absence of explicit memory (e.g., Thibodeau & Boroditsky, 2013). Of note, however, the

effect size we observed for the relationship between metaphor-congruent responding and memory was modest (Cramer's $V = 0.086$, for $DF = 1$) and was not statistically significant for each of the metaphor framing issues considered in isolation. Specifically, we observed a significant metaphor framing effect for the billiards trial despite the fact that this issue showed no relationship between explicit memory and framing. Therefore, this finding warrants further systematic research beyond the scope of this article.

One methodological limitation of Experiments 1 and 2 is the lack of speaker variability in the auditory and audiovisual conditions. In fact, there was only one speaker: a white male academic under 40. That this speaker was relatively high in social status along several dimensions (e.g., credibility and power) may have contributed to the efficacy of metaphor framing in these conditions. For example, it could have impacted the likelihood that observers attended to or placed credence in the content of the metaphorically framed messages (Chaiken, 1980; Druckman, 2004; Eagly & Chaiken, 1993; Petty & Briñol, 2008). Alternatively, previous work has found that people are more likely to show framing effects when they identify with the speaker (e.g., Hartman & Weber, 2009), which means our stimuli may have impacted some of our participants (e.g., males) more than others. This raises important questions about the generalizability of our findings. To what extent does the identity and social status of the speaker moderate the effects of metaphor framing? And, does this depend in part on the identity of the listener (and, e.g., whether it matches the identity of the speaker)?

We addressed these questions in Experiment 3 by replicating the audiovisual conditions of Experiments 1 and 2 using three different speakers in a between-subjects design. Participants again completed the four metaphor framing trials by watching videos of a single speaker presenting the vignettes. In Experiment 3, however, the speaker was either a white man, a white woman, or a black woman.[3] We hypothesized that metaphor framing might be more effective when the speaker had a relatively high social status (white, male), and when the speaker and listener were members of the same identity group or groups (e.g., both were female).

Experiment 3

Methods

Participants

We recruited 1201 participants through MTurk using the same exclusion criteria as Experiments 1 and 2, again aiming for approximately 200 participants per condition (three speaker identities X two response option types = six total between-subject conditions). We removed 14 participants who failed our attention check question (see below), leaving 1187 participants (41.7% female) in the final sample. All participants were at least 18 years old ($M = 37.3$, $SD = 12.1$) and lived in the US. See Table 1.

Material and procedure

Experiment 3 was nearly identical to the audiovisual conditions of Experiments 1 and 2, with the exception that participants were randomly assigned to view one of three speakers: a black woman, a white woman, or a white man. All speakers were professors from a state university psychology department, appeared to be in their mid-30's, and wore similar white dress shirts. The white man was the same speaker from Experiments 1 and 2, but new versions of the videos were created for Experiment 3 so that his outfit would be consistent with the other speakers. His glasses were removed as well. Copies of the video stimuli are available on the Open Science Framework. Participants were further randomly assigned to view response options that either did or did not extend the metaphor frames.

[3]Our original plan was to include a black man as a fourth speaker to make the design symmetrical across our two identity variables of race and gender. Two of the authors attempted for several months to recruit a suitable actor, but we have very few male faculty and staff of color on our campus, and those who were contacted expressed reticence about being recorded. Sadly, this speaks to the very real structural inequalities that motivated us to examine the potential effects of identity on metaphor framing in the first place. Future work is therefore needed to more fully examine these issues.

Another small change in Experiment 3 was the addition of two scales in the demographics survey to assess the degree to which gender and race formed a core aspect of participants' identities. After indicating their gender, participants were presented with a four-item measure of *gender identification* adapted from the Identity Centrality subscale of the *Collective Self-Esteem Scale* (CES; Luhtanen & Crocker, 1992). Participants indicated their level of agreement with each statement (e.g., "The gender I belong to is an important reflection of who I am") using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The same four-item measure was included again after participants indicated their race/ethnicity, with the items modified to reflect this demographic variable. Composite scores on the *Gender Identification* (Cronbach's alpha = 0.87) and *Racial Identification* (Cronbach's alpha = 0.83) measures were created by averaging ratings across the four items, reverse-coding as needed.

