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Approach Aversion: Negative Hedonic Reactions Toward Approaching Stimuli

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We live in a dynamic world, surrounded by moving stimuli—moving people, moving objects, and moving events. The current research proposes and finds an *approach aversion effect*—individuals feel less positively (or more negatively) about a stimulus if they perceive it to be approaching rather than receding or static. The effect appears general, occurring whether the stimulus is initially negative or nonnegative and whether it moves in space (toward or away from "here"), in time (toward or away from "now"), or in probability (toward or away from "sure"). This research complements extensive existing research on perceived static distance of stimuli (near vs. far) by exploring perceived dynamic movement of stimuli (approaching vs. receding), showing that the effect of movement is distinct from the effect of distance.

Keywords: psychological distance, affect, avoidance, goal gradient, decision making

We live in a dynamic world, surrounded by moving stimuli: People on the street are walking toward or away from us; balls on the beach are rolling toward or away from us; brand logos in commercials are moving toward or away from us. Will we hedonically feel differently toward a stimulus if we perceive it to be approaching (moving toward us), receding (moving away from us), or stationary?

This question is important both theoretically and practically. Theoretically, knowledge about the effect of perceived dynamic movement complements existing research on the effect of perceived static distance. Many researchers have studied people's mental construal of statically far versus near stimuli and found that people represent distal (far) stimuli more abstractly than they represent proximal (near) stimuli (e.g., Fujita, Henderson, Eng, Trope, & Liberman, 2006; Henderson, Fujita, Trope, & Liberman, 2006; Liberman & Trope, 1998, 2008; Rim, Uleman, & Trope, 2009; Trope & Liberman, 2003, 2010). Researchers have also studied the effect of perceived distance on emotional responses and found that the perceived distance of an event can influence the perceived funniness of the event (McGraw, Warren, Williams, & Leonard, 2012) and that priming participants with distance can influence their emotional responses to unrelated events (Williams & Bargh, 2008). In contrast and as a complement to the extensive literature on the effect of perceived static distance of stimuli (far or near), the current research studies the effect of perceived dynamic movement of stimuli (approaching, receding, or static).

Practically, an understanding of how individuals feel about moving versus static stimuli can address a variety of real-life-relevant questions. For example, suppose that a speaker wants to cast a favorable impression on his audience during a public speech. Should the speaker first stand far from the audience and then gradually move forward, first stand close to the audience and then gradually move backward, or remain constant at the same spot? As another example, suppose that a marketer wants to promote her product in a television commercial. Should she film the product so that it appears approaching the viewer, receding from the viewer, or stationary in front of the viewer?

Despite the importance of understanding how people feel about moving stimuli, this topic has largely been ignored, with only a few exceptions that we review later. The primary purpose of the present research is to study this topic.

The movement referred to above is movement in space. In life, we encounter not only spatially moving objects but also temporally and probabilistically moving events. By temporal movement, we mean that the occurrence time of a future event approaches (i.e., moves closer to the present moment), recedes (i.e., moves further away from the present moment), or remains unchanged. (By default, events are temporally approaching as time elapses; in the current research, we define the temporal movement of an event relative to this default movement of time.) By probabilistic movement, we mean that the occurrence likelihood of a possible event either approaches (i.e., increases), recedes (i.e., decreases), or is static (i.e., remains unchanged). Thus, in addition to the primary purpose of studying feelings toward spatially moving objects, a second purpose of the current research is to examine feelings toward temporally and probabilistically moving events, that is, to examine whether individuals hedonically feel differently toward

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an event if they perceive it to be approaching, receding, or static in time or in probability.

The central tenet of this research is that individuals will feel more negatively (or less positively) toward a stimulus if they perceive it to be approaching than if they perceive it to be receding or static and that this is a general and basic human tendency that arises for both stimuli that are a priori negative and stimuli that are a priori nonnegative and for both stimuli that move in space and stimuli that move in time or in probability. We refer to this tendency as *approach aversion*.

By proposing approach aversion as a general tendency, we are taking a provocative approach. We intend the present research to be seminal rather than conclusive and to open a dialogue on an understudied topic rather than to put a closure on a well-researched topic. We wish to acknowledge at the beginning of this article that the current research raises many questions that it is unable to answer and will have to await future research to address.

The rest of the article proceeds as follows. First, we discuss the primary approach aversion effect—approach aversion in space. Then, we discuss the extension of approach aversion to the time and probability dimensions. Next, we present a series of eight studies covering diverse stimuli to test for the approach aversion effect. Finally, we discuss implications and open questions from the current research and suggest directions for future research.

Approach Aversion in Space

We suggest that approach aversion with spatially moving stimuli is an evolutionarily rooted tendency. In their long struggle for survival, humans have learned that a stimulus will likely pose a greater danger if it is approaching than if it is receding or motionless. For example, an animal will likely pose a greater danger if it is approaching than if not. Therefore, individuals will feel more alarmed (more fearful, more worried, etc.) and hence more negatively about the animal if it is approaching than if not.

This proposition is relatively easy to understand if the stimulus is a priori negative, especially if it is a priori threatening, such as a hostile-looking wolf. Indeed, Mühlberger, Neumann, Wieser, and Pauli (2008) found an approach aversion effect for negative stimuli. The authors found that participants faced with negatively valenced pictures on a computer screen were more aroused and felt more negative when the pictures appeared approaching than when the pictures appeared receding. Davis, Gross, and Ochsner (2011) replicated this effect for negative stimuli even when the movement of the stimuli was imagined.

However, we propose that the approach aversion effect will occur even if the stimulus is a priori nonnegative, such as a neutral-looking or amicable-looking deer. Why do we expect an approach aversion effect even for nonnegative stimuli? There are two possible reasons. One is overgeneralization. Research suggests that evolutionarily rooted tendencies are not highly sensitive to specific situations, and people do not always distinguish between situations in which such tendencies are functional and situations in which they are not and tend to carry the tendencies from the former situations to the latter (e.g., Arkes & Ayton, 1999; Hsee, Zhang, Cai, & Zhang, 2013; Klayman & Brown, 1993). In terms of approach aversion, it may well be a functional tendency for stimuli that are negative and would actually pose a greater danger when approaching, but people may continue to exhibit the tendency for stimuli that are nonnegative and would not pose a greater danger when approaching.

Second, a stimulus that is overall nonnegative may be ambivalent—containing both positive elements and negative (even potentially threatening) elements (Priester & Petty, 1996; Rees, Rothman, Lehavy, & Sanchez-Burks, 2013; Rodriguez Mosquera, Parrott, & Hurtado de Mendoza, 2010), and these negative elements may carry more weight in the hedonic response of the viewer when the stimulus is approaching than when not. For example, a deer that looks neutral or amicable may still entail the potential of causing harm, and this negative element may carry more weight when the deer is approaching than when not. In other words, even a neutral- or amicable-looking deer may pose a greater danger—real or imaged—when it is approaching than when not. Therefore, individuals will exhibit the approaching aversion effect even toward such nonnegative stimuli.

Several clarifications are in order here. First, the two reasons discussed above may coexist to generate approach aversion. It is beyond the scope of this research to empirically tease apart these reasons, and we speculate on the relative viability of these two reasons in the General Discussion. Second, approach aversion is about relative feelings between the approaching condition and the receding and static conditions, and so, we use the phrases *more negatively* and *less positively* interchangeably. In terms of a nonnegative stimulus, approach aversion does not mean that individuals will feel negatively in the absolute sense when the stimulus approaches; instead, it means that they will feel relatively less positively when the stimulus approaches than when not. Finally, whereas we consider approach aversion general and applicable to nonnegative stimuli, we are agnostic about whether or not the effect is equally strong across different valence conditions. The focus of this research is to demonstrate the existence of the approach aversion effect for nonnegative stimuli, especially for neutral stimuli, and not to compare the approach aversion effect between different valence conditions. Accordingly, we examine only neutral stimuli in most of our studies and include positive and negative stimuli in only some studies.

