Affective Perseverance: The Resistance of Affect to Cognitive Invalidation

David K. Sherman
University of California, Los Angeles

Heejung S. Kim
Harvey Mudd College

Four studies demonstrated that affective preferences persevere even if the cognition that gave rise to the affect is invalidated. In Study 1, participants learned associations between Chinese ideographs and their English meanings that were either positively or negatively valenced; subsequently, they were informed that these meanings were incorrect. Despite this cognitive invalidation, the affect associated with the ideographs persevered. Studies 2 and 3 ruled out alternative explanations. Study 4 showed that invalidating information containing opposite affective valence succeeded in changing the affective perseverance, whereas the neutral cognitive invalidation of Studies 1 through 3 did not. The present research provides an empirical demonstration of affective perseverance, specifying the conditions where affective preferences do and do not persevere when confronted with invalidating information. Discussion centers on issues of underlying mechanism and implications for other psychological phenomena.

Affective dispositions to objects and persons are difficult to change (Zajonc, 1980). Once an individual forms a positive or negative feeling, to a certain city, a model of a car, or a type of food, then that feeling tends to persist. Others may assail the individual with facts and evidence to sway the feeling—the pros and cons of the given city, the fuel efficiency of the new car, the voluminous calories of the food—but once formed, the affect tends to persevere.

As these examples suggest, the tendency of affect to persevere despite evidence to the contrary is a very common phenomenon covering a rich range of experiences. Feelings are often independent of facts and evidence and it seems to be the case that it is harder to change how a person feels than what a person believes to be true. Yet, although affective perseverance has been speculated about in studies of belief perseverance (e.g., Edwards & Smith, 1996; Ross, Lepper, & Hubbard, 1975), to date, there has been no direct examination of this phenomenon. The purpose of the present research is to provide an experimental demonstration of affective perseverance, to show that feelings, once formed, tend to persevere, even if the cognitions that gave rise to those feelings are invalidated.

Affect and Cognition

Our notion of affective perseverance builds on the basic distinctions between affect and cognition, as observed by Zajonc (1980, 1998). Affect and cognition, although largely occurring together, are theorized to be two distinct systems with cognition corresponding to the true/false dimension (e.g., "The population of the city of Los Angeles is over 4,000,000") and affect corresponding to the positive/negative dimension (e.g., "I love Los Angeles") (Zajonc, 1998). Thus, cognitions can be evaluated for correctness against some external reality and can be invalidated and changed instantly at the introduction of new information from a reasonable source (e.g., reading a census report that the population of Los Angeles is 3,781,500). In contrast, affective experiences

compose an individual's internal reality and thus feel as though they can never be wrong. Furthermore, and central to the purpose of this article, is the notion that in contrast to cognitive judgments, affective preferences are not easily changed by subsequent information and cognitive invalidation does not automatically lead to affective invalidation. As Zajonc (1980) observed,

> The reason why affective judgments seem so irrevocable is that they "feel" valid. We are not easily moved to reverse our impression of a person or of a piece of music. We trust our reactions, we believe they are "true" and that they accurately represent an internal state or condition. (p. 157)

Affect and cognition, although distinct and empirically separable (e.g., Kunst-Wilson & Zajonc, 1980), in most cases are closely related to each other. Many forms of affect can result from cognitive appraisal (Ellsworth, 1991; Lazarus, 1982; Schachter & Singer, 1962), raising the question of how basic distinctions between affect and cognition are manifested because they are so interdependent. This article tried to separate these two systems to examine these basic distinctions. More specifically, this article focuses on the case where affect has a cognitive basis and investigates what happens to the affect when that cognitive basis is invalidated. It is our hypothesis that once formed, affective preferences shall persevere, despite the invalidation of its cognitive basis.

There is some indirect evidence to support affective perseverance and the resistance of affect to cognitive invalidation. In general, cognitive strategies have proven relatively ineffective at nullifying affective preferences or judgments. For example, research has shown that conscious efforts to ignore emotional material are unsuccessful (Wegner & Gold, 1995) and that instructions to disregard emotional evidence result in the emotional evidence persevering and influencing judgment to a greater extent than instructions to disregard more cognitive evidence (Edwards & Bryan, 1997).

Research on suboptimal affective priming (e.g., Edwards, 1990; Winkielman, Zajonc, & Schwarz, 1997) also has shown that affective preferences, when produced outside of awareness, persevere despite cognitive attempts at persuasion. Once affective preferences are established through priming—typically showing a happy or angry face prior to neutral stimuli such as Chinese ideographs—they prove resistant to semantic attempts at persuasion such as attributional techniques that identify the true source of the affect (Winkielman et al., 1997) or cognitive techniques that describe the positive or negative features of the ideograph (Edwards, 1990). Taken together, these studies demonstrate that affect is resistant to cognitive attempts at persuasion. However,

these studies do not examine a specific and important type of cognitive persuasion, the direct invalidation of the cognitive basis of the affect. Thus, although suggestive of affective perseverance, research from the affect and cognition literature has not demonstrated the resistance of affect to cognitive invalidation.

Attitudes and Attitude Change

Research from the attitude and attitude change literature also is relevant to our notions of affective perseverance. Different theories of attitudes and attitude change have proposed that attitudes are composed of distinct affective and cognitive (as well as behavioral) elements (see Eagly & Chaiken, 1993; Zanna & Rempel, 1988, for reviews). Zanna and Rempel (1988) define attitudes as the evaluative categorization of a stimulus object that is based on either cognitive information, affective information, or information concerning past behaviors. Attitudes that are based on cognition, then, are conceptually distinct from attitudes that are based on affect.