Following the demographics survey, participants were presented with an attention check question. They were shown freezeframe images of each of the three speakers and asked to check off which speaker(s) they had observed in the study. Participants who selected the wrong speaker or more than one speaker were removed from analysis.

Results

Consistent with the results of the previous experiments, a single-sample t-test showed that, overall, participants responded in a metaphor-congruent manner at significantly higher than chance levels (53.8%), $t(1186) = 5.26$, $p < .001$, $d = 0.15$.

Effects of speaker identity

To examine the effects of speaker identity on metaphor framing, we conducted a 2 (response options: extended vs. non-extended) X 3 (speaker identity: white man vs. white woman vs. black woman) factorial ANOVA, with proportion metaphor-congruent responding as the dependent variable. Replicating the results from previous studies, the analysis revealed a main effect of response options: metaphor-congruent responding was significantly higher when the metaphor frames were extended into the response options (56.6%) than when they were not (51%), $F(1, 1181) = 14.72$, $p < .001$, $\eta^2 = 0.012$.[4] Contrary to our hypothesis, however, there was no main effect of speaker identity: metaphor-congruent responding was roughly equal whether the speaker was a white man (54.3%), a white woman (52.9%), or a black woman (54.3%), $F(2, 1181) = 0.35$, $p = .70$, $\eta^2 = 0.001$. There was no interaction between speaker identity and response options, $F(2, 1181) = 0.34$, $p = .72$, $\eta^2 = 0.001$. See Figure 3.

Effects of observer identity

In order to test whether or not the *gender* identity of the listener and its relationship to speaker identity mattered, we divided participants into those whose gender matched the speaker they saw (e.g., a female participant viewing a female speaker; $n = 601$) and those whose gender did not match the speaker they were exposed to (e.g., a female participant viewing a male speaker; $n = 580$). We excluded participants who did not indicate their gender or who reported their gender as other/nonbinary ($n = 6$). The results of an independent samples t-test revealed that mean metaphor-congruent responding was significantly higher when the gender of the speaker and listener matched (55.3%) than when they did not match (52.1%), $t(1179) = 2.2$, $p = .028$, $d = 0.13$. See Figure 4. Follow up analyses revealed that this effect did not significantly differ across response option conditions, and that our measure of gender identification was not a significant moderator.

Next, we conducted a parallel set of analyses to examine whether the *race* of the speaker and listener moderated the effects of metaphor framing. We divided participants into those whose race matched the speaker they saw (e.g., a white participant viewing a white speaker; $n = 619$) and those whose race did not

[4]Of note, the rate of congruent responding in the non-extended condition of Experiment 3 was not significantly different from the rate of congruent responding in Experiment 2, $\chi^2(1) = 3.37$, $p = 0.066$. Pooling these data (n = 1202) revealed that participants responded congruently more often than would be expected by chance on non-extended trials (52.5%), $t(1201) = 3.52$, $p < 0.001$.