Approach Aversion in Time and Probability

We propose that approach aversion applies not only to spatially approaching objects but also to temporally nearing and probabilistically looming events. Objectively, space, time, and probability are separate and independent dimensions, but as evidenced in ample research, they are interconnected psychologically (Trope & Liberman, 2010). For example, people tend to group concepts suggesting spatial, temporal, and probabilistic nearness (e.g., near, tomorrow, sure) together and group concepts suggesting spatial, temporal, and probabilistic farness (e.g., far, year, maybe) together (Bar-Anan, Liberman, Trope, & Algom, 2007); people associate words suggesting spatial, temporal, and probabilistic nearness with concreteness and associate words suggesting spatial, temporal, and probabilistic farness with abstractness (Bar-Anan, Liberman, & Trope, 2006); people associate nearness in one of these dimensions with nearness in another and associate farness in one of these dimensions with farness in another (e.g., Caruso, Van Boven, Chin, & Ward, 2013; Wakslak & Trope, 2008); people respond similarly to size, time, and probability in both the joint and the single evaluation modes (e.g., Hsee & Zhang 2010; Hsee, Zhang, Wang, & Zhang, 2013).

Given the interconnectedness of these dimensions, we predict that the approach aversion effect in the domain of space will manifest itself in the domain of time and probability as well. Specifically, we propose that individuals will feel more negatively (or less positively) toward an event if they perceive the event to be approaching in time (closer to now) or in probability (closer to certainty) than if they perceive it to be receding or static in time or in probability, even if the event is a priori nonnegative.

Overview of Studies

We now report eight studies to test for the approach aversion effect. Of these studies, the first six examined the primary approach aversion effect—approach aversion in space—and the last two studies tested its extension to time (Study 7) and to probability (Study 8). All the studies used nonnegative (neutral stimuli) stimuli, and three of the studies (Study 2, Study 3, and Study 7) also manipulated the valence of the stimuli. To test the generality of the approach aversion effect, the studies adopted a diverse set of stimuli, ranging from visually displayed symbols (Study 1 and Study 2), videotaped persons (Study 3 and Study 4), audiotaped sounds (Study 5), physically presented objects (Study 6), and verbally described events (Study 7 and Study 8). To explore the underlying mechanism, two of the studies (Study 3 and Study 5) also included mediation evidence. To further explore the mechanism and the process, one of the studies (Study 4) also manipulated the agent of movement (stimulus vs. the viewer), and another (Study 6) traced participants' hedonic feelings while the stimulus was moving.

Study 1: Letters

Study 1 was exploratory, seeking to demonstrate the approach aversion effect in an innocuous context with neutral English alphabets. In a within-participants design, the study manipulated the size of the letters to mimic movement and elicited participants' hedonic responses toward the letters.

Method

The stimuli were neutral English letters displayed in short video clips, each lasting approximately 20 s. To create the stimuli, we adopted the following selection process. First, we selected six diverse fonts of the capitalized English alphabet from a fonts website and excluded redundant letters (letters that looked similar in different fonts), thus retaining 139 letters. Then we recruited a group of pretest participants ($N = 200$), presented each participant with a subset of the 139 letters, and asked them to rate their feelings toward each letter on a 7-point scale ranging from *very negative* to *very positive.* We used all the letters that were rated neutral as our final stimuli, that is, letters with pretest positivity ratings between ± 0.5 from the midpoint of the scale; there were 32 such letters.

For each of the 32 letters, we created three movement versions of videos: approaching, receding, and static. Following existing research showing that movement in space can be simulated by change in size (McGraw et al., 2012; Mühlberger et al., 2008), we manipulated the movement of the letter by varying its size on the screen. In the approaching version, the letter was initially small, occupying approximately 10% of the screen area, and during the video, it gradually increased in size until it was large, occupying approximately 90% of the screen area; in the receding version, the size of the letter changed in the reverse direction to that in the approaching condition; in the static version, the size of the letter stayed unchanged, always between the smallest and the largest size in the other two conditions.

Participants were 174 adults (47 females; mean age = 26 years) recruited via the Amazon Mechanical Turk. They were told that they would view video clips of English letters, that the letter in each clip may or may not move, and that their task was to rate their feelings toward the letter. Each participant was randomly assigned to view 16 of the 32 letters, and for each letter, each participant was randomly assigned to view one of the approaching, the receding, and the static versions of videos. At the end of each video, participants rated their feelings about the letter on a 7-point scale ranging from *very negative* to *very positive.*

Results and Discussion

Table 1 summarizes the results. A multivariate regression analysis with positivity ratings as the dependent variable and movement, letter, and participant (all coded as dummy variables) as independent variables yielded a significant movement effect, $F(2, 205) = 37.56$, $p < .001$. Planned contrast analyses that compared the approaching condition with the other two conditions found the predicted approaching aversion effect: Participants rated the approaching letters more negatively than both the receding letters and the static letters (see Table 1 for details). (We have also reported the comparison between the receding and the static letters in the table but do not discuss it here as it was theoretically unimportant to the current research.)

Study 1 provided initial evidence that individuals responded more negatively toward a stimulus if they perceived it to be approaching rather than receding or static, even though the stimuli were a priori neutral, simple, and apparently innocuous.

Table 1
Study 1 Results (N = 174)

Movement	*M*	*SD*	Planned comparisons	Other comparisons
A	3.71	1.22	A vs. others: $t(2579) = 8.55$, $p = .000$	R vs. S: $t(2578) = 1.42$, *ns*
R	3.99	1.20	A vs. R: $t(2578) = 6.67$, $p = .000$	
S	4.10	1.07	A vs. S: $t(2578) = 8.15$, $p = .000$	

Note. Neutral letters are rated less positively when approaching (A) than when receding (R) or static (S). Ratings are on a 7-point scale, greater numbers indicating more positivity.

Study 2: Emoticons

Study 2 sought to replicate the finding of Study 1 using a different set of stimuli—simple face icons (emoticons) displayed on a computer screen. Furthermore, whereas Study 1 manipulated movement within participants, Study 2 manipulated movement between participants, and whereas Study 1 used only neutral stimuli, Study 2 manipulated the valence of the stimuli.

Method

The stimulus used in the study was a simple emoticon (i.e., a face icon with two dots representing the eyes and a line representing the mouth) displayed in a video clip. The video had nine versions, which constituted a 3 (movement: approaching vs. receding vs. static) × 3 (valence: negative vs. neutral vs. positive) between-participants design.

The three valence versions were identical except for the shape of the mouth of the emoticon, which suggested happiness (upward bending), neutrality (flat) and unhappiness (downward bending). To verify that our valence manipulation was effective, we recruited a group of pretest participants ($N = 103$) and asked them to rate how positive they found the face icons to be on a 5-point scale ranging from *very negative* to *very positive.* As expected, the pretest participants found the unhappy icon less positive than the midpoint, $M = 1.59$, $t(31) = -8.73$, $p < .001$; the neutral icon as positive as the midpoint, $M = 3.18$, $t(32) = 1$, *ns*; and the happy icon more positive than the midpoint, $M = 4.49$, $t(34) = 10.75$, $p < .001$.

Each valence version of the video consisted of three movement versions. In the approaching version, the emoticon was initially small, occupying approximately 10% of the screen area, then gradually expanded until it was large, occupying approximately 80% of the screen area, giving the perception that the icon was approaching the viewer. The movement of the icon took approximately 3 s; each video clip lasted approximately 20 s and replayed this movement six times, giving the perception that a series of emoticons were approaching the viewer one after another. (We replayed the movement multiple times in this study because the duration of the movement was rather short and we were worried participants might not pay enough attention if the movement was played only once. In subsequent studies, we prolonged the duration of the movement of the stimulus and did not replay the movement.) The receding version of the video was identical to the approaching condition, except that the direction of the movement was reversed, thus giving the perception that the emoticon was moving away from the viewer. In the static version, the emoticon remained motionless, with its size being in the middle between the largest and the smallest sizes in the other two conditions.

Participants in the study were 320 adults (128 females; mean age = 29 years) recruited via the Amazon Mechanical Turk. Each participant was randomly assigned to view one of the nine versions of the video. After viewing the video, the participants were asked how they had felt about the emoticons and answered the question by rating their feelings on a 6-point scale ranging from *very bad* to *very good.*

Results and Discussion

Table 2 presents the results. A 3 (movement: approaching vs. receding vs. static) × 3 (valence: neutral vs. positive vs. negative) analysis of variance (ANOVA) found a significant valence effect, $F(2, 311) = 51.65$, $p < .001$; a significant movement effect, $F(2, 311) = 21.98$, $p < .001$; and a significant interaction effect, $F(2, 311) = 3.41$, $p < .01$. (The interaction was not theoretically important to the current research, and its pattern did not hold in the other studies that manipulated both movement and valence.)