Research from this framework that examines the cognitive basis of attitudes is particularly relevant to the present notions of affective perseverance and the resistance of affect to cognitive invalidation. Lingle and Ostrom (1981), for example, found that people maintain their attitudes—the evaluation of stimulus objects—even when the source of those attitudes is outside of awareness. Zanna and Rempel (1988) speculated on the relevance of this formulation for people's feelings as well; that is, they hypothesized that an attitude can be activated regardless of whether the individual can recall the specific emotional reaction that led to the formation of the attitude. Put somewhat differently, feelings toward an object may persevere despite the lack of awareness of the original basis of those feelings, which could be either cognitive (Lingle & Ostrom, 1981) or affective (Zanna & Rempel, 1988).

Our formulation is consistent with the findings demonstrated by Lingle and Ostrom (1981) and the speculation of Zanna and Rempel (1988). We believe that the feelings associated with an attitude object are likely to persist even when the cognitive basis for that attitude cannot be recalled. However, our theoretical interest in affective perseverance in the face of cognitive invalidation leads us to examine the more specific case where the very cognitive basis for attitudes, or affective preferences, is completely invalidated. Thus, the present investigation provides an extension of the issues raised by Lingle and Ostrom (1981) and Zanna and Rempel (1988) because instead of just examining whether the affective component of attitudes perseveres without awareness of the cognitive basis of the attitude, we shall examine whether the affective component of attitudes perseveres even when the cognitive basis of an attitude is

completely invalidated. If affective preferences persevere in the face of cognitive invalidation, then it would extend the findings of Lingle and Ostrom and be consistent with the speculation of Zanna and Rempel on the nature of persevering affective attitudes.

Perseverance Phenomena

Research conducted over the past 25 years on the belief perseverance phenomenon (Darley & Gross, 1983; Ross et al., 1975; Ross & Lepper, 1980) is also relevant to our notions of affective perseverance, although this research did not focus on distinctions between affective and cognitive perseverance. An early study on belief perseverance (Ross et al., 1975) examined the debriefing paradigm, where an initial belief is formed based on some evidence and then that evidence is invalidated. Participants' beliefs were strongly affected by being told that they performed very well or very poorly on a cognitive task. They persevered in their beliefs despite being subsequently debriefed that the feedback was determined by random assignment and, hence, totally unrepresentative of any real ability they might have. This study raised the possibility that affective factors contribute to belief perseverance, although the authors deemed it unlikely because observer participants, who are presumably less emotionally involved in the experiment, exhibited analogous belief perseverance as actor participants. The notion of affective perseverance, then, was not developed further, because the authors concentrated on cognitive explanations for perseverance phenomena (see also Lord, Ross, & Lepper, 1979; Ross & Lepper, 1980) and moreover did not distinguish between the roles of affect and cognition in perseverance phenomena.

More recent research has begun to distinguish the role of affect in the perseverance of beliefs. For example, Edwards and Smith (1996) speculated that emotion may underlie belief perseverance. In their study, participants read arguments that were either compatible or incompatible with their prior beliefs. A bias was found such that participants were less likely to believe arguments that were incompatible with their prior beliefs. Central to our analysis of affective perseverance, when beliefs were highly emotional, the magnitude of the disconfirmation bias was greater, suggesting that the emotional component of beliefs contributed to the disconfirmation bias. The authors argued that the emotional attachment to a belief serves to trigger the generation of more refutational thoughts that undermine an incompatible argument, resulting in belief perseverance (see also Munro & Ditto, 1997; Zuwerink & Devine, 1996). Thus, Edwards and Smith (1996) showed that affect plays a role in belief perseverance, but the study only measured affect as a mediator of belief perseverance and had no measure of affective perseverance.

One study demonstrated the persistence of affect in the absence of any cognition (Johnson, Kim, & Risse, 1985). Participants were patients with Korsakoff's syndrome, a brain disorder characterized by serious memory disturbances commonly caused by chronic alcohol use. In the study, Korsakoff patients saw pictures of men who were described as either good or bad. After 20 days, the participants maintained their feelings toward photographs described as positive or negative, despite not having any memory for the information. Thus, affect persevered even with a lack of memory for the original information (as in Kunst-Wilson & Zajonc, 1980). Another study demonstrated the tendency of affect to persevere despite contradictory information (Lerman et al., 1991). Participants in the study were women who had high-suspicion mammograms that were subsequently found to be negative for breast cancer as tests revealed that they had absolutely no cancer in them. Subsequently, they were contacted and asked questions about their moods. Results indicated that despite the complete invalidation of the suspicious mammogram, the women still had substantial anxiety and worries about breast cancer.

However, although suggestive of affective perseverance, the studies discussed above (Edwards & Smith, 1996; Johnson et al., 1985; Lerman et al., 1991; Ross et al., 1975) have not provided a direct demonstration of affective perseverance. The studies did not experimentally distinguish between affective and cognitive factors in perseverance phenomena; hence, it is difficult to determine which factor exactly is driving the perseverance phenomenon. The study examining the role of emotion in belief perseverance (Edwards & Smith, 1996) had no measure of whether affect persevered. The study with Korsakoff patients (Johnson et al., 1985) demonstrated affective perseverance with a lack of memory but did not show that affect would persist despite a direct cognitive invalidation. Finally, the study demonstrating the persistence of negative mood in the health domain (Lerman et al., 1991) did not experimentally examine the phenomenon. The present research was designed to test whether affective preferences would persevere even if the cognition that gave rise to those preferences is invalidated.

Overview of Studies

Following Zajonc's (1980) distinctions between affect, which corresponds to the positive/negative dimension, and cognition, which corresponds to the true/false distinction, we operationalize affective and cognitive perseverance in the following ways. Affective perseverance is measured by whether a feeling toward an

object (positive or negative) maintains or changes with new information that may negate that preference. Cognitive perseverance is measured by whether people's beliefs about the meaning of an object (i.e., what that object is) maintain or change with new information that may negate that meaning.

