Research Article

Effects of Fluency on Psychological Distance and Mental Construal (or Why New York Is a Large City, but *New York* Is a Civilized Jungle)

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ABSTRACT—***People construe the world along a continuum from concretely (focusing on specific, local details) to abstractly (focusing on global essences). We show that people are more likely to interpret the world abstractly when they experience cognitive disfluency, or difficulty processing stimuli in the environment, than when they experience cognitive fluency. We observed this effect using three instantiations of fluency: visual perceptual fluency (Study 1b), conceptual priming fluency (Study 2b), and linguistic fluency (Study 3). Adopting the framework of* construal theory*, we suggest that one mechanism for this effect is perceivers' tendency to interpret disfluently processed stimuli as farther from their current position than fluently processed stimuli (Studies 1a and 2a).***

Shakespeare's *Hamlet* is a play of 29,551 words about a fictitious Prince of Denmark. It is also a tragic tale of revenge and existential angst. Although both descriptions are accurate, they constitute fundamentally different representations of the play. Distinct cognitive and behavioral consequences might arise depending on whether a person construes the play in the concrete terms of the first description or the more abstract terms of the second description.

Numerous factors appear to determine whether people represent a stimulus concretely or abstractly. One such factor is the perceiver's experienced distance from the stimulus. According to *construal theory* (Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2003), the nearer people are to a stimulus, the more likely they are to focus on its concrete, specific details. As they move farther away, they increasingly focus on its abstract, global properties (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Henderson, Fujita, Trope, & Liberman, 2006). Thus, for example, people are more likely to define eating as "chewing and swallowing" from nearby and "getting nutrition" from afar.

To test the relationship between distance and construal, researchers have generally manipulated physical distance by telling participants to imagine that the stimulus event occurred locally or thousands of miles away. In one study, participants at New York University (NYU) watched a videotaped conversation between two students, ostensibly filmed either at NYU's Manhattan campus or in Florence, Italy, at NYU's study-abroad campus (Fujita et al., 2006, Study 2). Results were consistent with construal theory, as participants tended to describe the conversation using more abstract language when they believed the conversation was taking place in Florence.

It is worth noting that physical distance is only one instantiation of *psychological* distance, which generally promotes abstract construal. Psychological distance reflects how far a stimulus feels from the self in an abstract psychological space. More distant stimuli promote more abstract construal regardless of whether their distance is defined physically (Fujita et al., 2006), temporally (Liberman & Trope, 1998), socially (Small & Simonsohn, 2006), or probabilistically (Todorov, Goren, & Trope, 2007; Wakslak, Trope, Liberman, & Alony, 2006).

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There is good reason to believe that people make such distance calculations spontaneously, even in the absence of explicit instruction (Bar-Anan, Liberman, & Trope, 2006). Environmental cues to physical distance interact with proprioceptive feedback to prevent the perceiver from colliding with objects nearby (e.g., Bryant & Tversky, 1999). However, these cognitive processes may have metacognitive analogues. In this article, we suggest that a stimulus feels psychologically close to the extent that it feels easy to process.

There are several reasons why subjective ease might influence distance judgments. The first arises from the large literature on *processing fluency*—the metacognitive experience of ease or difficulty associated with a cognitive process (for a review, see Alter & Oppenheimer, 2007). Researchers have shown that processing fluency affects a broad array of judgments, including estimates of truth (Reber & Schwarz, 1999), confidence (Castel, McCabe, & Roediger, 2007), liking (Winkielman & Cacioppo, 2001), and frequency (Kahneman & Tversky, 1979).

A second reason why subjective ease might influence distance judgments is that fluency is an ecologically valid distance cue. Distant objects are difficult to see, and are thus perceptually disfluent. Also, people are more likely to encounter events that are closer in space or time (as local papers report local news, and people more frequently discuss temporally near events than events in the distant future). Such repeated exposure leads to increased conceptual fluency (Reder, 1987). The repeated pairing of fluency and closeness, on the one hand, and disfluency and distance, on the other hand, might lead people to form a bidirectional association between proximity and fluency over time (see Oppenheimer & Frank, in press; Unkelbach, 2006).