We then split the data by valence to test for the approach aversion effect. Specifically, we conducted two planned contrasts in each valence condition: one comparing the approaching condition with the receding condition and one comparing the approaching condition with the static condition. In each valence condition, the planned contrasts found an approach aversion effect. That is, regardless of whether the icon was a happy face, a neutral face, or an unhappy face, participants felt more negatively about the icon when they perceived it to be approaching than when they perceived it to be receding or static (see Table 2 for details).

Using a between-participants design, Study 2 replicated the approach aversion effect. Importantly, Study 2 corroborated Study 1 by showing that the approach aversion effect could arise for stimuli that are as simple and innocuous as icons displayed on the computer. Moreover, Study 2 manipulated the valence of the stimuli and demonstrated that the approach aversion effect applied not only to a priori negative stimuli and a priori neutral stimuli but also to a priori positive stimuli.

Table 2
Study 2 Results (N = 320)

Valence	Movement	*M*	*SD*	Planned comparisons	Other comparisons
Neutral	A	2.97	0.87	A vs. others: $t(105) = -2.35$, $p = .021$	R vs. S: $t(105) = -0.03$, *ns*
	R	3.39	0.96	A vs. R: $t(105) = -2.02$, $p = .046$	
	S	3.39	0.76	A vs. S: $t(105) = -2.09$, $p = .040$	
Positive	A	3.29	1.24	A vs. others: $t(105) = -5.09$, $p = .000$	R vs. S: $t(105) = -2.32$, $p = .022$
	R	4.16	0.97	A vs. R: $t(105) = -3.33$, $p = .001$	
	S	4.75	1.08	A vs. S: $t(105) = -5.54$, $p = .000$	
Negative	A	2.24	0.79	A vs. others: $t(101) = -3.68$, $p = .000$	R vs. S: $t(101) = 1.04$, *ns*
	R	3.08	1.15	A vs. R: $t(101) = -3.79$, $p = .000$	
	S	2.85	0.76	A vs. S: $t(101) = -2.65$, $p = .009$	

Note. Neutral, positive, and negative emoticons are all rated less positively when approaching (A) than when receding (R) or static (S). Ratings are on a 6-point scale, greater numbers indicating more positivity.

Study 3: Person

Study 3 differed from Study 1 and Study 2 in several aspects. First, the stimulus was more real-world relevant—it was a real person (videotaped) rather than an abstract symbol—and the movement was also more realistic—the person was walking forward (approaching), walking backward (receding), or walking in place (static). Second, whereas Study 1 and Study 2 included only one static condition, Study 3 included two static conditions—static-near, in which the stimulus was always near the camera, and static-far, in which the stimulus was always far away. Including both static-near and static-far conditions was important because these conditions would enable us to tease apart the effect of movement (approaching vs. receding) from the effect of distance (far vs. near). Finally, Study 3 elicited not only participants' positivity ratings (overall feelings) but also their fear ratings and allowed us to probe for the mechanism underlying approach aversion.

Method

The stimulus in the study was a male person in a video clip. The video had 12 versions, each lasting about 45 s. The 12 versions constituted a complete 4 (movement: approaching vs. receding vs. static-near vs. static-far) × 3 (valence: neutral vs. positive vs. negative) between-participants design.

The three valence versions were identical except for the expression of the person. In the neutral version, the person did not express any emotions. In the positive version, the person was somewhat smiling. And in the negative version, the person was somewhat frowning. To verify that our valence manipulation was effective, we recruited a group of pretest participants ($N = 82$) and asked them to view an excerpt of one of the three valence versions of the video (with the size of the person kept constant at the medium level as if he was moderately distant) and to rate their feelings toward the person on a 7-point scale ranging from *very negative* to *very positive.* As expected, the pretest participants rated the person in the neutral version ($M = 3.86$, $SD = 0.80$) not significantly different from the neutral (midpoint) of the scale, $t(27) = 0.94$, *ns*; the person in the positive version ($M = 5.14$, $SD = 1.58$) significantly more positive than the neutral point, $t(27) = 3.83$, $p < .01$; and the person in the negative condition ($M = 2.92$, $SD = 0.85$) significantly less positive than the neutral point, $t(25) = 6.50$, $p < .001$.

Each of the three valence versions of the video comprised four movement versions. The four movement versions were edited from the same original video by varying the size of the image of the person. In the approaching version, the image of the person was originally small, occupying about 20% of the screen area, but gradually increased during the video display until it occupied about 90% of the screen area, giving the perception that the person was gradually walking forward toward the viewer. In the receding version, the movement was the reverse of that in the approaching version, giving the perception that the person was gradually walking backward away from the viewer. In the static-near version, the image was always as large as the largest size in the approaching and receding conditions, giving the perception that the person was always close to the viewer. In the static-far version, the image was always as small as the smallest size in the approaching and receding conditions, giving the perception that the person was always remote. In all versions, the person slightly moved his lips as if he were talking and also slightly moved his body left and right to seem like he was walking naturally and realistically. To verify that our movement manipulation was effective, we recruited another group of pretest participants ($N = 56$), showed them an excerpt of one of the four movement versions of the videos (all in the neutral condition), and asked them which of the following statements best described their perception of the video: (a) The target person walked closer toward them, (b) the target person walked farther away from them, (c) they walked closer toward the target person, (d) they walked farther away from the target person, or (e) the distance between them and the target person did not change much. Most of the respondents perceived the video as we expected. Specifically, 100% of the respondents viewing the approaching version perceived the target person as walking closer toward them, 92% of the respondents viewing the receding version perceived the target person as walking farther away from them, 93% of the respondents viewing the static-far version and 86% of the respondents viewing the static-near versions perceived the distance as unchanged, all $\chi^2(1)$s > 37.50, $p < .001$, when compared with random choices. Moreover, the participants were also asked to estimate the distance between themselves and the target person in the video, and those viewing the static-far version estimated the distance to be significantly greater than those viewing the static-near version, $t(26) = 4.95$, $p < .01$.

Participants in the main study were 322 adults (132 females; mean age = 34 years) recruited via the Amazon Mechanical Turk. Each participant was randomly assigned to view one of the 12 versions of the video. After viewing their assigned version of the video, participants were asked two questions, one about positivity and one about fear. The positivity question asked them how they had felt about the person in the video overall and was followed by a 7-point scale ranging from *very negative* to *very positive.* The fear question asked them whether they would feel scared if the person in the video was actually facing them and moving in the manner as in the video and was followed by a 4-point scale ranging from *not at all* to *very much.*

Results and Discussion

Main results. Table 3 presents the results of the positivity ratings. We conducted a 4 (movement: approaching vs. receding vs. static-near vs. static-far) × 3 (valence: neutral vs. positive vs. negative) ANOVA and found a significant valence effect, $F(2, 310) = 78.37$, $p < .01$; a significant movement effect, $F(3, 310) = 16.66$, $p < .01$; and a significant interaction effect, $F(6, 310) = 2.29$, $p < .05$. (We do not think the interaction was theoretically important; it was in a different direction than the one found in Study 2, and was probably a statistical artifact due to a floor effect. That is, in the negative condition the stimulus was already rather negative in the receding and static conditions and had little room to go further downward in the approaching condition. Consistent with the floor effect argument, the standard deviations of the ratings in the negative condition were generally smaller than those in the neutral and positive conditions.)

