

Research Article

Effects of multiple psychological distances on construal and consumer evaluation: A field study of online reviews

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Abstract

Through a large-scale field study of 166,215 online restaurant reviews, we found evidence of a distance boosting effect, whereby experiencing spatial distance (i.e., authoring a review about a geographically distant restaurant, rather than proximate one) and temporal distance (i.e., authoring a review after a lengthy delay, rather than immediately) jointly affect review positivity by amplifying consumers' high-level construals. Although past research has explored the relationship between psychological distance, construal and consumer evaluation, the effects of various dimensions of distance have only been considered in isolation. Our research contributes to past work by testing the effects of experiencing two dimensions of psychological distance simultaneously on construal and consumer evaluations. Moreover, because our data contain naturalistic observations, our research includes a wide range of temporal and spatial distances. We found that the effect of one distance increases the effect of the other. Metaphorically speaking, the effect of one distance is boosted by another.

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Introduction

Mark Twain is famous for saying, “distance lends enchantment to the view,” attesting, anecdotally, that faraway things will appear better than they are in reality. Broadly speaking, Mark Twain observed a pattern that has interested scholars in psychology and marketing for the last six decades — the effects of feeling something as closer or farther relative to the self (Lewin, 1951). In more recent times, research on feelings of (greater or lesser) closeness forms part of a large body of work known as construal

level theory (CLT), which has theorized and found that psychological distance changes people's mental representations of events (Liberman & Trope, 1998). Specifically, distant events (e.g., those taking place in the past, or in faraway places) are more likely to be represented in high-level terms of abstract and central features; whereas close events (e.g., events in places and at times that are here and now, respectively) are more likely to be represented in low-level terms of concrete and peripheral features (Trope & Liberman, 2000, 2003).

Informed by theories of psychological distance and CLT, the present research examined whether the passing of time and space *jointly* affect online review positivity. Notably, our focus is on two dimensions of psychological distance (time and space), which addresses a broad, theoretical question: Does experiencing multiple dimensions of psychological distance of an event,

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simultaneously, lead to different event-appraisals compared to when only a single dimension of psychological distance is experienced? Research on psychological distance has identified four different dimensions of distance: temporal-, spatial-, social-, and certainty-distance, yet despite the extensive research on these dimensions' role in a varied range of outcomes (e.g., in decision making, persuasion, negotiation, creativity, metacognition, self-control, and memory; for a review see Liberman, Trope, & Wakslak, 2007), little research has examined the influence of experiencing more than one dimension of distance simultaneously.

By adopting a multiple-dimensions approach to distance, the current research extends the literatures on psychological distance and CLT in both theoretical and empirical terms. Research has shown that distant events generate high-level construals. However, what if an event will take place in the *future*, and also in a *faraway* place? Would this scenario generate even *more* high-level construals? As a specific example, does the level of construal that results when considering an event that will take place 5000 miles away grow even greater when a second distance is introduced, such as if the event were also to take place 5 years into the future (a case of two remote distances)?

It is this question that the current research helps address — what the effect is of experiencing multiple distances, at different levels on construal level and, subsequently, the evaluative judgments people generate of events. Our investigation enables us to examine the cross-dimensional effects of multiple distances (i.e., events that are close in time yet far in space; or far in time yet close in space) in a relatively nuanced and precise way: Owing to our novel dataset (containing a sample of 166,215 restaurant reviews) we are able to examine distance *continuously* (as opposed to categorically). By that we mean, in a departure from past research on psychological distance that typically compares one researcher-created discretionary, categorical level of distance with another level (e.g., comparing an event happening in “1 year” with an event happening “tomorrow”), we examined a wide range of naturalistic temporal and spatial distances, from 0 to 11 months and 0 to 11,910 miles respectively. Besides testing the separate effects of each distance across its range, our study design enables us to test our main focus: the effects of experiencing multiple distances in tandem — specifically, the interactive effect of different levels of temporal distance against a range of spatial distances, and vice versa.

We begin with a theoretical framework describing the effects of psychological distance on construal level, and argue that positive appraisals of past events are a result of generating high-level construals. Then, we shift our discussion from the effects of experiencing one dimension of distance to the effects of experiencing multiple dimensions, to advance our prediction that, compared with experiencing one distance, experiencing two distances fosters more high-level construals, and hence more positive event-appraisals.