Given the association between distance and cognitive acuity, and the fact that fluency affects many types of judgments, people might infer that disfluently processed stimuli are farther away. Thus, our first hypothesis was that participants would perceive disfluently processed stimuli as farther away than more fluently processed stimuli. Our second hypothesis adopted the logic of construal theory and followed from the first hypothesis: If greater disfluency implies greater distance from the target, then participants should construe disfluently processed targets in the environment more abstractly than fluently processed targets. In this article, we present five studies that examined the link between fluency and distance (Studies 1a and 2a) and the link between fluency and mental construal (Studies 1b, 2b, and 3). To test the generality of the effects, we used three instantiations of fluency: visual perceptual fluency (e.g., Reber & Schwarz, 1999; Studies 1a and 1b), conceptual priming fluency (e.g., Reder, 1987; Studies 2a and 2b), and linguistic fluency (e.g., Alter & Oppenheimer, 2006; Study 3).

STUDIES 1A AND 1B

We began by examining the effects of visual perceptual fluency on distance judgments (Study 1a) and psychological construal (Study 1b). In Study 1a, participants estimated the distance from their current location in Princeton, New Jersey, to various other U.S. cities. One version of the questionnaire was printed in an easy-to-read font (fluency condition), and the other was printed in a difficult-to-read font (disfluency condition). We expected that participants who experienced disfluency in reading the questionnaire would estimate that the cities were farther away than would participants who experienced fluency. Noting that people construe more distant stimuli more abstractly, we expected participants in Study 1b to describe a city more abstractly when the study materials were printed in a difficult-to-read font (disfluency) than when they were printed in an easy-to-read font (fluency).

Study 1a

Method

Forty volunteers at a train station in West Windsor, New Jersey, estimated their distance in miles from 24 U.S. cities. The diverse sample of participants consisted chiefly of male, Caucasian professionals who were waiting for a morning rush-hour train bound for New York City. As many researchers have done (e.g., Alter, Oppenheimer, Epley, & Eyre, 2007; Oppenheimer, 2006), we manipulated fluency by varying the legibility of the font in which the questionnaire was written. Half the participants were assigned to the disfluency condition and received a questionnaire printed in a font that was relatively difficult to read (12-point, italicized Haettenschweiler font: *sample*); the other half were assigned to the fluency condition and received a questionnaire printed in an easy-to-read font (12-point Times New Roman font: sample). For each city, the questionnaire asked: "How far are you from [city name]?" To reduce the variance across participants' estimates, we began the questionnaire with a sentence stating that the greatest distance between Princeton and any mainland U.S. city is approximately 2,500 miles.

Results

As expected, participants who experienced disfluency estimated that the cities were farther away (M = 1,331.17 miles, SD = 641.86) than did participants who experienced fluency (M = 1,251.43 miles, SD = 586.58), $t(23) = 3.06$, $p < .01$, $p_{rep} = .97$, $\eta_p^2 = .29$. These results suggest that people use visual fluency as a proxy for distance estimates.

Study 1b

Construal theory suggests that people construe distant objects more abstractly than they construe near objects. Having shown that cities seemed farther away when participants received the difficult-to-read questionnaire, we sought to show that participants would also describe cities more abstractly when they received a difficult-to-read, rather than an easy-to-read, questionnaire.

Method

One hundred ninety-six volunteers from various public locations around Princeton University were asked to "describe New York City using one or two sentences." Although participants did not provide demographic information, the samples consisted of students and working adults of mixed gender, age, and ethnicity. Half the participants were assigned to the fluency condition and received a questionnaire printed in an easy-to-read font (12-point Times New Roman font: sample), whereas the other half were assigned to the disfluency condition and received an otherwise identical questionnaire printed in a difficult-to-read font (10-point, 25% gray, italicized Arial font: *sample*).