Most examples of affective and cognitive perseverance involve stimuli with preexisting associations and feelings attached to them. Thus, to provide a clean test of affective perseverance, we chose neutral stimuli for which our participants had little or no affective or cognitive associations: Chinese ideographs. Because participants did not know the true meanings of the ideographs, we were able to create both cognitive associations to the stimuli (i.e., what the ideographs meant in English) and affective associations of the stimuli (i.e., whether the participants liked or disliked the ideographs). We also were able to change or invalidate the cognitive association to the stimuli and measure whether this changed the affective association. Then, affective perseverance was measured through preferences, and cognitive perseverance was measured by assessing what participants believed the ideographs meant after invalidating information was provided.

STUDY 1

In Study 1, we investigated whether affective preferences would persevere even when the cognition that gave rise to these preferences was invalidated. Participants learned associations between neutral stimuli, Chinese ideographs, and affectively valenced English words. We measured whether participants preferred the ideographs associated with positive English words to the ideographs associated with negative English words. Then, we invalidated the cognition by associating new, neutral English words with the same ideographs. Our prediction was that despite this change in cognition, the affective preference would persevere.

Method

Participants. Nineteen undergraduates (10 men and 9 women) at Stanford University participated in the experiment in exchange for credit in their introductory psychology course. Participants who had some knowledge of Chinese ideographs were excluded.

Procedure. When a participant arrived at the lab, the experimenter explained that the study was about "learning and memory." After administering a consent form, the experimenter instructed the participant to follow the instructions on the computer screen and left the room. The entire experiment was created using PsyScope, a psychology experimental software program

(Cohen, MacWhinney, Flatt, & Provost, 1993), and was conducted on a Macintosh computer.

Participants were instructed that there would be two parts to this experiment on "learning and memory" and that they would be informed of the second part later. For the first part, the computer presented 20 pairs of Chinese characters and their English meanings. Participants were told that the list would be shown twice, that they are to learn the associations between the Chinese characters and the English meanings, and that they would be tested for their memory. Among the 20 ideographs, 10 were presented with positive English meanings (e.g., 年 = peace) and 10 were presented with negative English meanings (e.g., 赤 = disease). Each ideograph appeared on the screen individually for two seconds. The list of 20 ideographs was presented twice, each time in random order.

Next, participants took the word completion test on these valenced meanings (the valenced word completion test) in which the ideographs were presented with a cue of the first three letters of their English meanings (e.g., " 年 pea" for peace, "赤 dis" for disease) and participants were asked to complete the word. The word completion test was done to facilitate learning of the pairs and not to test the participants on their memory. After participants completed the valenced word completion test, they viewed the list of 20 words and their English meanings again.

Participants next took the word recall test on these valenced meanings (the valenced word recall test) in which the ideographs were presented individually (e.g., 赤) and participants were asked to provide the English meanings. This memory test assessed the cognition attached to each ideograph. After the valenced word recall test, the list of 20 words and their English meanings was presented again.

Next, the computer instructed the participants that having completed the first learning and memory exercise, they would be presented with 20 pairs of Chinese ideographs (e.g., 赤 年). Participants were instructed to "tell us which of the two characters you prefer—we are interested in the role of liking in learning and memory." The pairs of ideographs were presented for 2 seconds. In each pair, one ideograph was associated with a positive meaning, the other with a negative meaning. Participants were instructed to type a key on the left side of the keyboard ("z") if they preferred the character on the left or type a key on the right side of the keyboard ("/") if they preferred the character on the right. Participants indicated which ideograph they preferred for each pair for all 20 pairs. This preference exercise concluded the first part of the experiment.

Participants were given a 1-min break. At the end of the break, participants were instructed that Part 2 would

TABLE 1:   **Overview of Procedure Used in Study 1 to Develop and Measure Affective and Cognitive Associations With Neutral Stimuli (Chinese Ideographs)**

1. First learning (valenced words)	年 = peace, 赤 = disease
2. Valenced word completion test	年 = pea, 赤 = dis
3. Valenced word recall test	年 = , 赤 =
4. First preference exercise	"Which do you like?" 年, 赤
5. Invalidation	"Those English words were not real meanings . . . now . . . the real English meanings."
6. Second learning (neutral words)	年 = calendar, 赤 = long
7. Neutral word completion test	年 = cal, 赤 = lon
8. Neutral word recall test	年 = , 赤 =
9. Second preference exercise	"Which do you like?" 赤, 年
10. Final recall test (both neutral and valenced words)	赤 = , 赤 = , 年 = , 年 =

NOTE: The same procedure was modified for Studies 2 through 4.

be very similar to Part 1 in form but not content. The first part would be the learning and memory exercise. The instructions stated, "We have to tell you something. The English words you learned in Part 1 were not the real English meanings of those Chinese characters. We are now going to show you the real English meanings for those 20 Chinese characters. You will be shown the list twice and then you will be tested." Then, the same list of Chinese ideographs was presented with new and "real" English meanings. In this second part, all the ideographs were presented with neutral English meanings (e.g., 年 = calendar, 赤 = long). This served as the cognitive invalidation as the meanings attached to the Chinese ideographs were changed. Other than the fact that the meanings were changed, the procedure was exactly the same as the first part. The complete list was shown twice, followed by the neutral word completion test to complete the meanings (e.g., "年 cal" for calendar, "赤 lon" for long), a presentation of the list, and the neutral recall test to provide the meanings for each ideograph, followed by another presentation of the list. Then, participants completed the second preference exercise for the 20 pairs of ideographs. In each pair, one ideograph was an ideograph that had been associated initially with a positive meaning and the other with a negative meaning. The 20 pairs of ideographs were matched up differently from the first preference exercise. At the end of the second preference exercise, the list of Chinese ideographs appeared once more, individually, and the participants were asked to respond with both meanings of each ideograph to the extent they could. Table 1 contains a summary of the procedure.

