Fluency and Psychological Distance

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Abstract

This paper examines the possibility that fluency – the subjective experience of ease or difficulty associated with cognitive processing – has an impact on the psychological distance of stimuli. Two studies directly examine the relationship between fluency and psychological distance. Five additional studies look at the implications of that relationship.

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Introduction

How far is it from your current location to Washington DC? How long is it from today until Cogsci? What are the odds that your paper will be accepted to the conference? All of these questions tap into the underlying psychological construct of psychological distance; namely, how far away does Cogsci feel?

Psychological distance is an important construct, because it mediates a number of behaviors and cognitions. For example, information that feels more distant is construed in a more abstract manner (Trope & Liberman, 2003), people hyperbolically discount the value of psychologically distant objects (Green & Myerson, 2004) and are less likely to give to psychologically distant charities (Small, Loewenstein, & Slovic, 2007). While many researchers have investigated the *effects* of psychological distance, there has been surprisingly little research on what *causes* a stimulus to feel close or far away.

In this paper we put forth the simple notion that things feel more psychologically close to the extent that they are easy to process. There are several reasons to believe that this might be the case. First, processing fluency – the subjective experience of ease or difficulty that accompanies most cognitive activity – has been shown to influence a wide array of judgments, ranging from the value of stock prices (e.g. Alter & Oppenheimer, 2006), to categorical induction (Oppenheimer & Frank, 2008) and many others (for a review, see Alter and Oppenheimer, 2008).

Second, fluency is likely an ecologically valid cue for distance. Physically closer stimuli are easier to see and hear. Temporally closer stimuli are easier to remember. Newspapers disproportionately cover local news which means that local news is more likely to be primed and easier to process. Thus, there is likely a relationship between fluency and objective distance, which makes it a potentially useful cue when making judgments of psychological distance.

In this paper, we first will demonstrate the relationship between fluency and distance. We will show that as stimuli become easier to process, people believe them to be closer. We then go on to explore some of the implications of this relationship. Specifically, we will look at how fluency impacts abstract vs. concrete construal of stimuli, and how it influences discount rates in value judgments.

Fluency and Psychological Distance

In this first set of studies, we examined the relationship between how easily stimuli are processed and how far away they seem from the perceiver. Since stimuli become more difficult to perceive visually as they move farther away, and events become more difficult to remember as they recede into the past, we expected disfluent stimuli to seem farther away than their more fluent but otherwise identical counterparts.

Study 1: Study 1 investigated whether reduced perceptual fluency would lead to increased judgments of distance. Forty volunteers from a local train station estimated the distance (in miles) between Princeton and 24 U.S. cities. Half the participants received surveys printed in a fluent font (12 point, Times New Roman: sample), while half received surveys in a disfluent font (12 point, italicized, Haettenschweiler font: *sample*).

Participants judged the cities to be more distant when they were presented in a disfluent font (M = 1331.17 miles, SD = 641.86) than in a fluent font (M = 1251.43 miles, SD = 586.58), t (23) = 3.06, $p < .01$, $\eta^2 = .29$. As such, decreasing fluency had a reliable impact on people's perceptions of distance.

Study 2: Study 2 aimed to replicate the findings of Study 1, but using a different instantiation of processing fluency: concept priming fluency. Previous research has shown that primed concepts are easier to subsequently retrieve from memory and process (Whittlesea, 1993).

32 Princeton University undergraduates recruited from the university campus center filled out a survey rating six sports stadiums on various dimensions. Half of the participants were asked to rate stadiums in Atlanta, Detroit, Milwaukee, St Louis, San Francisco, and Cleveland, while half were asked to rate stadiums in Cincinnati, Houston, Pittsburgh, Seattle, Kansas City, and San Diego. Then, in an ostensibly unrelated task, participants were asked to judge the distance (in miles) to 18 cities, some of which were the cities that they had previously made ratings on, and were consequently primed.

Participants estimated that cities were nearer after those cities had been primed (M = 1273.02 miles, SD = 230.42) than when the cities had not been primed (M = 1416.54 miles, SD = 284.03), t (31) = 2.32, $p < .05$, $\eta^2 = .13$. As such, increasing fluency through priming had a reliable impact on people's perceptions of distance.

Fluency and Construal

In Studies 3-5, we examined one implication of our initial finding that disfluent stimuli appear farther from the perceiver. Construal theory (Trope & Liberman, 2003) suggests that people process psychologically distant stimuli more abstractly than psychologically nearer stimuli. Thus, a person might construe the act of visiting the dentist *today* quite concretely, as "the experience of being prodded and poked by sharp metal objects," whereas in *six months* the experience might be represented more abstractly as "an act designed to maintain good dental hygiene." Since Studies 1 and 2 suggest that disfluent stimuli seem farther away, we sought to show in Studies 3-5 that disfluent stimuli are consequently processed more abstractly.

Study 3: 196 volunteers were recruited from various public locations around Princeton University and the surrounding town. Participants were asked to "describe New York City using one or two sentences". Half of the participants viewed the questionnaire in fluent font (12 point Times New Roman: sample), and half viewed the questionnaire in a disfluent font (10 point, 25% grey italicized Arial: *sample*).