Two raters who were blind to the purposes of the study coded each description. As many of the descriptions combined both abstract and concrete elements, each description was coded as entirely abstract (given a value of 0; e.g., "New York's lights, shimmering in the foggy sky, remind me of outer space"), entirely concrete (1; e.g., "New York City is a large city with five boroughs and about 18 million people"), or a combination of abstract and concrete (.5; e.g., "New York City is diverse, cosmopolitan, and vibrant"). The coders were told that

> concrete statements refer to specific, tangible objects. For example, you might describe the act of driving as sitting in a car, pushing the accelerator, and moving the steering wheel to point the wheels in the direction you want to go. This is a concrete description. An abstract description of driving a car might suggest that driving is the act of getting from point A to point B. It is abstract because it describes the higher order concept rather than the mechanical specificities of driving.

The coders rated 80.1% of the statements consistently, and a third blind coder resolved the inconsistencies. An experimenter (blind to the condition of the participants) resolved the coding for a few descriptions that troubled the three coders.[1]

Results

Because the codes were not normally distributed, we conducted a nonparametric Mann-Whitney *U* test on the data. As expected, participants in the disfluency condition provided more abstract descriptions ($M = .26$, $SD = .37$) than did participants in the fluency condition ($M = .16$, $SD = .31$), $U = 4{,}127.00$, $Z = 2.06$, $p < .05$, $p_{rep} = .93$, $\eta_p^2 = .02$.[2]

One potential alternative explanation for these findings is that disfluency fatigued participants, leading them to compose shorter descriptions. Shorter descriptions may contain less concrete detail, giving the impression of abstractness. However, the length of the descriptions in the disfluency condition ($M = 9.66$ words, $SD = 3.57$) did not differ significantly from the length of the descriptions in the fluency condition ($M = 10.39$, $SD = 6.48$), $t(194) < 1$; this result suggests that the effects were not moderated by description length.

A second alternative explanation is that disfluency led to negative mood states and that negative mood, rather than disfluency, promoted abstract construal. To address this concern, we asked two blind coders ($\alpha = .87$) to rate the descriptions on an affective dimension from 1 (*very negative*) to 7 (*very positive*). The descriptions were equally positive in the two conditions ($M_{fluency} = 4.49$, $SD = 1.36$; $M_{disfluency} = 4.48$, $SD = 1.29$), $t < 1$; this result suggests that the effects of fluency on construal were not merely an artifact of the effects of fluency on mood.

Discussion

In sum, the results of Studies 1a and 1b suggest that greater disfluency implies greater distance from a target and leads participants to perceive the world more abstractly. Next, we sought converging evidence by attempting to replicate this effect using a different instantiation of fluency: conceptual priming fluency.

STUDIES 2A AND 2B

Manipulations of conceptual priming fluency rest on the assumption that previously activated semantic concepts are subsequently easier to process and retrieve from memory (Reder, 1987; Whittlesea, 1993). Researchers have shown, for example, that people classify *nurse* as a real word more quickly when they are primed with the word *doctor* at an earlier stage in a lexical-decision task than when they are primed with an unrelated word (e.g., Collins & Loftus, 1975). Across multiple domains, conceptual priming yields effects similar to those of other fluency manipulations (Alter & Oppenheimer, 2007). Accordingly, in Studies 2a and 2b, we sought to show that people judge a city as closer (Study 2a), and construe it more concretely (Study 2b), when they have been primed with the city's name in an earlier phase of the study.

Study 2a

In Study 2a, participants completed two ostensibly unrelated tasks, the first of which primed certain cities, and the second of which asked them to estimate the distance of both primed and novel cities. We expected participants to judge the novel (and therefore less fluently processed) cities as more distant than the primed cities.

Method

Thirty-two Princeton University undergraduates volunteered to complete this study during the lunch hour at the student center on campus. The majority of participants were freshmen and sophomores, of mixed gender and ethnicity. Most were approached while dining alone.

During the first stage of the experiment, participants read a brief article describing six baseball stadiums. The author of the

[1] The results did not differ when we excluded these statements from the analyses.

[2] An independent-samples *t* test, the parametric analogue of the Mann-Whitney *U* test, also yielded significant results, $t(194) = 2.04$, $p < .05$, $p_{rep} = .92$, $\eta_p^2 = .02$.

article rated each stadium on three dimensions (comfort, standard of hot dogs, and field quality), and participants were asked to determine which stadium players and fans liked best. For half the participants, the six stadiums were in Atlanta, Detroit, Milwaukee, St. Louis, San Francisco, and Cleveland. For the other half of the participants, the six stadiums were in Cincinnati, Houston, Pittsburgh, Seattle, Kansas City, and San Diego.