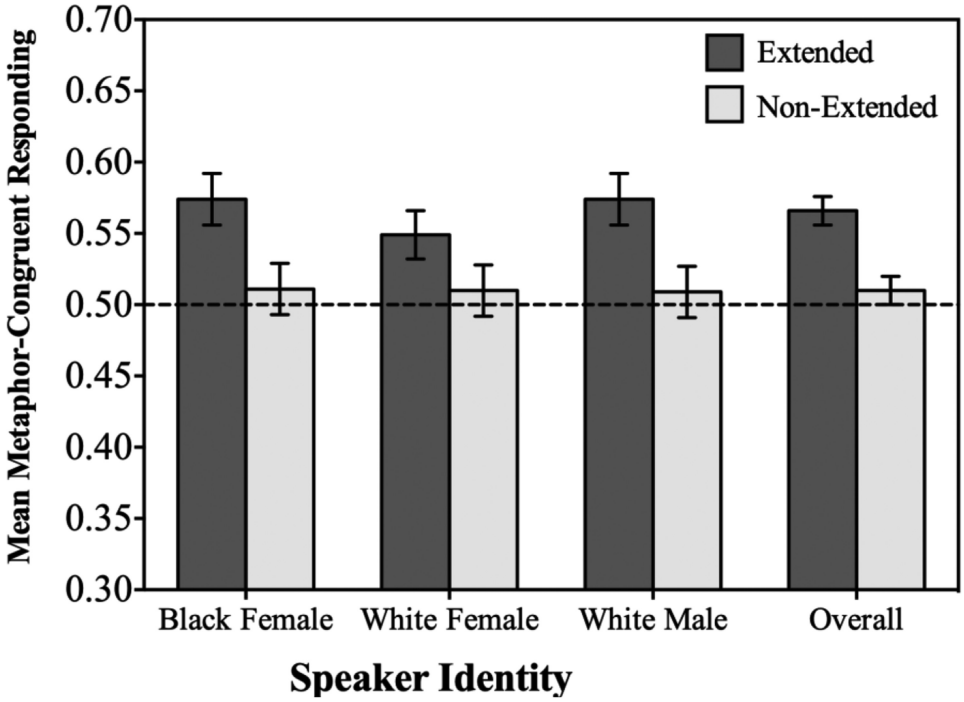

Figure 3. Mean proportion of metaphor-congruent responses overall and by speaker identity for Experiment 3, split by whether participants received response options that extended the metaphor frame or not. Dotted line represents chance level responding, while error bars represent standard errors of the mean.

match the speaker they were exposed to (e.g., a black participant viewing a white speaker; $n = 568$). The results of an independent samples t-test revealed that mean metaphor-congruent responding did not significantly differ when the race of the speaker and listener matched (53.6%) compared to when they did not match (54%), $t(1185) = 0.28$, $p = .78$, $d = 0.02$. Excluding participants who did not identify as either white or black ($n = 183$) did not change these results, nor did the inclusion of our racial identification measure as a moderator in a regression model.

Combined exploratory analyses

Because we found no main effects of communication modality or speaker identity in our studies, we combined the data from Experiments 1–3 and conducted several exploratory analyses to determine whether any other demographic factors moderated the effects of metaphor framing. We ran a series of regression models predicting mean metaphor-congruent responding that included age, gender, a continuous measure of political ideology (0 = extremely liberal, 100 = extremely conservative), political affiliation (Democrat, Republican, Independent), participant gender, an ordinal measure of educational attainment, and race/ethnicity. None of these factors reliably predicted metaphor-congruent responding in our models, suggesting no robust relationship between basic demographics and metaphor framing.

Item analysis

Next, we used a series of mixed-effect logistic regression models to test for differences by stimulus domain on this combined dataset (Jaeger, 2008). Of note, this approach also revealed a marginal main effect of Experiment, $\chi^2(2) = 5.93$, $p = .053$: participants were more likely to give a congruent response in Experiment 1 than in Experiments 2 or 3, likely due to the fact that Experiment 1 only used extended response options. This approach also confirmed that framing effects did not differ by