Psychological distance, CLT, and positivity

CLT suggests that individuals process events at higher levels of construal when they perceive greater psychological distance

between themselves and those events, where psychological distance is defined as an “egocentric” perception of “the different ways in which an object might be removed” from “the reference point of self in here and now” (Trope & Liberman, 2010, p. 440). Accordingly, theorizing on psychological distance has identified four means by which targets can drift in distance: in time, from now to earlier or later (Trope & Liberman, 2000); in space, from here to another place (Fujita, Henderson, Eng, Trope, & Liberman, 2006); in social contexts, from the self to others (Polman, 2012); and in probability, from certain to uncertain (Wakslak, Trope, Liberman, & Alony, 2006). Built on the notion that abstraction is required for predicting and planning for what is not present, CLT proposes that psychological distance influences how individuals mentally construe events. Under high construal, individuals tend to think in an abstract, decontextualized manner; whereas under low construal, individuals tend to think concretely and focus on contextual details, which are often peripheral or incidental.

Several studies hint at the possibility of a positivity bias when evaluating under high-level construal. Research has found that the positive aspects of an experience are more salient with high-level construal, such that when led to think with a high-level construal mindset, people contemplate more pros in favor of an action than cons (Eyal, Liberman, Trope, & Walther, 2004). Consistent with this view, research has also found that pros are easier to think of when considering temporally distant versus close events (Herzog, Hansen, & Wänke, 2007). Similarly, Williams, Stein, and Galguera (2014) found that past experiences felt more pleasant when they were described with a high-level construal, compared to a low-level construal. On the basis of these findings, we expect that psychologically distant (vs. closer) events foster more high-level construals (vs. low-level construals), which we predict makes appraisals of past events more positive. We test this hypothesis in the context of online restaurant reviews, and predict that (a) the more time between visiting a restaurant and reviewing it (temporal distance) and, separately, (b) the more space between the location of the restaurant and the location the reviewer (spatial distance), the higher the construal of the review, and hence the more positive the review.

Multiple distances

Moving beyond the standard focus on psychological distance and its effects on construal level, we turn to research on multiple dimensions of distance and argue that experiencing more than one dimension of distance simultaneously will induce higher-level construal, and thus transform the downstream consequences of distance on positivity. Though each distance has been found to have a separate similar effect on construal — where more distance leads to higher levels of construal (Liberman, Sagristano, & Trope, 2002), no research has examined the level of construal that results under conditions of multiple distances. Research concerning multiple distances has thus far focused on two areas: (1) fit, which describes synchronizing levels of distance, such that when a remote (close) distance is aligned with another remote (close)

distance, the choice feels “right” and people are faster to make choices and more susceptible to persuasion (Bar-Anan, Liberman, Trope, & Algom, 2007; Kim, Zhang, & Li, 2008; Zhao & Xie, 2011); and (2) distance-on-distance, which describes how a feeling of distance on one dimension serially influences how far another dimension of distance feels (Kim, Zauberan, & Bettman, 2012; Maglio & Polman, 2014; Maglio, Trope, & Liberman, 2013; Wakslak, 2012; Williams & Bargh, 2008; Yan, 2014; Zhang & Wang, 2009).

Our research question illuminates a third, new area: simultaneous distance, which describes how consumers behave when more than one distance is experienced at one time. We propose a *distance boosting effect*, whereby experiencing two distances amplifies consumers’ high-level construals. That is to say, using restaurant reviews as an example, we predict that high-level construals will be greater when a restaurant patron reviews a faraway restaurant that she visited a long time ago, compared to solely (separately): a faraway restaurant or a restaurant she visited a long time ago. Although direct evidence for a distance boosting effect has not yet been reported in the literature, the findings from the two existing areas noted above (fit and distance-on-distance) are consistent with our prediction. Based on the fit literature, support for distance boosting comes from research that shows that participants preferred products that were described in positive high-level (vs. positive low-level) terms when they received cues to instantiate at least one remote level of either temporal or social distance (Kim et al., 2008). Specifically, participants’ preferences aligned with what reliably follows from experiencing a remote level of distance: preference for the product described in high-level terms (cf. Liberman & Trope, 1998) — this is despite the fact that participants received cues with one remote and one close level of distance, as if a remote distance subsumes a closer one and prioritizes judgment. In other words, a remote distance does not appear to shrink (or get averaged) when it is misaligned (mismatched) with a close distance.

In fact, based on the distance-on-distance literature, the opposite is true — distance instead expands: feeling like one dimension of distance is remote subsequently makes all other dimensions feel remote (Yan, 2014). Indeed, the central thesis of research on psychological distance is that judgments of distance are subjective, and a range of distance-on-distance findings has found that priming participants with one remote (vs. close) level of distance makes other dimensions of distance feel more remote in kind (Kim et al., 2008, 2012; Wakslak, 2012; Zhang & Wang, 2009). Thus, previous research shows that judgments of distance grow according to how far a previous judgment of distance feels: the bigger the initial distance, the bigger the subsequent distance. While this past work has emphasized how experiencing a subjective level of distance can adjust judgment of another distance (in a serial fashion), the present investigation makes a distinct point about construal level to suggest that when two distances are configured together (experienced simultaneously), construal level will also increase — that is to say that in cases of two distances, each distance boosts the construal level of the other, leading to more high-level construals and consequences thereof.