After rating the stadiums, participants received an ostensibly unrelated second questionnaire. This questionnaire, which was similar to the questionnaire in Study 1a, asked participants to estimate the distance from their position in Princeton to 18 U.S. cities. Half the participants were primed with 6 of these cities, the other half were primed with a different set of 6 of these cities, and the remaining 6 cities were novel to all participants. Thus, each participant was given the names of 6 primed and 12 novel cities. The 6 cities that were novel to all participants were excluded from all analyses and served only as fillers, included to increase the number of unprimed cities relative to primed cities. We included more novel than primed stimuli to minimize the possibility that participants would focus on the fact that they had previously read about the primed cities, which might have prompted them to discount fluency as a distance cue (Oppenheimer, 2004). We expected each group of participants to rate the 6 cities with which they were primed as closer than the 6 cities with which the other group was primed. Thus, for each participant, we calculated the mean estimated distance to the 6 primed cities and the mean estimated distance to the 6 unprimed cities (i.e., the cities that were primed for members of the other group). As in Study 1a, we sought to reduce the variance across participants' estimates by stating that the longest distance between Princeton and any mainland U.S. city is approximately 2,500 miles.

Results

As expected, participants estimated that the primed cities were nearer (M = 1,273.02 miles, SD = 230.42) than the unprimed cities (M = 1,416.54 miles, SD = 284.03), $t(31) = 2.32$, $p < .05$, $p_{rep} = .93$, $\eta_p^2 = .13$. These results replicate those of Study 1a: Cities whose names are processed fluently seem nearer than those whose names are processed disfluently.

Study 2b

Having used conceptual priming to show that people judge fluently processed stimuli to be physically closer than disfluently processed stimuli, we sought to show that conceptual disfluency also promotes abstract construal.

Method

Two hundred thirty-six Princeton University undergraduates (153 females, 83 males; mean age = 20.69 years, SD = 2.22 years) completed this study as part of a larger packet of unrelated questionnaires and received $12 in compensation. Fifty-six percent of participants were White, 18% were Asian, 10% were Black, 7% belonged to two or more racial groups, and the remaining 9% identified with one of several other racial groups.

The priming task was similar to the task used in Study 2a. Participants again selected which of six baseball stadiums fans and players liked most. In the fluency condition, one of the stadiums was Dodger Stadium, home to the Los Angeles Dodgers baseball team. In the disfluency condition, this stadium was replaced by Comerica Park, home to the Detroit Tigers.

A subsequent ostensibly unrelated questionnaire asked participants to rank eight statements according to how well they described the city of Los Angeles. Four of the statements were concrete descriptions (e.g., "a dry, temperate city"), whereas the other four were abstract descriptions (e.g., "a tangle of freeways").

For a manipulation check, we asked a separate sample of 11 participants to rate the concreteness-abstractness of these eight statements along a 5-point continuum (from 1, *strongly concrete*, to 5, *strongly abstract*). We provided these participants with the brief description of concreteness and abstractness that the coders used in Study 1b. As expected, the participants rated the concrete statements as more concrete (M = 2.80, SD = 0.74) than the abstract statements (M = 4.03, SD = 0.85), $t(9) = 2.81$, $p < .05$, $p_{rep} = .95$, $\eta_p^2 = .47$.

Results

Participants ranked each of the eight statements from 1 (*best description of Los Angeles*) to 8 (*poorest description of Los Angeles*). We classified participants as concrete-preferring if they assigned superior rankings to the concrete descriptions, and as abstract-preferring if they assigned superior rankings to the abstract descriptions. As expected, the percentage of concrete-preferring participants was higher when Los Angeles had been primed earlier in the study (53%) than when Los Angeles had not been primed (41%), $\chi^2(1, N = 236) = 3.83$, $p = .05$, $p_{rep} = .92$, $\phi = .13$. These results replicate and extend those of Study 1b, in which participants construed New York City more concretely when the request to describe New York was processed fluently (i.e., written in an easy-to-read font) rather than disfluently (i.e., written in a difficult-to-read font).