Every list in the study was presented in randomized order. When participants completed the study, they were debriefed (in particular, they were told that in truth, nei-

ther set of English meanings was the correct translation for those Chinese characters), thanked, and dismissed.

Materials. All participants saw 20 Chinese ideographs that were paired first with valenced meanings, either positive (e.g., peace, beauty, etc.) or negative (e.g., disease, hypocrisy, etc.), and second with neutral meanings (e.g., calendar, long, etc.). To ensure that the positively valenced words were not paired with more aesthetically pleasing ideographs, we counterbalanced by creating two forms of the experiment.[1]

Pretest of the materials. Twenty Stanford undergraduates judged the valence of 60 words, indicating whether they were positive, negative, or neutral. Only words for which consensus was greater than 90% were selected as stimuli for the experiment.

Results and Discussion

In all four studies, there were no sex differences on any of the results. In addition, there were no differences between the two counterbalancing forms of the experiment in any of the studies. Thus, neither sex nor counterbalancing will be discussed further.

Preference exercises. Results supported the prediction that once an affective preference is attached to a neutral stimulus, it perseveres even after the cognitive basis for that affective preference is invalidated. Our measure of preference is the percentage of the 20 pairs in which participants preferred the ideograph originally associated with a positive meaning over the ideograph originally associated with a negative meaning. Then, this percentage was compared to 50%, which would indicate no preference for the positively associated ideographs. At the second preference exercise, participants preferred the ideographs originally associated with the positive

meanings to the ideographs originally associated with the negative meanings 59.6% of the time ($SE = 2.8\%$), which is significantly greater than 50%, one-sample $t(18) = 3.42$, $p < .01$. Despite the cognitive invalidation of the originally valenced meanings of the ideographs, participants preferred the positive to the negative associated ideographs. This preference for positively associated ideographs was reduced from the first preference exercise, where participants preferred the positive ideographs 73.7% of the time ($SE = 5.0\%$), paired $t(18) = 3.31$, $p < .01$. However, participants at the second preference exercise still preferred the positively valenced ideographs to the negatively valenced ideographs more than 50%. Thus, although the cognitive invalidation was successful at diminishing the affective preferences, much of the positive affect persevered.

Memory tests. Participants learned the neutral English meanings at the second word recall test ($M = 66.0\%$ correct, $SE = 5.1\%$) as well as the affectively valenced meanings at the first word recall test ($M = 65.7\%$ correct, $SE = 5.7\%$), paired $t(18) = .07$, *ns.* Thus, participants seemed to invalidate the cognitive basis for their affective preferences; that is, they accepted the new meanings of the ideographs. However, this cognitive invalidation did not invalidate their affective preferences. Finally, when participants were asked to recall both English meanings at the end of the experiment, participants recalled a greater percentage of neutral words ($M = 69.7\%$, $SE = 5.8\%$) than valenced words ($M = 54.5\%$, $SE = 4.6\%$), paired $t(19) = 2.76$, $p < .05$.

Item analysis. Utilizing the results from the final recall test, we conducted an item analysis on the second preference exercise. We wanted to see if the perseverance effect, the tendency for participants to prefer the originally positive associated ideographs over the negative associated ideographs despite the cognitive invalidation, was strongest when recall for the neutral meanings is weakest. If the perseverance effect is stronger when neutral meanings were not recalled, then it is possible that the affective perseverance could be driven by instances when the cognitive invalidation was unsuccessful (i.e., when participants failed to learn the neutral words). We examined this issue by measuring the perseverance effect only among ideographs where participants learned the neutral words. On the final recall test, participants were presented with the Chinese ideographs and asked to provide both the first and second English meanings. We then used these neutral responses to conduct an item analysis of the second preference exercise. The second preference exercise consisted of 20 pairs of Chinese ideographs (e.g., 年赤); one ideograph of each pair was originally associated with a positive meaning (e.g., 年 = peace) and then a neutral meaning (calen-

dar), whereas the other ideograph of each pair was originally associated with a negative meaning (e.g., 赤 = disease) and then a neutral meaning (long). The strongest test of our hypothesis would be to assess the perseverance effect for only those ideographs where participants learned and recalled both of these neutral words. There was an average of 10.48 ($SE = 1.46$) such cases out of the 20 pairs of ideographs at the second preference exercise, and participants chose the ideograph originally associated with the positive word 6.84 ($SE = 1.08$) times, for a perseverance effect of 63.3% ($SE = 5.2\%$). This perseverance effect was significantly greater than 50%, one-sample $t(18) = 2.56$, $p < .05$. This adjusted perseverance effect did not differ from the overall perseverance effect (59.6%), paired $t(18) < 1.0$, *ns.* This adjusted perseverance effect (63.3%) was not significantly lower than the percentage of positively associated ideographs preferred at the first preference exercise (73.7%), paired $t(18) = 1.68$, *ns.* Thus, among the strongest test of the perseverance effect, looking only at the ideographs for which participants had the successful cognitive invalidation, there was strong evidence for the perseverance of affect.

Our argument is that the affective preferences persevered despite the cognitive invalidation because of the irrevocable nature of affect. However, there are a number of alternative explanations. The first alternative explanation is that the valenced words were more memorable than the neutral words (e.g., Pratto & John, 1991). This argument does not seem plausible given that the participants remembered the neutral meanings on the final recall test better than they remembered the valenced meanings. That is, despite the neutral words being recalled better than the valenced words, the affect that originated from the valenced words persevered. Moreover, the item analysis strongly suggests that the perseverance effect is not driven by a failure to recall the neutral words.