Two research assistants blind to condition coded the descriptions. Coders were told: "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 say 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" (adapted from Trope & Liberman, 2003).

80.1% of the statements were coded consistently, and a third blind coder resolved the inconsistencies. A non-parametric Mann-Whitney U-test on the coded descriptions revealed that participants in the disfluent condition provided more abstract descriptions (e.g. "New York's lights shimmering in the foggy winter sky reminds me of outer space", M = .26, SD = .37) than did participants in the fluent condition (e.g. "New York City is a large city with 5 boroughs and about 18 million people", M = .16, SD = .31), U = 4127.00, Z = 2.06, $p < .05$, $\eta^2 = .02$. Descriptions in the disfluent condition (M = 9.66 words, SD = 3.57) did not significantly differ in length from those in the fluent condition (M = 10.39, SD = 6.48), t (194) < 1, suggesting that the effects were not due to participants in the disfluent condition being unmotivated and writing less.

Study 4: We sought to replicate the results of Study 3 using a second instantiation of processing fluency: conceptual priming. Specifically, we sought to show that recently primed (and therefore more fluent) stimuli are perceived more concretely than unprimed (and therefore more disfluent) stimuli.

Two hundred and thirty six Princeton University undergraduates completed this study as part of a larger packet of unrelated questionnaires. The priming task was very similar to that in Study 2. Participants were asked to rate various ballparks. For half of the participants, one of the stadiums was Los Angeles's Dodger Stadium. For the other half of the participants, Dodger Stadium was replaced in the survey with Detroit's Comerica Park.

Then, in an ostensibly unrelated study, participants rated eight statements about Los Angeles that varied in abstractness (e.g. "a tangle of freeways") and concreteness ("a dry, temperate city"). A manipulation check validated that the abstract statements were indeed perceived as more abstract than the concrete statements (t (9) = 2.81, $p < .05$, $\eta^2 = .47$).

Participants were classified as concrete-preferring if they gave higher overall rankings to the concrete descriptions, and as abstract-preferring if they gave higher overall rankings to the abstract descriptions. Participants preferred the concrete statements when Los Angeles had been primed earlier in the study (53%) than when Los Angeles had not been primed (41%), χ^2 (1, N = 236) = 3.83, p = .05, ϕ = .13.

Study 5: Further replicating the results in Studies 3 and 4, we sought to show that obscure, linguistically disfluent words are perceived to have more abstract definitions than linguistically fluent words.

Definitions from an online Balderdash community (535 definitions of 95 words) consisting of 33 players were collected. One hundred and forty Princeton University

undergraduates rated how easily they could pronounce each of these words. This gave us a measure of linguistic fluency for each word in the set.

Two coders blind to the hypotheses coded each definition using the same coder instructions that were used in Study 3. As in Study 3, a third coder resolved any inconsistencies.

Balderdash contestants created more abstract definitions for the more difficult-to-pronounce words (e.g. "Euneirophrenia: The belief that anything is possible with the correct medication") and more concrete definitions of easy-to-pronounce words (e.g. "Beestings: A type of spiced Scottish sausage"), β = -.14, t (533) = -3.18, p = .002. Additionally, 76% of the players created more abstract definitions for more complex words, a significantly greater proportion than might be expected by chance, χ^2 (1, N = 33) = 8.06, p = .003.

As such, it appears that fluency has a reliable influence on the extent to which people construe information abstractly or concretely. Ostensibly, a lack of fluency leads people to perceive the stimuli as more psychologically distant, which in turn leads to more abstract construal. Of course, this can have important behavioral implications. For example when making decisions (e.g. whether or not to diet) an individual may make different choices depending on whether he focuses on concrete (e.g. having to eat flavorless rice cakes) or abstract (e.g. being healthier and living longer) features.

Fluency and Discounting Rates

Another domain in which psychological distance can have a profound effect is in intertemporal choice. When making intertemporal choices, people often discount the value of delayed rewards. This discounting is best modeled by hyperbolic or hyperbola-like functions (Green & Myerson, 2004). These models of choice predict that adding a constant delay in front of two rewards might lead to preference reversals. For example, a person choosing between $10 immediately versus $15 in one week might prefer the *immediate* reward. However, when choosing between $10 in ten weeks versus $15 in 11 weeks this person might prefer the *later* reward, even though the absolute time difference between the two rewards is still one week.

If disfluency leads people to perceive events as further away, then we might expect disfluency to act in a manner similar to adding a constant time frame in front of delayed options. To test this hypothesis, participants in Study 6 made choices between two hypothetical delayed rewards: a smaller reward available at a sooner time (SS), and a larger reward available at a later time (LL). We expected that when participants experienced disfluency, they would be more likely to prefer the LL reward.

Study 6: One hundred sixty Princeton University students were recruited from the university campus center and compensated with a piece of candy. Participants were shown four pairs of hypothetical monetary rewards. Each pair consisted of a SS reward and a LL reward ($50 after 1 month versus $75 after 4 months, $225 after 3 months versus $300 after 6 months, $750 after 4 months versus $900 after 12 months, $1000 after 6 months versus $1150 after 14 months). Participants were asked to indicate which reward they preferred from each pair.