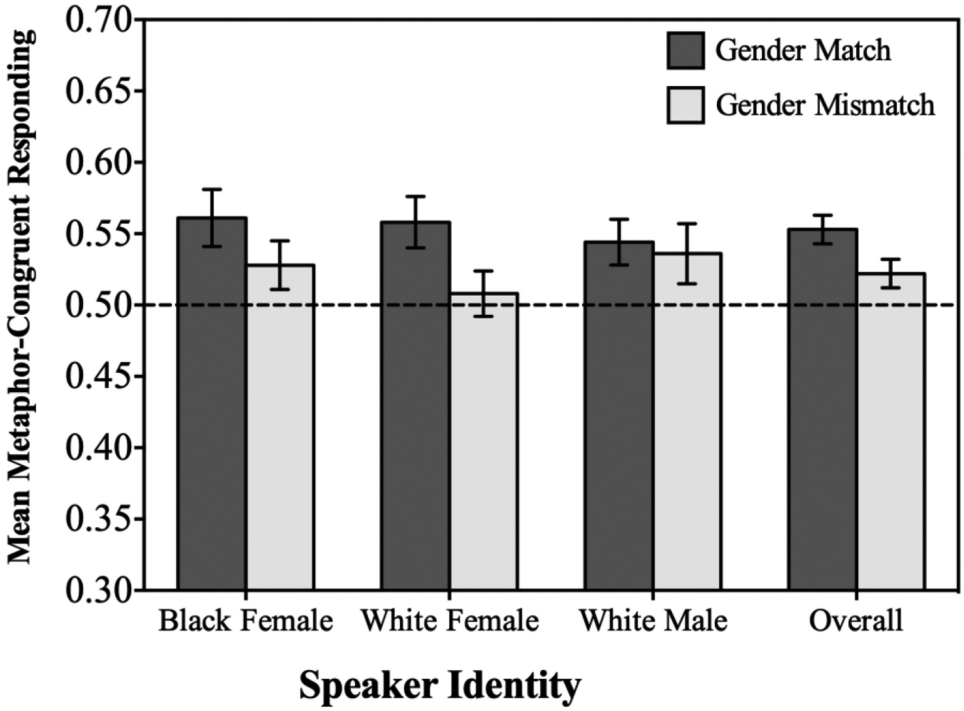

Figure 4. Mean proportion of metaphor-congruent responses overall and by speaker identity for Experiment 3, split by whether a participant's gender identity matched the gender of the speaker they observed or not. Dotted line represents chance level responding, while error bars represent standard errors of the mean.

communication modality, $\chi^2(2) = 3.30$, $p = .192$; nor was there an interaction between Experiment and modality in the model, $\chi^2(2) = 2.01$, $p = .367$.

Including a predictor for domain (billiards, crime, politics, research) yielded a significant main effect, $\chi^2(3) = 41.74$, $p < .001$. As shown in Figure 5, participants were less likely to respond to the crime story with a metaphor-congruent suggestion compared to the other issues. This may be due to the fact that the crime vignette was slightly longer and instantiated the metaphor frame less frequently than the other paragraphs. That said, one goal of future work will be to explore potential reasons for the variability across domains/metaphors. The model did not reveal interactions between item, Experiment, and communication modality, $\chi^2(18) = 23.46$, $p = .174$; nor did it reveal effects of the individual difference variables.

Discussion

In Experiment 3, we explored the generalizability of the finding that metaphor framing is effective in an audiovisual format by repeating this condition of Experiments 1 and 2 with three different speakers: a black woman, a white woman, and a white man. The results revealed no significant differences in metaphor framing effects across speakers, though we did again replicate the finding that extending the metaphor frame into the language of the response options enhanced the efficacy of the metaphor. This is a somewhat hopeful finding from a wider societal perspective, as it suggests that the social identity and status of the speaker––as cued by race and gender, at least––does not moderate the efficacy of their message. That said, all of our speakers were (relatively) young and highly educated, which was likely reflected in how they presented the metaphorically framed passages, and we only included a very restricted range of social identities. Therefore, it is possible that other identity types or social cues (e.g., accent, speech patterns, clothing) would have more of an impact in this task.