Overview

To summarize, we aim to improve upon the understanding of the relationship between psychological distance and evaluations by exploring the joint effects of temporal and spatial distance on review positivity. In this vein, we carried out a field study and examined the association between (spatial and temporal) distance and review positivity in a large sample of *TripAdvisor* restaurant reviews. Further, to measure construal level, we coded the text of a sub-sample of the reviews using the Linguistic Categorization Model. The coded construal levels, in turn, were used in a mediation analysis to test CLT as the primary mechanism underlying the observed associations. In all, we predicted that construal level mediates the effects of temporal and spatial distance on review positivity. Moreover, we predicted a positive interaction effect that would evidence our distance boosting account, whereby the effects of temporal and spatial distance amplify one another.

Our work attempts to replicate past work on psychological distance, using a high-powered large-scale field study. In light of the growing demand for independent direct replications of findings (Pham, 2013), our work not only heeds that demand, it also contributes to the extensive body of literature on psychological distance, a subject of substantial value and broad theoretical importance, by illuminating new theoretical aspects of experiencing multiple psychological distances on construal level, and the downstream consequences thereof. In this vein, our data, which contain 166,215 restaurant reviews, constitute what is to our knowledge the largest dataset concerning psychological distance and CLT ever assembled. Furthermore, we employed econometric analyses, which bring to bear a study design and methodological approach that is less common in consumer psychology. Because experimental methods dominate consumer psychology, a recent call by consumer psychologists has suggested that researchers test hypotheses with other methods (Lynch, Alba, Krishna, Morwitz, & Gurhan-Canli, 2012).

Methodology

Data

We combined two different data sources for our empirical analyses. First, we obtained publicly available data on restaurant reviews from *TripAdvisor*, spanning the period between 2003 and 2014. We constructed a panel, where each observation captures an online review, with a review date, the identity and characteristics of the reviewer, as well as the restaurant. Our data thus incorporate repeated observations across reviewers (who may author reviews about multiple restaurants) and restaurants. The body of reviews we consider pertains to a random set of restaurants located in seven major cities throughout the United States: Chicago, Houston, Los Angeles, New York, Phoenix, Philadelphia, and Seattle.

We next obtained geographic coordinates for each restaurant, based on its address; and for each reviewer, based on his or her self-reported city of residence. The coordinates (latitude and longitude) were obtained via geocoding, using the *Google*

Maps Application Programming Interface (API). We manually cleaned the data to deal with some cases where acronyms of cities were used (for example, “LA” rather than Los Angeles), before performing the geocoding process (note: these observations constitute less than 1% of the sample).

Key measures

Review positivity

Review positivity is operationalized as the star rating of the review. This variable takes on positive integer values between 1 and 5. More stars indicate more positivity.

Temporal distance

Temporal distance is defined as the delay between a dining experience and the consumer’s submission of a review. On *TripAdvisor*, both the date of the review submission and the month in which the reviewer’s relevant dining experience took place are publicly available. We therefore calculated the number of months between the month of the consumption date and the review date. We log-transformed this measure to achieve normality, because of the skewness of the variable (*skewness* = 74.626, $p < 0.001$).

Spatial distance

Spatial distance is defined as the geographic distance between the location of the reviewed restaurant and the reviewer’s place of residence (in miles), based on the geodesic distance between the pair of geographic coordinates. This distance was calculated using the equation for great-circle distance: the shortest distance between two points on the surface of a sphere (Vincenty, 1975). We log-transformed the resulting distance measure to achieve normality, again because of the skewed distribution (*skewness* = 1.847, $p < 0.001$).

As standard procedure, we mean-centered our two distance variables before constructing the interaction term (Cohen, Cohen, West, & Aiken, 2003). For variables that contain zeroes, we added a value of 1 (the lowest non-zero value) before applying the log-transformation (McCune, Grace, & Urban, 2002).