A second alternative explanation is that participants did not take our invalidation seriously. That is, the affective preferences persevered because of cognitive perseverance as participants still believed that the first set of meanings were the true meanings despite our invalidation. To examine whether participants took our invalidation seriously, we ran another wave of participants through the study ($n = 10$) and included a thorough suspicion probe utilizing a full funnel debriefing procedure (Aronson, Ellsworth, Carlsmith, & Gonzales, 1989) that asked participants directly how they interpreted the invalidation procedure. The results indicated that the vast majority (90%) interpreted the invalidation as we intended: They believed that the original meanings were not the true meanings of the words and that the true meanings would be subsequently presented. However, we believed that this important issue warranted an addi-

tional study; therefore, in Study 3, we will deal with the adequacy of the cognitive invalidation directly.

A third alternative explanation is that the participants indicated their preferences for the ideographs originally associated with the positively valenced words over the ideographs originally associated with the negatively valenced words because they wanted to be consistent. That is, because they indicated a preference for the 年 ideograph over the 赤 ideograph at the first preference exercise, at the second preference exercise, they also indicated their preferences for 年 and against 赤 to be consistent for self-presentational or experimental demand reasons. We sought to rule out this alternative explanation in Study 2.

STUDY 2

Study 2 sought to replicate the findings in Study 1, with one key difference. In Study 1, participants indicated their preferences at two times, once after they learned (and were tested on) the valenced words and once after they learned (and were tested on) the neutral words. In Study 2, the first preference exercise was eliminated to examine whether the positive affect attached to the ideographs would persevere even if participants did not express their preferences initially. Thus, to the extent that participants favored the Chinese ideographs originally associated with the positive meanings to the Chinese ideographs originally associated with the negative meanings, it would not be due to the fact that they already committed themselves to preferences for certain ideographs and against other ideographs.

Method

Participants. Twenty-two undergraduates (8 men and 14 women) at Stanford University participated in the experiment in return for credit in an introductory psychology course. Participants who had some knowledge of Chinese ideographs were excluded from the study.

Procedure. The procedure of Study 2 is exactly the same as the procedure of Study 1 except that there was no preference exercise after the valenced recall test. As in Study 1, participants learned 20 Chinese ideographs and their English meanings, among which half were positively valenced and half were negatively valenced. The list of 20 ideographs was shown twice, followed by the valenced word completion test, another presentation of the list, and the valenced word recall test. The list was then presented again. Unlike Study 1, however, participants were not asked to take the first preference exercise. Instead, the participants were informed that the first part of the experiment was over and were given a 1-min break. After the break, the computer instructed the participants, with the same instructions as in Study 1, that the

previous meanings were not the real meanings of the ideographs and that the real meanings would be shown shortly. Then, the same list of Chinese ideographs was presented with their allegedly real meanings, the neutral English words. The list was shown twice, followed by the neutral word completion test, a presentation of the list, the neutral word recall test, and a final presentation of the list. Then, participants completed the preference exercise. As in Study 1, every list in the study was presented in randomized order and the meanings of the ideographs were counterbalanced across two forms. When participants completed the experiment, they were debriefed, thanked, and dismissed.

Results and Discussion

Preference exercises. Study 2 replicated the basic findings of Study 1 and further ruled out the consistency bias explanation. That is, despite the cognitive invalidation of the originally valenced meanings of the words, participants still reported preference for the Chinese ideographs originally associated with the positive words.

Results showed that even without the first preference exercise, the affect attached to the ideographs persevered after the change of meanings. In the preference exercise, participants preferred the ideographs that were originally associated with positive meanings over the ideographs that were originally associated with the negative meanings 57.5% (SE = 2.7%) of the time, a percentage significantly greater than 50%, one-sample $t(21) = 2.81$, $p < .05$.

Memory tests. Overall, participants learned the neutral English meanings at the second word recall test (M = 78.2% correct, SE = 3.9%) better than the affectively valenced meanings at the first word recall test (M = 69.1% correct, SE = 3.7%), paired $t(21) = 2.22$, $p < .05$. Again, participants successfully invalidated the cognitive basis for their affective preferences as they accepted the new meanings of the ideographs, but this cognitive invalidation did not nullify their affective preferences.

STUDY 3

Studies 1 and 2 provide evidence for the perseverance of affect. Once attached to the neutral stimuli, the affect persevered despite the invalidation of the original cognitive basis for that affect. However, the strength of Studies 1 and 2 rests on an important assumption: Participants believed the cognitive invalidation that the original (valenced) meanings were incorrect and the subsequent (neutral) meanings were correct. Although participants were probed for suspicion in the previous studies, and did not raise any questions about the procedure, we thought it best to replicate the findings with a stronger cognitive invalidation and include a measure of cogni-

tive invalidation in addition to a thorough suspicion probe.

In Studies 1 and 2, both the valenced and the neutral meanings for the Chinese ideographs were created for the purposes of this research. Thus, whether they voiced suspicion about the neutral meanings after we told participants that the first meanings were incorrect, participants would have been correct in being suspicious because, in fact, the neutral meanings were as fabricated as the valenced meanings. In Study 3, we eliminated this possibility by presenting participants with *true* neutral meanings and clear evidence as to the truthfulness of new meanings. That is, we selected a new set of 20 Chinese ideographs from the book *Understanding Chinese* (Choy, 1999). We selected 20 Chinese ideographs that had relatively neutral meanings. Otherwise, the procedure was very similar to Studies 1 and 2. First, participants learned the ideographs and their first (valenced and false) meanings. Then, participants were told that the first meanings were incorrect and were given a copy of *Understanding Chinese* with the relevant ideographs highlighted so that they could verify the first meanings were incorrect. Then, participants learned the correct, neutral meanings and we assessed their preferences for the Chinese ideographs. With this new (and true) cognitive invalidation, if the affective preferences persevered, then it could not be because the participants still believed that the valenced meanings were in fact the correct meanings.