STUDY 3

The previous studies suggest that stimuli that are processed disfluently feel more distant than those that are processed fluently, and consequently are judged as physically farther away and are construed more abstractly. These studies show that fluency influences construal in a laboratory experiment, but in Study 3, we examined the relation between fluency and construal in a naturalistic environment. Additionally, we sought converging evidence by testing a third instantiation of fluency. Specifically, we looked at archival data to examine how the pronounceability, or linguistic fluency, of an obscure word influences how people define that word. We collected the words and definitions from a Web community of *Balderdash* players. In

TABLE 1
Sample Words From Study 3

Word	Sample definition offered by a player	Word complexity (1–10)	Complexity percentile
Euneirophrenia	The belief that anything is possible with the correct medication	7.90	100
Tyrosemiophily	The love of creating new genres within art	7.48	98
Beestings	A type of spiced Scottish sausage	2.07	2
Redknees	Theatrical term referring to an adult actor who plays the part of a child by walking on their knees	2.13	4

Note. *Euneirophrenia* and *tyrosemiophily* are examples of complex words for which players tended to give abstract definitions, and *beestings* and *redknees* are examples of less complex words for which players tended to give more concrete definitions.

the game of *Balderdash*, each player attempts to generate a plausible definition for an obscure English word without having first seen its true definition. The player-generated definitions and the real definition are posted on-line with no indication of which definition is real, and the players try to identify the real definition. A player earns a point when other players mistake his or her fabricated definition for the word's real definition. We used the natural variation in the pronounceability of English words as a proxy for fluency (see Alter & Oppenheimer, 2006). We expected people to create more abstract definitions for words that were more difficult to pronounce, and more concrete definitions for words that were easier to pronounce.

Method

We collected all definitions from an on-line *Balderdash* community (535 definitions of 95 words) that ran from 1997 until 2004 and attracted 33 regular players. Players had 2 days to contribute a definition for each round of play, and then the Web master posted the real and fabricated definitions and asked players to identify the real definition.

To obtain ratings of the 95 words' complexity, we divided them into three subsets of approximately 32 words each. While completing a larger packet of questionnaires in exchange for $12, each of 140 Princeton University undergraduates rated how easily he or she could pronounce each word from one of these subsets (from 1, *very easy to pronounce*, to 10, *very difficult to pronounce*). These ratings served as a proxy for linguistic fluency (see Alter & Oppenheimer, 2006).

Two raters blind to the purposes of the study coded each definition. As many of the descriptions combined both abstract and concrete elements, each description was coded as entirely abstract (given a value of 0), entirely concrete (1), or a combination of abstract and concrete (.5).

Results

As expected, the *Balderdash* contestants created more abstract definitions for the more difficult-to-pronounce words, $\beta = -.14$, $t(533) = -3.18$, $p = .002$, $p_{rep} = .99$ (see Table 1 for representative examples).[3] Of the 33 players, 25 (76%) created more abstract definitions for less pronounceable words, a significantly greater proportion than might be expected by chance, $\chi^2(1, N = 33) = 8.06$, $p = .003$, $p_{rep} = .98$. Furthermore, the mean correlation between the pronounceability of the words and the abstractness of players' definitions differed reliably from zero ($M_r = -.16$, $SD_r = .32$), $t(32) = -2.81$, $p < .01$, $p_{rep} = .97$, $\eta_p^2 = .20$.[4] Thus, both definition- and player-level analyses revealed that players generated more abstract definitions for more difficult-to-pronounce words.

It is important to note that we also found that participants did not provide shorter definitions for more disfluently processed words, $r(533) = .003$. Thus, it is not the case that linguistic disfluency only appeared to induce abstract construal because participants created shorter (and less concretely detailed) definitions for more disfluently processed words.