Half of the participants received questionnaires printed in an easy to read, fluent font (Black 12 pt. Times New Roman: Sample), while half of the participants received questionnaires printed in a hard to read, disfluent font (Grey 12 pt. Monotype Corsiva: *Sample*).

For the analysis, we calculated the proportion of each participant's choices that indicated a preference for the LL reward. Participants in the disfluent condition chose the LL reward significantly more often (M = .47, SD = .37) than did participants in the fluent condition (M = .33, SD = .33), t(158) = 2.37, p = .02, Cohen's d = .39. Therefore, it appears that disfluency essentially shifted the events further away on a subjective time scale, leading participants to more strongly prefer the LL reward as predicted by hyperbolic discounting.

However, we would not expect disfluency to affect perceptions of immediate events (because there is no duration that needs to be estimated between "now" and an immediate event). Instead, we would expect fluency manipulations to have a different effect on choices between two delayed rewards than on choices between one immediate and one delayed reward. In the latter case, we might expect disfluency to lead to a weaker preference for the LL reward because it would be perceived as further away while the perception of the immediate reward would not change.

To test this hypothesis, we adopted a slightly different approach than that in Study 6. In Study 7, participants were asked to imagine that they had received a gift certificate and then asked how much they would need to be paid to wait before using the gift certificate (i.e., the delay premium). A higher delay premium would indicate greater preference for the sooner reward; that is, a preference for using the gift certificate without waiting.

Study 7: Eighty Princeton University students were recruited from the university campus center on campus and compensated with a piece of candy.

Participants were first asked to imagine receiving a $75 Visa gift card that had no expiration date. Half of the participants were told that the gift card could be used immediately, half were told that the card could only be used after waiting for one year. They were then asked to imagine having to wait an additional two months before using the gift card and asked how much more they would need to be paid in order to wait.

Half of the participants received questionnaires printed in an easy to read, fluent font (Black 12 pt. Times New Roman: Sample), while half of the participants received

questionnaires printed in a hard to read, disfluent font (Grey, Italicized 10 pt. Monotype Corsiva: *Sample*).

For the immediate condition, we expected the delay premium to be higher under disfluency than fluency because the two month wait would loom larger under disfluency. For the delay condition, we expected the delay premium to be higher under fluency than disfluency. This prediction is similar to the prediction for Study 6. Disfluency would essentially be analogous to extending delay before the availability of the gift card and so an additional two months would not loom as large.

A 2 (delay: immediate vs. delayed) x 2 (ease of processing: fluent vs. disfluent) factorial between-subjects ANOVA revealed no significant main effects of delay or ease of processing. However, as expected, there was a significant effect of the interaction between delay and fluency on the amount of money participants requested in order to wait before using the gift card, $F(1, 73) = 8.24$, $p = .005$, $\eta_p^2 = .10$.

When considering the immediately available gift card, participants in the disfluent condition asked for more money to wait (M = \$34.50, SD = 33.79) than did participants in the fluent condition (M = \$23.82, SE = 25.06), but the difference was not significant, $F(1, 37) = 1.25$, $p = .27$, $\eta_p^2 = .03$. However, when considering the delayed gift card, participants in the disfluent condition asked for *less* money to wait (M = \$16.25, SD = 16.69) than did participants in the fluent condition (M = \$40.00, SD = 26.73), $F(1, 36) = 11.03$, $p = .002$, $\eta_p^2 = .24$. This suggests that changes in fluency affect choices between delayed and immediate options differently.

These studies on intertemporal choice therefore indicate that ease of processing can shift perceptions of temporal distance and that changes in subjective time estimates subsequently alter choice behavior. Admittedly, however, Studies 6 and 7 *indirectly* assess the effect of fluency on subjective time estimates. More direct measurements of subjective time under fluency and disfluency would offer further insight into whether fluency affects time estimates, or whether it affects which dimension of an outcome (delay or amount) people attend to.

The implications of intertemporal discounting are non-trivial. Decisions about how much money to save for the future, and whether or not to engage in activities to delay negative health outcomes (Chapman & Elstein, 1995) have important personal and societal consequences. As we have shown, perceptions of psychological distance can influence intertemporal choices.

Conclusions

Things that feel difficult to process also feel farther away. This makes sense, as things that are farther away typically are more difficult to process. However, a consequence of this association is that simple manipulations such as font selections, conceptual priming, or linguistic complexity can influence the psychological distance of a stimulus.

While many studies have shown that fluency has a direct impact on judgment (e.g. more fluent stimuli are judged as being more valuable, Alter & Oppenheimer, 2006), these studies show an indirect impact of fluency on judgment (c.f. Alter, Oppenheimer, Epley, & Eyre, 2007; Shah & Oppenheimer, 2007). The increase in psychological distance of a stimulus can lead us to construe the stimulus more abstractly, and can influence our valuation of that stimulus over time.

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