We then split the data by valence to test for the approach aversion effect. Specifically, we conducted three planned contrasts in each valence condition: one comparing the approaching condition with the receding condition, one comparing the approaching

Table 3
Study 3 Results (N = 322)

Valence	Movement	*M*	*SD*	Planned comparisons	Other comparisons
Neutral	A	2.70	1.02	A vs. others: $t(105) = -3.88$, $p = .000$	R vs. SN: $t(105) = 0.04$, *ns*
	R	3.67	1.18	A vs. R: $t(105) = -3.31$, $p = .001$	R vs. SF: $t(105) = 0.19$, *ns*
	SN	3.65	1.16	A vs. SN: $t(105) = -3.15$, $p = .002$	SN vs. SF: $t(105) = 0.14$, *ns*
	SF	3.61	1.16	A vs. SF: $t(105) = -2.90$, $p = .005$	
Positive	A	3.23	1.69	A vs. others: $t(98) = -4.98$, $p = .000$	R vs. SN: $t(98) = 1.51$, *ns*
	R	5.19	1.33	A vs. R: $t(98) = -4.50$, $p = .000$	R vs. SF: $t(98) = 0.62$, *ns*
	SN	4.61	1.31	A vs. SN: $t(98) = -3.28$, $p = .001$	SN vs. SF: $t(98) = -0.87$, *ns*
	SF	4.96	1.34	A vs. SF: $t(98) = -4.24$, $p = .000$	
Negative	A	2.13	0.86	A vs. others: $t(107) = -2.49$, $p = .014$	R vs. SN: $t(107) = -0.10$, *ns*
	R	2.54	0.74	A vs. R: $t(107) = -1.69$, $p = .094$	R vs. SF: $t(107) = -0.89$, *ns*
	SN	2.56	1.04	A vs. SN: $t(107) = -1.74$, $p = .085$	SN vs. SF: $t(107) = -0.76$, *ns*
	SF	2.75	0.97	A vs. SF: $t(107) = -2.59$, $p = .011$	

Note. Neutral-, positive-, and negative-looking persons are all rated less positively when approaching (A) than when receding (R), statically near (SN), or statically far (SF). Ratings are on a 7-point scale, greater numbers indicating more positivity.

condition with the static-near condition, and one comparing the approaching condition with the static-far condition. In each valence condition, the planned contrasts revealed an approach aversion effect (though some of the results were only marginally significant). That is, regardless of whether the target person looked neutral, positive, or negative, participants felt more negatively about the person if the person appeared approaching than if the person appeared receding, always near, or always distant (see Table 3 for details). (We have also reported the other comparisons in the table but do not discuss them here, as they are beyond the scope of the current research.)

Mediation results. Besides providing positivity ratings, participants in this study also provided fear ratings, which allowed us to investigate the underlying process. As we proposed earlier, approach aversion arises because the stimulus appears more threatening in the approaching condition than in the other conditions. Thus, we predicted that the fear ratings would mediate the effect of approaching on the positivity ratings. A mediation analysis supported this prediction. Specifically, approaching (vs. other conditions) lowered positivity ratings ($\beta = -1.10$, $p < .01$) and also increased fear ratings ($\beta = .79$, $p < .01$); fear ratings, in turn, lowered positivity ratings ($\beta = -.88$, $p < .01$); and the inclusion of fear ratings in the analysis significantly reduced the effect of approaching on positivity ratings ($\beta = -.40$, $p = .01$; Sobel test $z = -5.83$, $p < .01$). A bootstrap analysis revealed that the 95% bias-corrected confidence interval for the size of the indirect effect excluded zero (−.98, −.48), suggesting a significant indirect effect (MacKinnon, Fairchild, & Fritz 2007; Preacher & Hayes 2004).

Discussion. Study 3 tested the approach aversion effect in a person-perception context and demonstrated the effect regardless of whether the person a priori looked negative, neutral, or positive. The study also collected fear responses and, consistent with our theory, found that fear mediated the effect of approaching on positivity judgment.

Note that Study 3 included two static conditions, static-far and static-near, and two dynamic conditions, approaching and receding. These conditions enabled us to distinguish the approach aversion effect from two other possible effects—mere distance and mere movement. By mere-distance effect, we mean that people may feel more negatively or more positively about a stimulus if it is near rather than far. For example, people may feel less comfortable if another person is near rather than far (e.g., Argyle & Dean, 1965; Mobbs et al., 2007). The approach aversion effect was different from such a mere-distance effect because, in our study, participants in the approaching condition felt more negatively not only than those in the static-far condition but also than those in the static-near condition. By a mere-movement effect, we mean that individuals may feel more negatively or more positively about a stimulus if it is moving than if it is static, regardless of whether it is approaching or receding. The approach aversion effect was also different because, in our study, participants in the approaching condition felt more negatively not only than those in the static conditions but also than those in the receding condition. Thus, approach aversion is neither due to the absolute distance of the stimulus nor due to any kind of movement of the stimulus but rather due to the approaching movement of the stimulus.

Study 4: Person (Manipulation of Agent of Movement)

So far, we have demonstrated the approach aversion effect in situations in which the respondents perceive the target stimulus as approaching them. Will the approach aversion effect also arise in situations in which respondents perceive themselves as approaching the stimulus? We doubt so. If respondents are approaching the stimulus, it usually implies that the stimulus is benign and harmless (Bem, 1972; Higgins, 1997). Even if respondents are not actively approaching the stimulus themselves and are only led to perceive themselves as approaching the stimulus, they may still take this perception as implying that the stimulus is benign (Labroo & Nielsen, 2010). Thus, we predicted that the approach aversion effect will be weaker or disappear if respondents perceive themselves as approaching the stimulus rather than perceive the stimulus as approaching them. To test this prediction, we conducted Study 4, in which we manipulated not only movement but also the perceived agent of movement. We focused on neutral stimuli only.

Method

The procedure of this study was similar to that of Study 3 except for the following. The study adopted a 4 (movement: approaching vs. receding vs. static-near vs. static-far) × 2 (agent of movement: stimulus vs. viewer) between-participants design. As in Study 3, movement was manipulated by the movement of the person in the video; the video used in this study was similar to that used in the neutral condition of Study 3.

Agent of movement was manipulated by instructions given to the participants. In the stimulus-moving condition, participants were instructed to imagine that if the distance between themselves and the person in the video changed, it was the person in the video who was walking toward or away from them; in the viewer-moving condition, participants were instructed to imagine that if the distance between themselves and the person in the video changed, it was they themselves who were walking toward or away from the person.

Participants in this study were 230 adults (107 females; mean age = 34 years) via the Amazon Mechanical Turk. They were randomly assigned to one of the eight conditions described above.

Results and Discussion

Table 4 summarizes the results. A 4 (movement) × 2 (agent of movement) ANOVA found a significant movement effect, $F(3, 222) = 3.00$, $p < .05$; no agent-of-movement effect, $F(1, 222) < 1$, *ns*; and a significant interaction effect, $F(3, 222) = 3.75$, $p < .02$. As predicted, in the stimulus-moving condition, participants exhibited an approach aversion effect, which replicated the result of Study 3. In contrast and consistent with our prediction, in the viewer-moving condition, the approach aversion effect disappeared (see Table 4 for details). These results highlighted the moderating role of perceived agent of movement—perceiving the stimulus as moving is an important condition for the approach aversion effect to occur.

Recall that in each valence condition, all of the participants viewed the same video and we were able to turn the approach aversion effect on or off by merely asking participants to perceive the target as moving or themselves as moving. It appeared that what mattered was the perception, not the reality. In theory, movement is always relative, such that a changing distance between a person and a stimulus can be perceived either as the stimulus moving or the person moving. In reality, it is not always clear whether the agent of movement is the stimulus, the person, or both. Because people are egocentric, we suspect that in such ambiguous situations, people tend to perceive the stimulus as moving rather than them as moving. For example, people intuitively perceive the sun as circulating around them rather than them circulating around the sun. Likewise, in Study 3 in which we did not tell participants whether the target person was moving or they were moving, most respondents perceived the target person as moving, as we demonstrated in the pretest. Given this widespread egocentric perception, approach aversion is also likely a widespread phenomenon.

Study 5: Sound

The studies reported so far all used visual stimuli. Study 5 attempted to replicate the approach aversion effect with audio stimuli. In addition, as in Study 3, Study 5 also tested fear as a possible mediator between perceived movement and positivity judgment.