GENERAL DISCUSSION

Across five studies, we have shown that disfluently processed stimuli feel more psychologically distant than fluently processed stimuli, and consequently are judged as farther away and perceived more abstractly. This effect emerged across three instantiations of fluency (visual perceptual fluency, conceptual

[3]The coders agreed on 59.2% of the codes, so, as in Study 1b, a third coder resolved inconsistencies between the two original coders. We were concerned by the low level of interrater agreement, so two additional blind raters coded the statements on a scale from 1 (*entirely abstract*) to 5 (*entirely concrete*). The level of interrater agreement was significantly higher ($\alpha = .66$), and analyses using these ratings showed again that players created more abstract definitions for more complex words, $\beta = -.11$, $p = .005$, $p_{rep} = .99$. To further ensure that the effects were not an artifact of interrater disagreement, we eliminated the definitions for which the ratings differed by more than 2 points on the 5-point scale. Raters coded the remaining statements with a high level of consistency ($\alpha = .88$), and the effect persisted, $\beta = -.09$, $p < .05$, $p_{rep} = .93$.

[4]The effect size in Study 3 is markedly stronger than the effect sizes in Studies 1b and 2b, probably because of the strength of the fluency manipulation in Study 3. The font manipulation in Study 1b and the conceptual priming manipulation in Study 2b were quite subtle, whereas words such as *euneirophrenia* and *tyrosemiophily* are considerably more difficult to process than are words like *beestings* and *redknees*.

priming fluency, and linguistic fluency) and in both controlled laboratory studies and a more naturalistic setting.

Although earlier research demonstrated that psychologically distant stimuli are perceived more abstractly than psychologically near stimuli, the experimenters typically induced psychological distance through explicit instruction (but see, e.g., Bar-Anan et al., 2006). The present research therefore makes two important contributions: First, Studies 1a and 2a identify processing fluency as a mechanism that drives spontaneous inferences of psychological distance. Second, Studies 1b, 2b, and 3 show that processing fluency determines how people represent and construe stimuli, along a continuum from concretely to abstractly. As this research suggests, the effects of disfluency on construal might be driven, in part, by the effects of disfluency on distance perception. Alternatively, disfluency might diminish the perceiver's ability to perceive the target's details, directly compelling a more abstract construal of the target. Figuratively, as each individual tree begins to blur, the perceiver has no choice but to focus on the forest at large.

These studies also represent a novel approach to the study of fluency. To date, most research on fluency has investigated the vast array of direct effects of fluency on judgments. For example, stocks with more easily pronounced names appear more valuable (Alter & Oppenheimer, 2006), the simpler of two semantically identical texts seems to come from a more intelligent author (Oppenheimer, 2006), and people are more confident in intuitive judgments than in those that challenge intuition (Simmons & Nelson, 2006). However, researchers have only recently begun to consider the indirect effects of fluency on judgment. In addition to showing the direct influence of fluency on judgments of distance, this article shows that fluency influences judgment indirectly by changing how people construe or represent stimuli. Situations will elicit different judgments depending on which elements of those situations the perceiver represents; judgments of the desirability of a visit to the dentist will depend on whether a person is thinking of "good oral hygiene" (abstract) or "having one's teeth drilled with a sharp metal object" (concrete). Thus, fluency influences judgments not only directly, but also indirectly by changing which aspects of the stimuli are momentarily salient.

In other research on the indirect effects of fluency on judgment, we (Alter et al., 2007) showed that disfluency tempers people's confidence in their judgments, which leads them to approach subsequent cognitive tasks more analytically. These effects were indirect because fluency altered the strategy with which participants processed the target stimuli, rather than how they evaluated those stimuli per se. Also examining the indirect effects of fluency on judgment, Shah and Oppenheimer (in press) showed that people attend to fluently processed cues in the environment more carefully than they attend to disfluently processed cues. These findings, along with those of the studies we have presented here, show that fluency not only has profound effects on how people evaluate targets directly, but also on how they appraise and represent those targets.

Perhaps there is value in the idea that one should read classic texts in their original form. As colloquialisms, common vocabulary, and grammar change over time, new generations of readers may discover layers of abstract complexity that escaped their forebears. Had Shakespeare jettisoned Hamlet's complicated "To be or not to be!" soliloquy in favor of a more straightforward exclamation of angst, Hamlet might long ago have faded into obscurity with countless other, more simplistic literary characters.

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