In Studies 1 and 2, we told participants that the first set of (valenced) meanings was incorrect and we gave them new (neutral) meanings, which they subsequently learned. We inferred from this learning that the original cognitions were invalidated. However, we did not directly assess this cognitive invalidation. Thus, in Study 3, we included a direct measure of cognitive invalidation. At the conclusion of the study, we presented participants with the 20 Chinese ideographs and three words and asked participants which word was closest in meaning to what they thought the Chinese ideograph stands for. Of the three words, one was a synonym for the neutral meaning, one was a synonym for the valenced meaning, and one was an antonym for the valenced meaning. This direct comparison allowed us to measure cognitive invalidation more carefully and directly.

Method

Pretest. In Study 3, we utilized 20 new Chinese ideographs and their true neutral meanings, obtained from the book *Understanding Chinese* (Choy, 1999). We presented the 20 neutral meanings along with the 20 valenced meanings from Study 1 and Study 2 to 15 participants and asked them to rate the valence of each word from 1 (*extremely negative*) to 4 (*neutral*) to 7 (*extremely positive*). Pretest ratings supported our distinctions into positive ($M = 6.24$, ranging from 5.53 to 6.93), negative ($M = 2.03$, ranging from 1.33 to 2.80), and neutral ($M = 4.48$, ranging from 4.00 to 5.13); all ps < .001 for differences in group means.

Participants. Nineteen undergraduates (11 women, 8 men) at University of California, Los Angeles, participated in the experiment in exchange for credit in their introductory psychology course. Participants had no knowledge of Chinese characters or language. Two participants did not successfully follow all the instructions and are not included in the study.

Procedure. The procedure of Study 3 is exactly the same as the procedure of Study 1, with the following exceptions. First, the 20 Chinese ideographs were chosen based on their true neutral meanings (Choy, 1999); hence, there is a different list of characters and neutral meanings, although we used the same valenced meanings. Second, the cognitive invalidation was administered and measured differently, which will be described below.

As in Studies 1 and 2, participants learned 20 Chinese ideographs and their English meanings, among which half were positively valenced and half were negatively valenced. The list of 20 ideographs was presented twice, followed by the valenced word completion test, another presentation of the list, and the valenced word recall test. Then, participants completed the first preference exercise, where 20 pairs of the ideographs were shown, 1 of which was previously associated with a positive word, the other of which was previously associated with a negative word. Then, participants were told that the first part of the experiment was over and were given a 1-min break.

After the break, the computer instructed the participants,

> Before we start the second part of the study, we would like to tell you about the Chinese characters. The English words you learned in Part 1 were not the real English meanings of those Chinese characters. We are now going to show you the real English meanings for those twenty Chinese characters. We have taken these real English meanings from a book, *Understanding Chinese: A Guide to the Usage of Chinese Characters.*

The computer went on to instruct participants that on their desk was an envelope that contained the book of Chinese characters (Choy, 1999). Participants were instructed to open the envelope and examine the contents. The envelope contained the actual book with the pages marked that contained the relevant Chinese characters that the participants just learned as well as a summary sheet copied directly from the book of the Chinese characters they learned and their real English meanings.

Participants were told that they should not attempt to memorize the characters at this time but that they should merely familiarize themselves with the characters and their real English meanings. When participants were done examining the book, the computer instructed them that they are now to complete the second learning exercise where they will be presented with the Chinese characters, once again, with their real English meanings.

From this point, the experiment resumed in identical form to Study 1. Participants were presented with the Chinese characters and their real (neutral) English meanings. The list was shown twice, followed by the neutral word completion test, a presentation of the list, the neutral word recall test, and a final presentation of the list. Then, participants completed the preference exercise, where two characters were presented, and were instructed to indicate which character they preferred. One of the characters was originally associated with a positive English meaning, and the other character was originally associated with a negative English meaning.

After participants completed the second preference exercise, concluding the computer part of the study, the experimenter administered a final questionnaire examining the "meanings of characters." This measure served to examine the success of the cognitive invalidation. The instructions stated, "In the following exercise, we are going to present the 20 characters you learned and three English words. Please circle the word that comes closest in meaning to what you think the character stands for." For each character, the three words consisted of a synonym for the neutral (real) meaning, a synonym for the valenced meaning, and an antonym for the valenced meaning. So, for example, for the character 員, which had the valenced meaning of "poverty" and actually means "member," the character was presented with the following choices: segment (a synonym for member), destitution (a synonym for poverty), and affluence (an antonym for poverty). All synonyms and antonyms were taken from *The Oxford Thesaurus* (Urdang, 1992) and the Merriam-Webster online thesaurus (http://mw.com). The purpose of the test of meanings was to determine whether the cognitive invalidation was successful by assessing whether participants thought that the character had a meaning more similar to the true neutral meaning or the valenced meaning that was subsequently invalidated.

As in Studies 1 and 2, every list in the study was presented in randomized order and the valenced meanings of the ideographs were counterbalanced across two forms. When participants completed the experiment, they were debriefed, thanked, and dismissed. During debriefing, the full funnel interview (Aronson et al., 1989) was utilized to determine whether participants had any suspicions about the true meanings of the char-acters. No participants were suspicious and all indicated that upon seeing the *Understanding Chinese* book, they recognized that the first meanings were incorrect and that the second meanings were correct.

Results and Discussion

Preference exercises. Study 3 replicated the results of Studies 1 and 2 as, once again, affect attached to the neutral stimuli persevered even after the cognitive basis for the affect was invalidated. At the second preference exercise, participants preferred ideographs that were originally associated with positive meanings over ideographs originally associated with negative meanings 59.5% of the time ($SE = 3.7\%$), which is significantly greater than 50%, one-sample $t(18) = 2.57$, $p < .05$. Despite the cognitive invalidation where participants were shown the true neutral meanings of the Chinese ideographs in the *Understanding Chinese* book, participants still preferred the positive to the negative associated ideographs. As in Study 1, this preference for positively associated ideographs was reduced from the first preference exercise, where participants preferred the positive ideographs 70.0% of the time ($SE = 5.0\%$), paired $t(18) = 2.28$, $p < .05$. Although some of the affective preference was diminished by the cognitive invalidation, positive affect toward the positively associated characters did persevere, because participants still preferred the positively valenced ideographs to the negatively valenced ideographs greater than 50%.