Method

The stimuli used in the study were two sounds, each contained in a soundtrack lasting approximately 25 s. One of the sounds was of a Xun, an ancient Chinese musical instrument, and the other was of footsteps. In a pretest ($N = 25$), both sounds were rated as neutral on a 5-point scale ranging from *very bad* to *very good,* with means being 3.04 and 2.92, respectively (ts < 1, *ns*), compared with the midpoint of the scale. Each soundtrack was edited into four movement versions: approaching, receding, static-near, and static-far. In the approaching version, the sound was initially soft and gradually became louder. In the receding version, the sound was initially loud and gradually became softer. In the static-near version, the sound remained constantly at the same level as the loudest level in the approaching and receding versions. In the static-far version, the sound remained constantly at the same level as the softest level in the approaching and receding versions.

Participants were 176 adults (55 females; mean age = 30 years) recruited via the Amazon Mechanical Turk. Each participant wore a pair of earphones and listened to one of the eight versions of the soundtracks. After listening to their assigned soundtrack, participants were asked two questions, one about positivity and one about fear. The positivity question asked whether they felt bad or good about the sound and was followed by a 5-point scale ranging from *very bad* to *very good.* The fear question asked whether they felt fearful of the sound and was followed by a 4-point scale ranging from *not at all* to *very much.* The two sounds did not produce any differences, and we collapse the data for the two sounds in our analyses.

Table 4
Study 4 Results (N = 230)

Agent	Movement	*M*	*SD*	Planned comparisons	Other comparisons
Stimulus	A	3.28	1.56	A vs. others: $t(113) = -4.19$, $p = .000$	R vs. SN: $t(113) = -0.45$, *ns*
	R	4.41	1.28	A vs. R: $t(113) = -3.50$, $p = .001$	R vs. SF: $t(113) = 0.89$, *ns*
	SN	4.55	0.83	A vs. SN: $t(113) = -4.02$, $p = .000$	SN vs. SF: $t(113) = 1.38$, *ns*
	SF	4.13	1.07	A vs. SF: $t(113) = -2.74$, $p = .007$	
Viewer	A	4.26	1.10	A vs. others: $t(109) = 0.25$, *ns*	R vs. SN: $t(109) = -0.26$, *ns*
	R	4.14	1.18	A vs. R: $t(109) = 0.39$, *ns*	R vs. SF: $t(109) = -0.28$, *ns*
	SN	4.22	1.19	A vs. SN: $t(109) = 0.12$, *ns*	SN vs. SF: $t(109) = -0.01$, *ns*
	SF	4.23	1.02	A vs. SF: $t(109) = 0.11$, *ns*	

Note. The approach aversion effect occurs when the agent of movement is the stimulus (the target person) rather than the viewer (the participant). Ratings are on a 7-point scale, greater numbers indicating more positivity. A = approaching; R = receding; SN = statically near; SF = statically far.

Results and Discussion

Main results. Table 5 presents the results. A one-way ANOVA across the four movement conditions found a significant movement effect on positivity ratings, $F(3, 172) = 9.71$, $p < .001$. Planned contrasts revealed the expected approach aversion effect: Participants felt more negatively toward the sounds when the sounds appeared approaching than when the sounds appeared either receding, constantly near, or constantly remote (see Table 5 for details).

Mediation results. Besides providing positivity ratings, participants also provided fear ratings. As in Study 3, we predicted that the fear ratings would mediate the effect of approaching on the positivity ratings. A mediation analysis supported the prediction. Approaching (vs. other conditions) lowered positivity ratings ($\beta = -.67$, $p < .001$) and also increased fear ratings ($\beta = .89$, $p <$ 001); fear ratings, in turn, lowered positivity ratings ($\beta = -.44$, $p < .001$); and the inclusion of fear ratings in the analysis significantly reduced the effect of approaching on positivity ratings ($\beta = -.28$, $p = .05$; Sobel test $z = -4.20$, $p < .001$). A bootstrap analysis revealed that the 95% bias-corrected confidence interval for the size of the indirect effect excluded zero (−.63, −.21), suggesting a significant indirect effect (MacKinnon et al., 2007; Preacher & Hayes, 2004).

Discussion. Study 5 extended the findings of the previous studies from visual stimuli to audio stimuli, thereby further demonstrating the generality of the approach aversion. Study 5 also provided further process evidence that fear mediated the effect of approaching on positivity.

Study 6: Poster

In the studies reported so far, the stimuli were virtual—either images displayed on computer screens or sounds transmitted through earphones. In Study 6, the stimulus was a real physical object—a large poster placed on a cart. Furthermore, in the studies reported so far, we elicited participants' responses only at the end of the stimulus-display period; in Study 6, we tracked participants' responses throughout the stimulus-display period and examined how the responses varied across time as the stimulus moved.

Method

The stimulus was a large (36 in. × 48 in.) poster depicting a Peking opera figure. We asked a group of pretest participants ($N =$ 27) to rate their feelings toward the poster on a 7-point scale ranging from *very negative* to *very positive* and found the mean rating (3.74) not significantly different from the neutral point (midpoint) of the scale, $t(26) < 1$, *ns*.

Participants were 95 college students (43 females; mean age = 21 years) recruited from a large private university. Each participated in the study individually, standing at one end of a long, straight hallway with a rating sheet in hand. We placed the poster on a small, wheeled magna cart, facing the participant in the hallway. Invisible but known to the participant, a research assistant stood behind and held the poster. We told participants in advance that the research assistant might move the poster along the hallway, that the range of movement would be between 2 feet and 25 feet, and that the poster would never come closer to them or farther away from them beyond this range. With these instructions, the participants would not need to worry that the poster might come close enough to hit them.

We assigned each participant to one of four movement conditions: approaching, receding, static-near, and static-far. In all conditions, we kept the duration of the display period constant at approximately 25 s. In the approaching condition, the research assistant moved the poster at a constant speed from the farthest end of the range to the nearest end over the display period; in the receding condition, the movement was the opposite of that in the approaching condition. In the static-near and the static-far conditions, the research assistant kept the poster at the farthest or the nearest end of the range, respectively, over the period.

Participants were told in advance that they would hear beeps during the display period and that once they heard a beep they should immediately rate their feelings toward the poster at that moment on an 11-point scale ranging from *very negative* to *very positive.* Throughout the 25-s display period, participants heard one beep every 5 s for a total of 5 beeps.

Results and Discussion

We analyzed the data in two ways. First, we examined the positivity ratings at the end of the display period, as we did in other studies. Table 6 presents the results. These data replicated the approach aversion effect found in the other studies. An omnibus one-way ANOVA found a significant movement effect, $F(3, 91) =$ 2.92, $p < .05$. Planned contrasts found the participants feeling more negatively about the poster when the poster approached than when it receded, stayed near, or stayed far (see Table 6 for details).

Second, we analyzed participants' ratings of the poster across time. Figure 1 presents the results. As the figure suggests, the initial ratings of the poster were rather similar across the four movement conditions, but across time, the ratings in the approaching condition gradually dropped, whereas the ratings in the other

Table 5
Study 5 Results (N = 176)

Movement	*M*	*SD*	Planned comparisons	Other comparisons
A	2.16	0.97	A vs. others: $t(172) = -4.42$, $p = .000$	R vs. SN: $t(172) = 2.90$, $p = .004$
R	3.04	0.88	A vs. R: $t(172) = -4.81$, $p = .000$	R vs. SF: $t(172) = 0.61$, *ns*
SN	2.51	0.83	A vs. SN: $t(172) = -1.88$, $p = .062$	SN vs. SF: $t(172) = -2.30$, $p = .023$
SF	2.93	0.75	A vs. SF: $t(172) = -4.20$, $p = .000$	

Note. Neutral sounds are rated less positively when approaching (A) than when receding (R), statically near (SN), or statically far (SF). Ratings are on a 5-point scale, greater numbers indicating more positivity.