Control variables

Control variables were included to account for time, reviewer, and restaurant fixed effects (Wooldridge, 2002, p. 265). The time effect was captured via the “review month” variable, a vector of dummy indicators reflecting the year and month in which a review was submitted. Our complete set of control variables is identified in Table 1. Specifically, we controlled for mobile device usage because consumers who submit reviews from mobile devices may systematically author reviews under lower temporal distance (given that they can author a review immediately, on the spot). Mobile reviews may also exhibit systematically different characteristics for other reasons (e.g., device-specific user interface differences), thus it is important to account for this variable (Burtch & Hong, 2014). We included a binary indicator of whether the user was an American Express (*Amex*) credit card holder because these individuals may be systematically different from other consumers in ways that may influence the content of their reviews (e.g., Frankel, 2014; Amex users may exhibit higher average levels of wealth, and thus exhibit lower price sensitivity). We controlled for the reviewer’s average star rating across all the reviews they have provided, in order to account for the fact that individuals may be systematically positive or negative in their opinions, on average (Goes, Lin, & Yeung, 2014). We controlled for the reviewer’s prior volume of reviewing activity for similar reasons, because past reviewing experience has the potential to influence subsequent evaluation behavior. We controlled for a restaurant’s average rating as a proxy for restaurant quality, which influences the ratings it receives. We controlled for the lowest and highest item prices appearing on the restaurant’s menu, again to account for the possible role of price sensitivity, and as an additional proxy for unobserved restaurant quality. We controlled for the restaurant’s “dining style,” because consumers may provide systematically different ratings in a city, depending on the local population’s experience with, or preference for that dining style. Finally, we controlled for the restaurant’s accessibility to public transportation, because accessibility may influence the customer segments who choose to frequent the restaurant, and thus may produce systematic differences in consumer ratings.

In all, we estimated multiple models to demonstrate the robustness of our results. In some models, reviewer or restaurant

Table 1
Control variables.

Variable	Description
<i>Mobile</i>	A binary variable that measures whether a consumer submitted his or her review from a mobile device.
<i>Amex User</i>	A binary variable that measures whether a consumer has associated an American Express (Amex) credit card with his or her <i>TripAdvisor</i> profile.
<i>Reviewer Average Rating</i>	The average of all past ratings of a reviewer.
<i>Restaurant Average Rating</i>	The average of all past ratings of a restaurant.
<i>Lowest Price</i>	The lowest price of the listed menu in a restaurant.
<i>Highest Price</i>	The highest price of the listed menu in a restaurant.
<i>Reviewer Status</i>	A categorical variable that indicates the levels of reviewer status on <i>TripAdvisor</i> .
<i>Dining Style</i>	A categorical variable that classifies restaurants into different dining styles.
<i>Public Transportation</i>	A binary variable that measures whether a restaurant is accessible to public transportation.

static characteristics are not identified because of the incorporated reviewer or restaurant fixed effects. The summary statistics and correlation matrix for all of our variables are reported in Table M1, in the Methodological Details Appendix (MDA).

Results

Our identification strategy relies on the application of three-way fixed effects: for the consumer, restaurant, and time of the review submission. Additionally, we employed propensity score matching (PSM) and exact covariate matching as robustness checks, in order to address any remaining endogeneity concerns. For our outcome variable (review positivity), we examined the effects of spatial and temporal distance using alternative estimators (*viz.* ordinary least square regression, ordered logistic regression, one-way fixed effects, and two-way fixed effects). The various models demonstrate robustness to different model specifications. However, our three-way fixed effect regressions are the most conservative because these estimations control for static unobservable heterogeneity across time, reviewers, and restaurants, while simultaneously leveraging our entire sample. Following the procedure proposed by Cornelissen (2008), we employed the following econometric specification, which

corresponds to the three-way fixed effects models with interactions and time dummies (see final column of Table 2):

$$\begin{aligned}
 \text{Rating}_{favorability_{ijt}} = & \alpha * TD_{ij} + \beta * SD_{ij} + \gamma * (TD * SD)_{ij} \\
 & + \delta_i + \sum_j \lambda_{j} * R_j + \sum_T \tau_t * M_t \\
 & + \text{Control}_{ijt} + \varepsilon_{ijt}
 \end{aligned}
 \tag{1}$$

In Eq. (1), TD and SD are our indicators of temporal and spatial distance, respectively. Subscript *i* indexes consumers, *j* indexes restaurants, and *t* indexes time. In addition, δ_i represents a vector of consumer fixed effects, R_j a vector of restaurant fixed effects, and M_t a vector of month fixed effects. Lastly, Control_{ijt} represents our set of control variables.

Table 2 presents our regression results. In support of our predictions, we found that temporal distance is positively and significantly related to review positivity ($\alpha = .024, p < .01$), and that spatial distance is positively and significantly associated with review positivity ($\beta = .021, p < .01$).