Memory and meaning tests. Overall, participants learned the neutral English meanings at the second word recall test far better ($M = 65.8\%$ correct, $SE = 4.5\%$) than the affectively valenced meanings at the first recall test ($M = 46.3\%$ correct, $SE = 5.3\%$), paired $t(18) = 6.32$, $p < .001$. This supports the successful invalidation of the cognitive basis for the affective preferences, because participants learned the new meanings of the Chinese characters.

Study 3 also contained a test of meanings designed to directly assess the cognitive invalidation. Participants were presented the 20 Chinese ideographs and were given three words from which to choose the word that most closely matches what they thought the ideograph meant. One of these words was a synonym for the neutral meaning, one of the words was a synonym for the valenced meaning, and one of the words was an antonym for the valenced meaning. This meaning test provided a more stringent measure of cognitive invalidation because it directly compared whether participants thought the word meant something closer to the neutral or the valenced meaning. Participants selected the synonym for the neutral meaning 84.2% ($SE = 3.4\%$), the synonym for the valenced meaning 10.0% ($SE = 2.4\%$), and the antonym for the valenced meaning 5.8% ($SE =

1.8%), repeated-measures ANOVA, $F(2, 36) = 188.1$, $p < .001$. Paired t tests indicate that participants selected the neutral meanings more than either of the valenced meanings (both ps < .001) but that there was no significant difference in how often participants selected the valenced synonym or antonym, $t(18) = 1.69$, ns. Thus, the measure of cognitive invalidation confirms that participants perceived the true meaning of the characters to be the neutral and not the originally valenced meaning.

Item analysis. The cognitive meaning test allows us to conduct a more stringent test of our hypothesis. Although participants learned the neutral meanings better than the valenced meanings and they overwhelmingly chose the neutral synonym over the valenced synonym, it is still possible that the preference for the originally positively valenced ideographs is being driven by those ideographs for which participants failed to learn the neutral meanings. Thus, we conducted an internal item-based analysis of the preference exercise, utilizing the cognitive meaning test. Recall that in the second preference exercise, participants were presented with 20 pairs of Chinese ideographs, one of which was originally associated with a positive meaning and one of which was originally associated with a negative meaning. Each ideograph on the cognitive meaning test, then, was in two pairs of ideographs on the preference exercise. Thus, we reexamined the preference exercise, looking only at the pairs of ideographs for which participants chose the neutral synonym as the meaning of the ideograph.

The results demonstrated the perseverance of affect. Among the pairs of ideographs for which participants correctly chose the neutral meanings ($M = 14.3$ pairs of ideographs out of 20 total), participants preferred the ideograph originally associated with the positive meaning 62.4% ($SE = 4.4\%$), which was significantly greater than 50%, one-sample $t(28) = 2.83$, $p < .05$. This perseverance effect (62.4%) did not differ from the entire preference exercise (59.5%), paired $t(18) = 1.58$, ns. As in Study 1, we should note that this adjusted perseverance effect (62.4%) did not differ significantly from the first preference exercise (70.0%), paired $t(18) = 1.47$, ns. This internal analysis strengthens the evidence for the hypothesis of the perseverance of affect: Among the items for which the original valenced cognition was most definitively invalidated, there remained a strong perseverance of affect.

STUDY 4

Taken together, these three studies provide a demonstration supporting the irrevocable nature of affect (Zajonc, 1980). Once affect was attached to the neutral stimuli, it persevered, despite the fact that the cognitive basis for the affect was invalidated. These findings are consistent with the work of Edwards (1990) and Fabrigar and Petty (1999), who have found that cognitive attempts are relatively ineffective at modifying affectively based attitudes (although Millar & Millar, 1990, find an opposite pattern). These findings also are consistent with the primacy of affect hypothesis (Murphy, Monahan, & Zajonc, 1995; Murphy & Zajonc, 1993; Zajonc, 1984) because, once instantiated, affective preferences were relatively impervious to cognitive influences.

This demonstration of the perseverance of affect raises the question of what would change the affect attached to the neutral stimuli. Must affect always persevere, and under what conditions would it not persevere? Many examples come to mind where feelings are able to change dramatically with new information. A person may be upset because everybody is ignoring him on his birthday but subsequently finds out via a big "SURPRISE!" that the reason he was ignored was that everybody was preparing a surprise party. In this case, would the person's negative affect persevere? Or would, as we suspect, the person feel much better? Similarly, if a student was upset because she failed a test but subsequently found out that it was due to a scoring error, and in fact she received an A on the test, would it be likely that this information would change her affect?

These examples suggest that affect may be less likely to persevere when the invalidating information carries an affective valence of its own. Thus, we sought to examine whether replacing the originally valenced words with words of opposite affect would reduce or eliminate affective perseverance. Study 4 was designed to test this hypothesis.

Study 4 sought to examine a possible way to modify the affective perseverance demonstrated in the first three studies. In Studies 1 through 3, participants learned associations between neutral stimuli, Chinese ideographs, and valenced words, only to have these associations invalidated by new information. In Studies 1 through 3, this new information had neutral valence and the affect originally attached to the ideographs persevered. In Study 4, participants were instructed, as in Studies 1 through 3, that the original meanings they learned for the Chinese ideographs were incorrect; however, in Study 4, the new meanings for the ideographs had an opposite affective valence from the original meanings. The issue examined in Study 4 is whether information of opposite affect would reduce or eliminate the tendency of affect to persevere.

Method

Participants. Eighteen undergraduates (8 men and 10 women) at Stanford University participated in the experiment in return for credit in an introductory psychology

course. Participants who had some knowledge of Chinese ideographs were excluded.