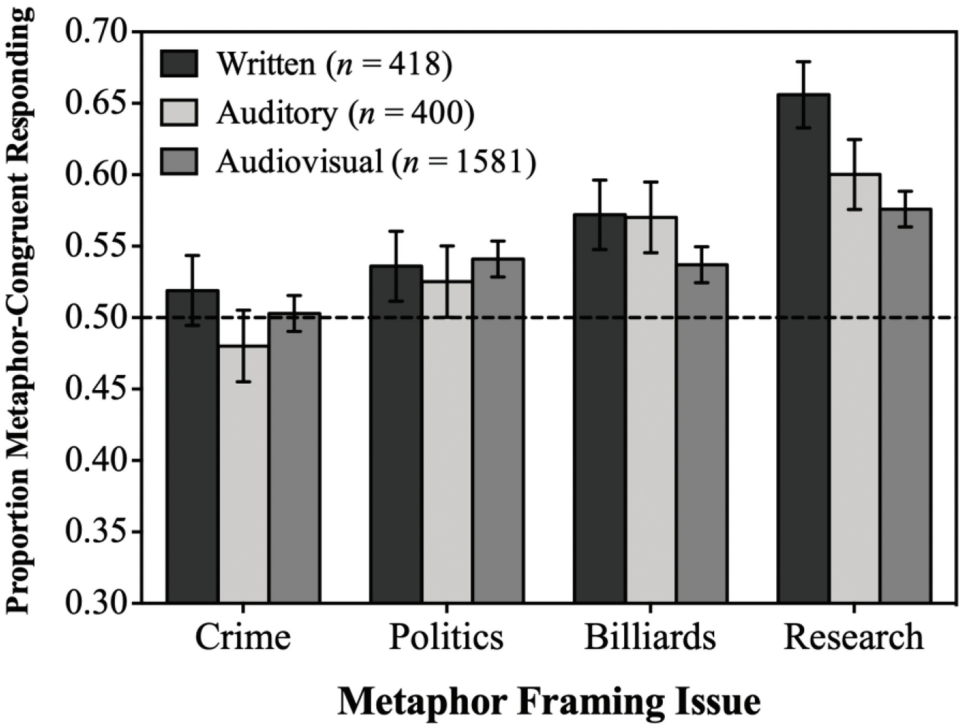

Figure 5. Proportion of metaphor-congruent responses by stimulus domain for all experiments combined, split by communication modality. Dotted line represents chance level responding, while error bars represent standard errors of the proportions.

Our results did show that metaphor framing was enhanced when the gender of the participant matched the gender of the speaker, which suggests that identifying with a speaker in some way may increase the persuasive power of metaphor (cf. Hartman & Weber, 2009). We found no parallel effects for racial demographics, though this may be due to the fact that a majority of participants (and two thirds of our speakers) were white. Future work will address this issue by including a wider range of speaker identities and ideally a more ethnically diverse participant pool.

General discussion

When politicians are accused of *playing political theater*, it suggests that they are only interested in drumming up attention through dramatic aggrandizing rather than a desire to accomplish any real legislating. Research has shown that using this metaphor can shape how people think about the political morass in Washington, leading people to draw conceptually congruent inferences (i.e., that ending constant media coverage might encourage a healthier political culture; Thibodeau, 2016). One significant limitation in the experimental literature on metaphor framing, though, is that most studies have relied exclusively on written materials. This is notable, as people regularly encounter metaphors in a variety of different communication formats, which has been shown to affect message processing and persuasiveness (e.g., Chaiken & Eagly, 1976, 1983; Furnham & Gunter, 1989; Sparks et al., 1998). In the present study, we addressed this issue by implementing a basic metaphor framing task in three different communication formats.

In Experiments 1 and 2, participants read, heard, or watched a person describe four different issues framed with one of two unique metaphors. After each vignette, they had to select from two response options to address a target question about the issue, one of which was conceptually congruent with the metaphor frame they had observed. Results revealed a significant, similarly-sized effect of metaphor

framing in all conditions, suggesting that communication modality does not reliably moderate the efficacy of metaphor framing. This was true whether the metaphor frame was extended in the language of the response options or not, suggesting that neither lexical priming nor reading metaphorical language alone is sufficient to explain our results. However, we did replicate the finding that extending the metaphor leads to enhanced metaphor framing overall (Keefer et al., 2014; Thibodeau, 2016).