Next, we tested our main prediction concerning the distance boosting effect. As Table 2 shows, we found that temporal distance and spatial distance are positively and significantly related to review positivity ($\gamma = .006, p < .05$). That is, we found that temporal and spatial distance positively moderate

Table 2
Results for review positivity (DV = star rating).

	(1) OLS		(2) Ordinal Logit		(3) Restaurant FE		(4) Reviewer FE		(5) Three-way FE	
	Main	Interaction	Main	Interaction	Main	Interaction	Main	Interaction	Main	Interaction
<i>Temporal D</i>	0.047*** (0.004)	0.047*** (0.004)	0.105*** (0.009)	0.104*** (0.009)	0.046*** (0.004)	0.045*** (0.004)	0.023*** (0.009)	0.032*** (0.009)	0.017** (0.008)	0.024*** (0.009)
<i>Spatial D</i>	0.013*** (0.001)	0.013*** (0.001)	0.026*** (0.002)	0.026*** (0.002)	0.016*** (0.001)	0.016*** (0.001)	0.017*** (0.003)	0.018*** (0.003)	0.020*** (0.003)	0.021*** (0.003)
<i>Temporal D X Spatial D</i>		0.004*** (0.001)		0.013*** (0.003)		0.005*** (0.001)		0.008*** (0.003)		0.006** (0.003)
<i>Mobile</i>	-0.023** (0.012)	-0.022* (0.012)	-0.023 (0.026)	-0.019 (0.026)	-0.029** (0.012)	-0.027** (0.012)	-0.077*** (0.026)	-0.075*** (0.026)	-0.086*** (0.027)	
<i>Amex User</i>	0.020** (0.008)	0.021** (0.008)	-0.010 (0.019)	-0.009 (0.019)	0.020** (0.008)	0.020** (0.008)				
<i>Reviewer Average Rating</i>	0.896*** (0.006)	0.896*** (0.006)	2.109*** (0.014)	2.109*** (0.014)	0.899*** (0.009)	0.899*** (0.009)				
<i>Restaurant Average Rating</i>	0.631*** (0.007)	0.631*** (0.007)	1.413*** (0.016)	1.414*** (0.016)			0.699*** (0.012)	0.699*** (0.012)		
<i>Lowest Price</i>	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)			0.001*** (0.000)	0.001*** (0.000)		
<i>Highest Price</i>	0.000* (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)			0.000*** (0.000)	0.000*** (0.000)		
<i>Public Transportation</i>	-0.014*** (0.004)	-0.015*** (0.004)	-0.056*** (0.010)	-0.057*** (0.010)			-0.004 (0.008)	-0.004 (0.008)		
Constant	-2.298*** (0.056)	-2.299*** (0.056)			0.337*** (0.061)	0.337*** (0.061)	1.147*** (0.096)	1.148*** (0.096)		
Reviewer Status Dummies	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-
Dining Style Dummies	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reviewer Fixed Effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Restaurant Fixed Effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
R-squared	0.210	0.211	0.100	0.103	0.160	0.161	0.070	0.071	-	-
Observations	166,215	166,215	166,215	166,215	166,215	166,215	166,215	166,215	166,215	166,215
Number of reviewers	-	-	-	-	-	-	104,554	104,554	104,554	104,554
Number of restaurants	-	-	-	-	2593	2593	-	-	2,593	2,593

Notes: ****p* < 0.01, ***p* < 0.05, **p* < 0.1; Robust standard errors are in parentheses. Within R-squared is reported for fixed effect models.

each other's effects on review positivity, amplifying one another.

In sum, we found support for the role of two different dimensions of distance in influencing review positivity. Moreover, our test demonstrates a novel finding, by showing that when two distances are experienced *at the same time*, each distance boosts the effect of the other (on review positivity) — as evidenced by the positive, significant interaction. In other words, the influence of one dimension of psychological distance on review positivity increases not only when its *own* units increase (e.g., with temporal distance, when more time passes), but when an entirely *separate* dimension of distance also increases.