Table 6
Study 6 Results (N = 95)

Movement	*M*	*SD*	Planned comparisons	Other comparisons
A	4.04	2.50	A vs. others: $t(91) = -2.89$, $p = .005$	R vs. SN: $t(91) = 0.01$, *ns*
R	5.64	2.54	A vs. R: $t(91) = -2.09$, $p = .039$	R vs. SF: $t(91) = -0.57$, *ns*
SN	5.63	2.92	A vs. SN: $t(91) = -2.13$, $p = .036$	SN vs. SF: $t(91) = -0.59$, *ns*
SF	6.09	2.67	A vs. SF: $t(91) = -2.69$, $p = .009$	

Note. A neutral poster is rated less positively when approaching (A) than when receding (R), statically near (SN), or statically far (SF). Ratings are on an 11-point scale, greater numbers indicating more positivity.

conditions did not. Statistical analyses confirmed these observations. A 4 (movements: approaching vs. receding vs. static-near vs. static-far; between-participants) × 5 (time: t_1 vs. t_2 vs. t_3 vs. t_4 vs. t_5; within-participants) mixed ANOVA yielded a significant interaction effect, $F(12, 364) = 4.94$, $p < .001$. Further analyses found that at t_1 the ratings in the four conditions were not significantly different, $F(3, 91) = 1.03$, *ns,* and that across time ratings in the approaching condition significantly dropped, $F(1, 26) = 22.27$, $p < .001$, whereas the ratings in the receding, static-near, and static-far conditions did not drop or even increased, $F(1, 21) = .24$, *ns*; $F(1, 23) = .06$, *ns*; and $F(1, 21) = 5.46$, $p < .05$, respectively.

These results shed light on the temporal process of hedonic reactions toward moving stimuli: Initially, participants felt similarly about the target regardless of whether it was nearby or far away, yet across time, they felt more negatively toward the target when it moved closer but not when it moved away or stayed far or stayed near. These data reinforced our proposition that what created the approach aversion effect was neither the absolute distance of the stimulus nor the presence of any movement but rather the movement of approaching.

Study 7: Cousin's Visit (Movement in Time)

The studies we have reported so far tested approach aversion in spatial movement. Study 7 and Study 8 tested approach aversion in temporal and probabilistic movement. Concerning temporal movement, Study 7 relied on a hypothetical yet realistic scenario about the upcoming visit of a remote relative. It adopted a complete 4 (movement: approaching vs. receding vs. static-near vs. static-far) × 3 (valence: neutral vs. positive vs. negative) factorial design and elicited participants' positivity ratings.

Method

Participants in the study were 331 adults (145 females; mean age = 32 years) recruited via the Amazon Mechanical Turk. They were asked to imagine that a remote cousin residing in a different city was going to visit their city for 1 week for personal business and had asked if she could stay with them and that without thinking too much, they had agreed to the request. Participants were assigned to one of the 4 (movement) × 3 (valence) conditions. Valence was manipulated by the description of the visit. In the neutral condition, participants were asked to image that they had mixed feelings about the cousin and that overall they felt neutral about the cousin and were indifferent about her stay. In the positive (negative) condition, participants were asked to image that they had mixed feelings about the cousin and that overall they somewhat liked (disliked) the cousin and looked forward to (dreaded) her stay.

Movement was manipulated via a visual timeline. Respondents were told that the arrival date of the cousin depended solely on the availability of airline tickets; then, they were shown a timeline on which the shaded date indicated her "most likely arrival date" (see Figure 2).

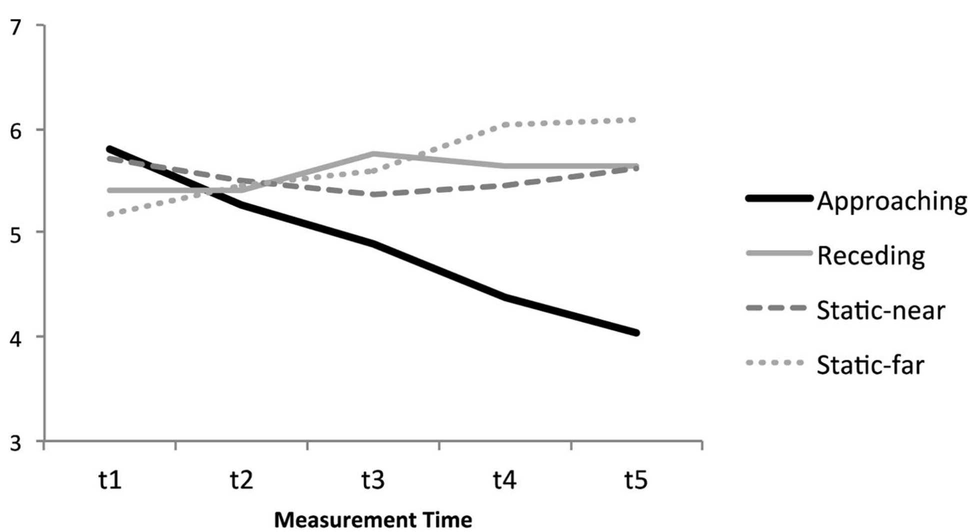

Figure 1. Study 6 (poster) results. The approach aversion effect becomes stronger with the passage of time.

Tomorrow	Day after tomorrow	In 3 days	In 4 days	In 5 days	In 6 days	In 7 days	In 8 days	In 9 days	In 10 days	In 11 days	In 12 days	In 13 days	In 14 days

Figure 2. The timeline used in Study 7.

Respondents were told that the cousin was presently checking the availability of airline tickets, that the availability might change from moment to moment and so her most likely arrival date might also change accordingly, and that the whole air-ticket-checking process would take about 2 minutes. In the approaching condition, the shaded date was initially at the "In 12 days" cell; then, throughout the 2-minute period, it gradually moved closer until it reached the "In 3 days" cell. In the receding condition, the movement was the reverse of that in the approaching condition. In the static-near condition, the shaded date was always at "In 3 days" throughout the 2-minute period; in the static-far condition, it was always at "In 12 days." For added realism, we imposed a few back-and-forth movements between two adjacent cells in the middle of the display period in all of the four conditions.

At the end of the process, while the shaded date remained at the final position, respondents were asked, "Now, how do you feel about her staying at your home—do you mostly feel good (looking forward to her stay) or mostly bad (dreading her stay)?" They answered the question by providing a rating on a 5-point scale ranging from *mostly good* to *mostly bad.* In the analysis, we reverse-coded the ratings so that as in the other studies, greater numbers indicated more positivity.

Results and Discussion

Table 7 presents the results. A 4 (movement: approaching vs. receding vs. static-near vs. static-far) $\times$ 3 (valence: neutral vs. positive vs. negative) ANOVA on positivity ratings found a significant valence effect, $F(2, 319) = 16.48$, $p < .001$; a significant movement effect, $F(2, 319) = 13.02$, $p < .001$; and no interaction effect, $F(2, 319) < 1$. We then split the data by valence and conducted planned contrasts to test for the approach aversion effect. In each valence condition, we found an approach aversion effect. That is, regardless of whether the cousin's visit was initially described as neutral, positive, or negative, participants felt more negatively about the event when her arrival date moved closer to the present than when it either moved farther from the present, remained close to the present, or remained remote from the present (see Table 7 for details).

Study 7 extended the approach aversion effect on the spatial dimension to the temporal dimension: A temporally approaching event is hedonically more aversive than a temporally receding or a temporally stable event.

Just as the approach aversion effect in spatial movement was not a mere distance effect, the approaching effect in temporal movement was also not a mere distance effect. In the temporal dimension, a mere distance effect implies that people would feel more negatively (e.g., more worried) toward an event if it is temporally near than if it is temporally far (e.g., Gilovich, Kerr, & Medvec, 1993). However, the approach aversion effect found in this study was different as participants in the approaching condition felt more negatively not only than those in the static-far condition but also than those in the static-near condition. Thus, what produced the approach aversion effect was not the static time point but the movement in time.

Study 8: Cousin's Visit (Movement in Probability)

Study 8 utilized the same scenario as Study 7 except that it replaced the time dimension with the probability dimension. Because the contexts of the two studies were identical, we focused only on the neutral condition and varied only movement of probability.

Method

Participants were 161 adults (53 females; mean age = 32 years) recruited via the Amazon Mechanical Turk. They received similar instructions to those in the neutral condition of Study 7 with the following exceptions. Participants were told that there was a chance that the cousin would visit their city and stay with them for a week, that if she did visit, the arrival date would be "tomorrow," and that her likelihood of visit depended solely on the availability of airline tickets. Participants were shown a likelihood scale on which the shaded number indicated her likelihood of visit (see Figure 3).