In addition, in Experiment 2 we found that explicit memory for the metaphor frame was associated with selecting a metaphor-congruent response option. While the details of this analysis do not necessarily contradict prior research that finds metaphors *can* covertly influence reasoning (e.g., Thibodeau & Boroditsky, 2013), the results of the present study are notable, as they suggest that deeper processing of the metaphorically framed message may be necessary to produce a reliable metaphor framing effect (Reijnierse et al., 2015; Steen, 2008)––especially when that message is presented in an auditory or audiovisual format (see Figure 2). Future work is needed to systematically examine this effect, however, perhaps through the use of more sensitive memory probes and a wider range of metaphorically framed issues.

In Experiment 3, we investigated the generalizability of our findings by reproducing the audiovisual condition of Experiments 1 and 2 using three different speakers: a white man, a white woman, and a black woman. Once again, we found that extending the metaphor frame into the language of the response options led to a significantly larger metaphor framing effect, but we observed no significant differences in metaphor-congruent responding across speakers. However, we did find that metaphor framing was more effective when the gender (but not the race) of the speaker and listener matched. This provides some evidence that identifying with a speaker contributes to the persuasive power of metaphor, though we believe more research is needed to fully address this issue. No other participant demographics were reliably associated with the magnitude of the metaphor framing effect, even when we combined the data from all three experiments.

Overall, the results of the present set of studies help illuminate the power and generalizability of metaphor framing. Metaphors are effective tools for shaping how people think and reason about a variety of issues, across a variety of communication formats, and across a variety of speaker identities––though the magnitude of these effects is modest. The current studies also suggest several avenues for future research. In addition to investigating a wider range of metaphors, issues, and speaker identities, we also hope to explore why some metaphors and domains are more likely to elicit metaphor framing effects than others, and to further unpack the relationship between memory and metaphor framing. Moreover, we are interested in testing whether and why certain people may be more likely to be influenced by metaphors than others. Taken together, this research has significant implications not only for scholars interested in metaphor and social communication, but also for journalists, policy makers, educators, and others who hope to use language effectively to influence the beliefs and attitudes of others.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix A. Experimental Stimuli

Crime. Crime is a {*virus plaguing/beast preying on*} 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?*

Extended Response Options

(1) Treat the problem by reforming educational practices and creating after school programs (*congruent with virus)*
(2) Attack the problem by increasing street patrols that look for criminals (*congruent with beast)*

Non-Extended Response Options

(1) Reform educational practices and create after school programs (*congruent with virus)*
(2) Increase street patrols that look for criminals (*congruent with beast)*

Politics. The Democrats and Republicans have been {*playing political theater/fighting a battle*} with each other in which both parties seem more interested in {*performing dramatic monologues/attacking their opponent*} than engaging with difficult policy questions. Congress has passed roughly 80% fewer bills in recent terms than it did in the '70 s and '80 s. *Which of the following do you think would be more likely to change the culture in Washington?*

Extended Response Options

(1) Close the curtain on the saga by ending the 24-hour media coverage of politicians (*congruent with theater)*
(2) Bring a truce to the war by forcing politicians to acknowledge their common obligation *(congruent with battle)*

Non-Extended Response Options

(1) End the 24-hour media coverage of politicians (*congruent with theater)*
(2) Force politicians to acknowledge their common obligations (*congruent with battle)*

Research. 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 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?*

Extended Response Options

(1) Looks for connections by testing completely novel theories (*congruent with puzzle)*
(2) Gains ground by using methods that are simple to follow *(congruent with mountain)*

Non-Extended Response Options

(1) Tests completely novel theories *(congruent with puzzle)*
(2) Uses methods that are simple to follow *(congruent with mountain)*

Billiards. Aaron is the {*detective/sniper*} of the billiards world. 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*}. 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?*

Extended Response Options

(1) Deciphering a sequence of several shots (*congruent with detective)*
(2) Locking the current shot in his crosshairs (*congruent with sniper)*

Non-Extended Response Options

(1) Setting up a sequence of several shots *(congruent with detective)*
(2) Making the current shot *(congruent with sniper)*