Construal level content analysis

To identify the theoretical mechanism underlying the distance boosting effect, we coded textual content from a sub-sample of online reviews. We employed the widely used Linguistic Categorization Model (Fujita et al., 2006; Semin & Fiedler, 1988, 1991; Trope, Liberman, & Wakslak, 2007) to code construal level. The Linguistic Categorization Model (LCM) is a five-level classification scheme that distinguishes between linguistic terms to measure the abstractness of content (Coenen, Hedeboew, & Semin, 2006; Semin & Fiedler, 1991). More abstract content indicates higher levels of construal (Fujita et al., 2006; Semin & Smith, 1999). The five levels of linguistic terms that measure increasing levels of abstractness include (Coenen et al., 2006, pp. 6–7): descriptive action verbs (DAV), interpretive action verbs (IAV), state action verbs (SAV), state verbs (SV) and adjectives (ADJ). DAV reflect the lowest level of abstract construal; this includes verbs that describe a specific action with at least one “physically invariant feature” (e.g., walk, speak, punch). IAV include verbs that are not physically invariant and contain an evaluative component (e.g., help, escape, praise). SAV include verbs that express the “emotional consequence of an action” (e.g., surprise, amuse, satisfy). SV include verbs that capture the “enduring cognitive or emotional state” (e.g., love, hate, appreciate). Finally, ADJ, which indicate the highest level of construal, include adjectives that describe a “characteristic or feature” of an entity (e.g., honest, nice, excellent).

The content coding was performed as follows (note: the complete details of the content coding procedure are provided in

the Methodological Details Appendix). First, the various linguistic terms were identified in the text of each online review, and the total number of terms falling into each category (e.g., DAV, ADJ) was counted. We then assigned each category a weighting, based on the degree to which the category indicates high-level construal. In particular, consistent with the literature (Coenen et al., 2006), we assigned a weight of 1 to DAV terms; IAV and SAV terms were assigned a weight of 2; SV terms were assigned a weight of 3; and ADJ was assigned a weight of 4. Finally, based on the number of linguistic terms appearing in each category, we calculated an abstractness score for each review, using the weighted average equation proposed by Coenen et al. (2006, p. 15). This involved multiplying the number of terms appearing in the review from each category by the category's respective weight, to obtain the review's score on each level. The scores for each level were then summed, and the result was divided by the total number of linguistic terms appearing in the review, across all levels.

Due to the time-consuming nature of the coding task and the volume of reviews at our disposal, it was not feasible to code the entire sample. As such, we used a stratification sampling approach. We purposefully sampled 1000 reviews, at random, conditional on the presence of high or low spatial or temporal distance (here, high or low refers to a distance value falling in the top or bottom 25% of the empirical distribution in our overall sample, respectively). Thus, we identified four sub-samples, each containing 250 reviews, which were separately characterized by (a) low spatial and low temporal distance (Group 1); (b) high spatial and low temporal distance (Group 2); (c) low spatial and high temporal distance (Group 3); and (d) high spatial and high temporal distance (Group 4).

We recruited eight research assistants (coders) to perform the content coding. The coders attended two, two-hour instructional sessions. In the first instructional session, the instructor explained the LCM to the assistants and each assistant then independently coded 10 reviews. The instructor and the eight assistants then compared results to ensure proper understanding of the instructions. The coders were asked to independently code 25 additional reviews before the second instruction session. In the second instruction session, the instructor revisited the LCM and discussed the assistants' coding of the 25 reviews to further ensure understanding and agreement (note: the 35 reviews considered in the instruction sessions did not contribute to the sample of 1000 reviews that were considered in the subsequent analysis).

Table 3
Descriptive statistics for content analysis.

	Group 1 (low temporal, low spatial)		Group 2 (low temporal, high spatial)		Group 3 (high temporal, low spatial)		Group 4 (high temporal, high spatial)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<i>Temporal Distance</i>	0	0	0	0	6.34	2.70	7.06	2.98
<i>Spatial Distance</i>	6.84	7.84	4552.66	2237.45	5.73	6.71	4686.96	2168.15
<i>Construal Level</i>	2.74	.59	2.83	.41	2.87	.52	3.03	.46

Notes:

For Group 1 vs. Group 2 & Group 3 vs. Group 4, spatial distance is significantly different, whereas temporal distance is not.

For Group 1 vs. Group 3 & Group 2 vs. Group 4, temporal distance is significantly different, whereas spatial distance is not.

For Group 2 vs. Group 3 & Group 1 vs. Group 4, both temporal distance and spatial distance are significantly different.

Following the instruction sessions, the coders were asked to independently code the set of 1000 reviews. Each review was examined by two coders. Each of the coders reported working between 15 and 25 h to code 250 reviews over the course of 5 weeks. After the coding process was completed, we assessed the consistency of the results. Inter-rater reliability was above the commonly accepted threshold (Krippendorff's Alpha = 0.814). We then used the weighted average equation provided by Coenen et al. (2006, p. 15), described above, to calculate the construal level score.