Respondents were further told that the cousin was presently checking the availability of airline tickets, that the availability

Table 7
Study 7 Results (N = 331)

Valence	Movement	*M*	*SD*	Planned comparisons	Other comparisons
Neutral	A	2.47	1.01	A vs. others: $t(102) = -3.74$, $p = .000$	R vs. SN: $t(102) = 0.47$, *ns*
	R	3.41	1.26	A vs. R: $t(102) = -3.22$, $p = .002$	R vs. SF: $t(102) = 0.02$, *ns*
	SN	3.28	1.11	A vs. SN: $t(102) = -2.57$, $p = .012$	SN vs. SF: $t(102) = -0.46$, *ns*
	SF	3.11	0.89	A vs. SF: $t(102) = -3.24$, $p = .002$	
Positive	A	3.08	1.16	A vs. others: $t(107) = -3.50$, $p = .001$	R vs. SN: $t(107) = 0.43$, *ns*
	R	3.83	0.95	A vs. R: $t(107) = -3.15$, $p = .002$	R vs. SF: $t(107) = 0.97$, *ns*
	SN	3.83	0.71	A vs. SN: $t(107) = -3.03$, $p = .003$	SN vs. SF: $t(107) = 0.61$, *ns*
	SF	3.87	1.04	A vs. SF: $t(107) = -2.28$, $p = .025$	
Negative	A	2.21	1.11	A vs. others: $t(110) = -3.53$, $p = .001$	R vs. SN: $t(110) = 0.004$, *ns*
	R	3.15	1.06	A vs. R: $t(110) = -2.99$, $p = .003$	R vs. SF: $t(110) = -0.181$, *ns*
	SN	3.00	1.31	A vs. SN: $t(110) = -2.86$, $p = .005$	SN vs. SF: $t(110) = -0.177$, *ns*
	SF	3.14	0.89	A vs. SF: $t(110) = -2.91$, $p = .004$	

Note. Cousin's visit, initially neutral, positive, or negative, is rated less positively when approaching (A) than when receding (R), statically near (SN), or statically far (SF) in time. Ratings are on a 7-point scale, greater numbers indicating more positivity.

Almost 0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	Almost 100%

Figure 3. The likelihood scale used in Study 8.

might change from moment to moment and so her likelihood of visit might also change accordingly, and that the whole air-ticket-checking process would take 2 minutes.

We randomly assigned respondents to one of four movement conditions: approaching, receding, static-near, and static-far. In the approaching condition, the shaded cell was initially the least likely cell ("almost 0%"), and throughout the period, it gradually moved toward the other end until it reached the most likely cell ("almost 100%"). In the receding condition, the movement of the shaded cell was the reverse of that in the approaching condition. In the static-near condition, the shaded cell was constantly the most likely cell ("almost 100%") during the process; in the static-far condition, it was constantly the least likely cell ("almost 0%") during the process. For added realism, we imposed a few oscillating movements between adjacent cells in the middle of the display period in all of the four conditions.

Results and Discussion

Table 8 summarizes the results. An omnibus one-way ANOVA found a significant movement effect, $F(3, 157) = 5.56$, $p < .001$. Planned contrasts again found the approach aversion effect as participants felt more negatively toward the visit of the cousin when the likelihood of her visit loomed from low to high than either when it shrank from high to low, when it stayed high, or when it stayed low (see Table 8 for details). This study provided initial evidence that approach aversion applies also to probabilistic movement, showing that a probabilistically approaching event is hedonically more aversive than a probabilistically receding or stable event.

Again, the approach aversion effect found in this study was not a mere distance effect in likelihood. Participants in the approaching condition, in which the likelihood of the visit loomed, felt more negatively than both those in the static-near condition, in which the likelihood was always high, and those in the static-far condition, in which the likelihood was always low. Thus, what produced the probabilistic approach aversion effect was not static probability but rather the movement in probability.

General Discussion

The current research investigates how individuals hedonically react to dynamic stimuli. Over a wide range of contexts, the research has documented a systematic approach aversion effect, whereby people feel more negatively toward a stimulus that they perceive as approaching rather than receding or static, regardless of whether the stimulus is initially negative or nonnegative and whether the stimulus is moving in space (toward or away from "here"), in time (toward or away from "now"), or in probability (toward or away from "sure"). Figure 4 provides a visual summary of the results (z scores) of all the studies (except for the viewer-moving condition of Study 4, which our theory did not expect to produce the approach aversion effect).

The current research yields both theoretical and practical implications. Theoretically, it contributes to at least three existing lines of work. One is research on human reactions to near versus far stimuli, notably construal level theory (Liberman & Trope, 1998, 2008). Like construal level theory, our research studies people's reactions toward stimuli with varying distances and demonstrates that people behave similarly in the spatial, temporal, and probabilistic dimensions. But our research differs from construal level theory in several ways. The key dependent variable in construal level theory is mental construal—abstract or concrete—whereas the key dependent variable in our research is hedonic reactions—positive or negative. The key independent variable in construal level theory is static distance—far or near—whereas the key independent variable in our research is dynamic movement—approaching, receding, or static. The key finding from construal level theory is that people adopt a more concrete mental construal for statically near stimuli than for statically far stimuli, whereas the key finding from our research is that people react more negatively toward dynamically approaching stimuli than toward dynamically receding or static stimuli.

The current research also complements existing research on approach–avoidance conflict (Epstein & Fenz, 1962) and on goal gradient (Anderson, 1933; Hull, 1932, 1938). According to the approach–avoidance conflict research, the relative weights of negative stimuli over positive stimuli are greater when the stimuli are near rather than far, and therefore, when faced with mixed positive and negative stimuli, individuals will be more likely to avoid those stimuli if the stimuli are near rather than far (e.g., Miller, 1944). According to the goal gradient research, an attractive goal will be more attractive if it is near than if it is far, and therefore, individuals will be more motivated to approach the goal if it is near rather than far (e.g., Kivetz, Urminsky, & Zheng, 2006). Although our research is also concerned with approach versus nonapproach, it is different from these existing lines of research. In the existing research, the independent variable is generally distance (near or far), whereas in ours, it is movement (approach or not). In the existing research, approach versus nonapproach is generally a

Table 8
Study 8 Results ($N = 161$)

Movement	M	SD	Planned comparisons	Other comparisons
A	2.98	1.37	A vs. others: $t(157) = -3.30$, $p = .001$	R vs. SN: $t(157) = -2.039$, $p = .043$
R	3.52	1.32	A vs. R: $t(157) = -2.07$, $p = .040$	R vs. SF: $t(157) = 0.228$, *ns*
SN	4.08	1.01	A vs. SN: $t(157) = -4.08$, $p = .000$	SN vs. SF: $t(157) = 2.298$, $p = .023$
SF	3.47	1.03	A vs. SF: $t(157) = -1.88$, $p = .063$	

Note. Cousin's visit, initially neutral, is rated less positively when approaching (A) than when receding (R), statically near (SN), or statically far (SF) in probability. Ratings are on a 7-point scale, greater numbers indicating more positivity.