The descriptive statistics for the coded data are reported in Table 3. We performed an ANOVA to examine both the main effects and the interaction effect of spatial and temporal distance on construal level. That is, we estimated an ANOVA using a 2 (spatial distance: high vs low) \times 2 (temporal distance: high vs. low) design, with 250 observations in each of the cells. All the effects on construal level were at least marginally significant: temporal distance ($F = 8.28$, $p = 0.004$), spatial distance ($F = 4.03$, $p = 0.045$) and their interaction ($F = 3.30$, $p = 0.070$). To decompose the interaction, we performed t tests to determine statistical differences in construal level among the four groups. In further support of the distance boosting effect, the highest level of construal level was observed when spatial and temporal distance were both high (Group 4). Specifically, we found a significant difference between the “high temporal, high spatial” group (Group 4; $M = 3.03$, $SD = 0.46$) and all other groups, $t_s > 4.65$, $p_s < .001$; as well as a significant difference between the “low temporal, low spatial” group (Group 1; $M = 2.74$, $SD = 0.59$) and all other groups, $t_s > 1.98$, $p_s < .05$. The cross-dimensional groups (Groups 2 and 3; $M = 2.83$, $SD = 0.41$ and $M = 2.87$, $SD = 0.52$), where one distance is high and the other is low, were not significantly different from each other, $t = 0.96$, $p = .34$; furthermore, each cross-dimensional group was significantly different from Groups 1 and 4, $t_s > 1.98$, $p_s < .05$. In essence, as more distance is felt, a higher level of construal is observed, and as more than one dimension of distance is felt, a higher level of construal is likewise observed.

Mediation analysis

To further demonstrate the role of construal level in the relationship between temporal distance, spatial distance, and review positivity, we performed a mediation test, using a bias-corrected bootstrapping procedure ($n = 10,000$; results presented in Table 4). Specifically, we used the MEDIATE

Table 4
Mediation analysis results.

Biased corrected indirect effects on review positivity through construal level			
	Estimate	Bootstrap S.E.	Bootstrap Confidence Interval
Spatial Distance	0.0318	0.0175	95% CI = [0.0003; 0.0697]
Temporal Distance	0.0457	0.0185	95% CI = [0.0137; 0.0861]
Spatial \times Temporal Distance	0.0408	0.0240	90% CI = [0.0034; 0.0811]

Notes: Number of bootstrap samples for bias corrected bootstrap confidence intervals is 10,000 times.

macro (Hayes & Preacher, 2014) in SPSS, employing construal level as the mediator. The independent variables were spatial distance, temporal distance, and their respective interaction.

We observed that the indirect effect of spatial distance on review positivity, through construal level, yielded a 95% confidence interval (CI) that did not contain zero (95% CI = [0.0003, 0.0697]). The indirect effect of temporal distance on review positivity through construal level, also yielded a 95% CI that did not contain zero (95% CI = [0.0137, 0.0861]). Finally, the indirect effect of the interaction between spatial and temporal distance, on review positivity through construal level, yielded a 90% CI that did not contain zero (90% CI = [0.0034, 0.0811]). These results indicate that construal level mediates the effects of spatial distance, temporal distance, and (marginally) their interaction, on review positivity. The mediation analysis also shows that the effects on review positivity from temporal distance, spatial distance, and their interaction, are fully mediated by construal level (none of the respective direct effects were significant).

In sum, we found that experiencing more distance increased consumers' construal level, and that experiencing more than one dimension of distance further increased consumers' construal level – which we found to be a candidate underlying mechanism (albeit a marginal one) that drives the distance boosting effect on review positivity, reported earlier.

General discussion

This study provides empirical evidence for the separate and interactive effects of temporal distance and spatial distance on construal level and consumer evaluations. Previous research on psychological distance has studied the effects of distance on construal level (and other outcomes) in relative isolation, we examined two dimensions of psychological distance in tandem. Consistent with past research, we found that temporal and spatial distance each (individually) increase construal level and review positivity. Moreover, we found that temporal and spatial distance exhibit an interactive effect, such that each distance increases the effect of the other distance. Furthermore, we tested the process by which multiple psychological distances impact consumer evaluations, through construal level, by directly measuring construal level via a content analysis of the review text. We found construal level to mediate the effects of temporal distance, spatial distance, and their interaction on review positivity – such that, similar to the effect on consumers' restaurant evaluations, which grow increasingly positive, construal level also received a boost when more than one distance was experienced.

Theoretical and empirical contributions

Our research highlights the value of investigating multiple distances and contributes to the psychological distance, construal level theory, and online review literatures in several ways. First, our results extend an array of prior findings that show the effects of distance on construal level. While research has identified four kinds of psychological distance, only the

effects of experiencing a single dimension on construal level have been investigated previously, on a notable range of outcomes. For instance, experiencing a single dimension of distance has been shown to affect important decisions involving gift-giving, negotiation, and creativity (Baskin, Wakslak, Trope, & Novemsky, 2014; Henderson & Wakslak, 2010; Polman & Emich, 2011). Our research suggests that there is *more* to experiencing one dimension of distance, such that outcomes like creativity (among others) could be further increased when people experience *more* than one dimension of distance, in tandem.

Second, our findings were drawn from data that included a wide range of distances which allowed us to investigate a continuum of distance. Our data thus enable a very fine-grained analysis of psychological distance that is not only rare, but informative: We are able to examine construal level and review positivity based on a wide range of different points of distance – and can measure with precision the marginal effect of, say, one month or one mile (and the respective interaction) on review positivity. Quite possibly, past tests of distance have yielded null results because the categorical levels of distance chosen by researchers were not different enough to return significant findings (a problem that would exacerbate in tests involving more than one distance). However, with our data, we are able to show a reliable pattern for the effects of distance across gradually increasing swaths of distance — providing fidelity and thus rigorous internal validity.

Third, we extend the online review literature by applying theories of psychological distance and construal level in a context of significant relevance to marketing scholars. We therefore expand the boundary of CLT's application to a context that offers great potential for studying psychological distance and evaluation. The majority of prior studies on online reviews has focused on understanding the consequences of online reviews, such as facilitating consumer decision making (Hu, Liu, & Zhang, 2008), driving firm sales (Chevalier & Mayzlin, 2006; Zhu & Zhang, 2010) and affecting market competition (Kwark, Chen, & Raghunathan, 2014). Our study, in contrast, examines the antecedents of online review characteristics (e.g., Chen & Kirmani, 2015). In this regard, our study builds upon a relatively small body of work (Biyalogorsky, Gerstner, & Libai, 2001; Goes et al., 2014; Stephen & Lehmann, 2009), demonstrating the importance of consumer behavioral context (psychological distance) to consumer evaluations.

Future directions

With an eye toward future research, we suggest a few questions that we think would be fruitful for investigation. First, does the effect of distance always receive a boost from another distance? While we have found evidence for a distance boosting effect, we must bear in mind the Weber-Fechner law (Fechner, 1966), which describes a diminished sensitivity to differences of magnitude as magnitude increases (i.e., decreasing marginal returns). For example, not unlike prospect theory, most people would consider the difference between \$0 and \$100 as

greater than the difference between \$1,000,000 and \$1,000,100. In this vein, Maglio et al. (2013) found that among participants thinking of a more remote (vs. closer) location, a 2-year period in the future felt shorter. At first glance, our findings might appear inconsistent with that research. However, past research has shown that a remote feeling on one distance fosters a remote feeling on another, when distance is egocentric (i.e., relative to self; Yan, 2014); whereas other research finds the opposite pattern when distance is non-egocentric (Maglio et al., 2013). Thus, whether a feeling of distance makes other distances larger (vs. smaller) might depend on whether the distances are egocentric (e.g., distances that are relative to here, now, me, reality).

Another related question concerns research that has observed a negative relationship between distance perception and emotional intensity (Van Boven, Kane, McGraw, & Dale, 2010; Williams & Bargh, 2008), possibly suggesting that we should expect consumers to review a restaurant less favorably as the months and miles increase from a long-ago visited restaurant and one's "here and now," respectively. Recent research, however, has theorized that the oft-found causal connection between psychological distance and construal level does not imply that they are the same theory (Van Boven & Caruso, 2015). In support of this perspective (that CLT and psychological distance are distinct), Williams et al. (2014) showed that the effects of psychological distance and construal level have "separable paths" (p. 1126) revealing simultaneously: (1) an inverse link between psychological distance and intensity and (2) a positive link between construal level and positivity. It is therefore possible to generate positive event-appraisals in spite of and because of increases in psychological distance.

Conclusion

When it comes to recounting past experiences – like writing online reviews about restaurants once-visited — how do consumers construe and evaluate those past events? As time and space increase (from here and now to then and there), are they more or less likely to construe events at a high-level and evaluate them more positively? Further, does the commingling of distance in both time and space have its own effect on judgment, separate from the individual effects of time and space? As revealed in the current field research, the answers to these questions lie at the intersection of theories of psychological distance and construal level. By adopting a simultaneous, cross-dimensional approach to psychological distance, we found that an increase in one distance increased the effect (on construal and review positivity) of the other. A famous anonymous poet once said, "distance makes the heart grow fonder" — we might say, based on our research, that "distances make the heart grow fonderer" (albeit less poetically).

Methodological Details Appendix

Methodology details of this article can be found online at <http://dx.doi.org/10.1016/j.jcps.2016.03.001>.

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