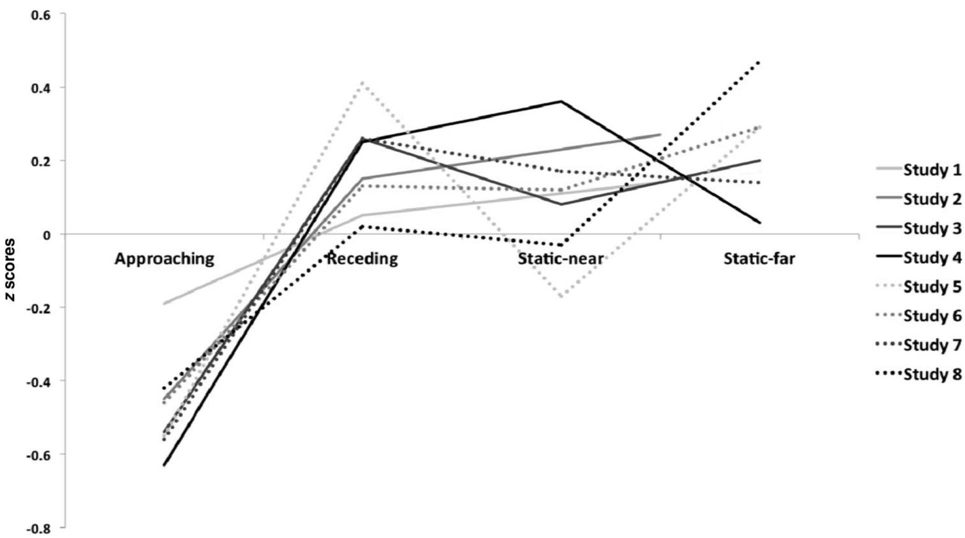

Figure 4. Combined results (z scores) of all the studies. Overall, the results reveal a systematic approach aversion effect: less positive feelings for approaching stimuli than for receding or static stimuli. (Because Studies 1 and 2 each include only one static condition, the lines for those studies end between the static-near and the static-far conditions in the figure. Also, because approach aversion is not theoretically predicted in the viewer-moving condition of Study 4, that condition is omitted from the calculation of the z scores.)

dependent variable, whereas in our research, it is an independent variable and the dependent variable is hedonic reactions. In other words, the existing research studies approach/avoidance behaviors toward far versus near stimuli, whereas our research studies hedonic reactions toward approaching versus nonapproaching stimuli.

Finally, the current research also enriches the seminal research by Mühlberger et al. (2008) showing that people respond more negatively toward approaching negative stimuli than toward receding negative stimuli. The current research has demonstrated the approaching aversion effect with both negative and nonnegative stimuli, with both visual and audio stimuli, and with both spatially moving objects and temporally and probabilistically moving events. Why did the current research find an approach aversion effect for nonnegative stimuli whereas the previous research did not? A possible reason is that the procedure used in the previous research was too subtle. For example, Mühlberger et al. simulated movement by varying the size of pictures in a between-participants design, so the sense of movement may have been weak; moreover, they measured hedonic reactions after measuring other (startle) responses. To make the sense of movement salient, we either adopted a within-participants design (Study 1), replayed the movement multiple times (Study 2), or used stimuli with real or highly realistic movement (Studies 3–6); moreover, we measured hedonic reactions right after the movement manipulation.

Besides its contributions to the exiting psychological literature, the current research also yields practical implications. Although approach aversion is likely a general tendency, people do not always realize it or take it into consideration when interacting with others. During a conversation at a party, a person who intends to befriend another person may gradually approach the other person without realizing that doing so may achieve the opposite. During a lecture, the speaker may gradually walk closer to the audience without realizing that doing so may cast an unfavorable impression on the audience. In a television commercial, the marketer may gradually move the product closer to the viewer without realizing that doing so may hurt the image of the product. When deciding whether or when to hold a meeting, the organizer may first announce the likelihood of the meeting to be low and then gradually increase the likelihood or may first schedule the meeting far in the future and then gradually move it sooner without realizing that doing so may make the potential attendees dread the meeting. Our research highlights the importance of such considerations.

The current research is still preliminary and leaves many questions unanswered. In the rest of this section, we explore some of these open questions and offer our speculative answers.

Feelings Toward the Stimulus Versus Overall Feelings

Our research suggests that approach aversion may arise even for positive stimuli. Does it mean that people will feel less happy overall when something they like approaches them? For example, would a fisherman feel less happy if the fish he or she wishes to catch swims closer? We speculate that the answer is no. We distinguish between two types of feelings—feelings toward the stimulus and overall feelings. If the fish one hopes to catch swims closer, it is possible that the person feels happier overall but at the same time feels more negatively (more fearful, more worried, etc.) about the fish (the stimulus) per se. Our research is about feelings toward the stimulus, not overall feelings.

Ambivalence Versus Overgeneralization

In the introduction, we offered two reasons why approach aversion may arise for nonnegative stimuli. One is overgeneralization—that approach aversion is functional in some situations (e.g., when the stimulus is indeed harmful) but not in others (e.g., when the stimulus is innocuous), yet individuals do not distinguish between the two types of situations and exhibit the effect in both types of situations. The other explanation concerns the notion of ambivalence—that an overall nonnegative stimulus may still contain negative elements and those elements may carry more weight when the stimulus is approaching than when not. Which of these two reasons is more viable? In two of our studies (Study 1 and Study 2), the stimuli (English alphabets and face icons) seemed rather innocuous and unambiguous, yet we still observed approach aversion. These results suggest that overgeneralization is sufficient for approach aversion. Nevertheless, even in those studies, we were not able to entirely rule out the possibility that participants may have perceived such simple symbols and icons as containing negative elements. Therefore, to tease apart the overgeneralization and ambivalence explanations, future researchers will need to empirically manipulate the degree of ambivalence of the stimuli while keeping the overall valence of the stimuli constant.

Intentionality of the Stimulus

Does the approach aversion effect arise because respondents infer a malignant intention of the stimulus from its approaching movement? For example, in Study 3 (on person perception), did the approach aversion effect arise because the respondents interpreted the approaching movement of the target person as an indicator of malignant intentions such as attacking the perceiver? Our answer to this question is twofold: On one hand, we believe that in many cases, if an animal or a person approaches another person, it is indeed possible that the former intends to hurt the latter. This is consistent with our conjecture that the approach aversion tendency is evolutionarily functional. Thus, we speculate that the approach aversion effect will be more pronounced if the stimulus is an animal or a person who is capable of having a malignant intention. On the other hand, we do not believe that the capability of having a malignant intention is a necessary condition for the approach aversion effect to occur. As mentioned earlier, approach aversion is an overlearned tendency. People do not always make a rational decision of whether to exhibit this tendency when encountering an approaching stimulus, and they may exhibit the tendency even when the stimulus has no malignant intentions. For example in Study 1, the stimuli were English letters, and in Study 5, the stimuli were posters. These stimuli were unlikely to entail malignant intentions. In Study 7 and Study 8, the timing and probability of the cousin's visit were said to depend solely on the availability of airline tickets and hence did not reflect the intention of the cousin. Yet we still observed an approach aversion effect in all of these studies. Thus, we surmise that perceived malignant intent is not a necessary condition for approach aversion but may be a moderator that can strengthen or attenuate the effect.

Powerlessness Versus Action Preparedness

Does the approach aversion effect occur because people feel powerless when encountering an approaching stimulus and hence feel negatively? Again, we suggest a two-sided answer. On one hand, we speculate that people will feel less in control and hence less powerful when a stimulus is approaching them than when it is not. This speculation is consistent with the result of Study 4, showing that the approach aversion effect would vanish if the participants perceived themselves as approaching the stimulus; presumably, participants in that condition felt more in control and more powerful. On the other hand, we doubt that people will feel completely out of control or powerless when a stimulus is approaching them; instead, they will feel a sense of alarm and a need to prepare themselves for action (e.g., to fight or flee). The notion of action preparedness is consistent with the results of Study 3 and Study 5 showing that approaching stimuli were associated with fear. Fear is an arousal feeling (Russell, 1980) and reflects a need for action. This notion is also consistent with the finding from Mühlberger et al. (2008) showing that approaching stimuli led to heightened startle responses and arousals. We hope that future research will better examine the role of power and action preparedness in hedonic reactions toward moving stimuli.

Receding Versus Nonreceding Stimuli

The current research documents a more negative feeling toward approaching stimuli than toward nonapproaching stimuli. Will there be a parallel effect for receding stimuli—a more positive feeling toward receding stimuli than toward nonreceding stimuli? Empirically, our studies did not find such an effect. Theoretically, the effect is possible (which our studies may not be powerful enough to detect). However, if it exists, the effect is likely due to other reasons than the reasons for approach aversion. One possible reason why people may feel more positively toward a receding stimulus is that a receding stimulus induces a sense of loss and people are loss averse and attach more value to a loss than to a gain; another possible reason is that a receding stimulus creates a sense of scarcity and people consider what is scarce to be more valuable. These speculations will need future research to test.

Conclusion

Stimuli are constantly moving around us—objects are approaching or receding in space, and events are approaching or receding in time and in likelihood. For survival, humans have developed a tendency to guard against approaching stimuli and likely apply this evolutionarily functional tendency to stimuli for which the tendency is not necessary, rendering approach aversion a general human tendency.

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