Procedure. The procedure of Study 4 is identical to the procedure of Study 1 except that the second set of English meanings associated with the ideographs consisted of oppositely valenced words rather than neutral words. As in Study 1, participants learned 20 Chinese ideographs and their English meanings, of which half were positively valenced and half were negatively valenced. The list of 20 ideographs was shown twice, followed by the first valenced word completion test, a presentation of the list, the first valenced word recall test, another presentation of the list, and the first preference exercise, where the 20 pairs of ideographs were presented and participants indicated which ideograph they preferred. Then, participants took the 1-min break.

After the break, participants were informed that the previous meanings were actually not the real meanings of the ideographs and the same list of Chinese ideographs was presented with their allegedly real meanings. In this part, all the ideographs were presented with a new set of English words. The new English words had either positively or negatively valenced meanings and the valence of the new words was oppositely matched with the valence of words from the first list. For example, if an ideograph "年" was presented with the word *peace* in the first list, it was presented with the word *deformity* in the second list, and if "赤" was presented with the word *disease* in the first list, it was presented with the word *trust* in the second list. The second list was shown twice, followed by the second valenced word completion test, a presentation of the list, the second valenced word recall test, and a final presentation of the list. Then, participants completed the second preference exercise with 20 pairs of oppositely valenced ideographs (both according to the first list and the second list). There were two forms of the experiment that counterbalanced the meanings of the words. Every list in the study was presented in randomized order. When participants completed the experiment, they were debriefed, thanked, and dismissed.

Results and Discussion

Preference exercises. The results indicated that when invalidating information is affective in nature, the original affect attached to a stimulus can be changed. In the first preference exercise, participants preferred the ideographs that were associated with positive meanings to the ideographs that were associated with negative meanings 63.4% ($SE = 5.1\%$) of the time, a percentage greater than 50%, one-sample $t(17) = 2.64$, $p < .05$. After being told that the original meanings were incorrect and given a second set of meanings with opposite valence, the participants no longer preferred the ideographs

originally associated with the positively valenced words. That is, participants preferred ideographs that were associated with positively valenced words in the first list—ideographs that were subsequently associated with negative meanings—significantly less than 50% ($M = 35.6\%$, $SE = 5.0\%$), one sample $t(17) = 2.92$, $p < .05$, indicating that the affect ceased to persevere when the information that invalidated it had an opposite affective valence. Indeed, the magnitude of the preferences for the (originally) positively valenced ideographs at the first preference task (63.4%) is virtually the same as the magnitude of the preferences for the (subsequently) positively valenced ideographs at the second preference task (64.4%), paired $t(17) = .25$, *ns*, indicating that when the invalidating information was of opposite valence, none of the original affect persevered.

Memory tests. Overall, participants learned the English meanings at the first word recall test ($M = 59.7\%$ correct, $SE = 6.5\%$) significantly better than at the second word recall test ($M = 49.5\%$ correct, $SE = 5.0\%$), paired $t(17) = 2.18$, $p < .05$. Despite the greater memory for the first set of associations between the ideographs and their meanings, the second set of associations had a greater impact on the preferences at the second preference exercise.

Thus, Study 4 demonstrates that invalidating information of opposite affective valence can succeed, whereas neutral cognitive invalidation did not. Whereas Studies 1 through 3 demonstrated the tendency of affect to persevere when the cognition that gave rise to that affect was invalidated, Study 4 suggests that when the invalidating information itself is affective in nature, the original affect can be replaced by the affect attached to the invalidating information.

GENERAL DISCUSSION

What accounts for these findings demonstrating the perseverance of affect in the face of cognitive, but not affective, invalidation? Our argument is that the tendency of affect to persevere is one of the fundamental aspects that distinguish affect and cognition, as proposed by Zajonc (1980, 1998). Support for the theoretical mechanisms that underlie this basic distinction between affect and cognition can be found in both neuroanatomical evidence as well as theories of attitudes and attitude change. Research examining the neurophysiological processes in the context of emotion and cognition has found that amygdalae functioning corresponds to affective responses, whereas hippocampi functioning corresponds to cognitive responses (LeDoux, 1989; Zola-Morgan, Squire, Alvarez-Royo, & Clower, 1991). The different structures support notions of the independence of affect and cognition and the existence of affective preferences without cognitive rec-

ognition (Kunst-Wilson & Zajonc, 1980; Zajonc, 1980). Relevant to the present research, it suggests that once an affective response to a stimulus is generated, it exists distinctly from the cognitive basis of that affect (Damasio, 1994). Subsequent information that invalidates the cognitive basis of the affect, then, may not alter the affect itself unless the affective system also is engaged.

At a more proximal level, other explanations for the present effect come from theories of attitude and attitude structure. For example, the tripartite theory of attitudes (Breckler, 1984; Ostrom, 1969; Rosenberg & Hovland, 1960) holds that attitudes can have conceptually distinct affective, cognitive, and behavioral components. Similar to the neurophysiological evidence described above, it could be that the neutral invalidating information in our research (Studies 1, 2, and 3), although successfully negating the cognitive component of the attitude toward the Chinese ideograph, did not negate the affective component of the attitude. In contrast, the affective invalidation of Study 4 may have altered both the affective and the cognitive components of the attitudes, resulting in the eradication of the affective perseverance. The tripartite theory of attitudes (Breckler, 1984) may also suggest why, in Studies 1 and 3, the preference for the positively associated ideographs diminished from the first preference exercise to the second preference exercise. The attitude toward the ideographs with positive meanings probably had distinct cognitive and affective components to it. The neutral invalidating information affected the cognitive component of the attitude, thus resulting in the reducing liking for the ideographs. However, the affective component of the attitude remained and, hence, participants still liked the originally positive associated ideographs better than chance. As noted above, this also suggests why the affective invalidation, which affected both the cognitive and affective components of the attitude, was successful in eliminating the perseverance of affect in Study 4.

In Studies 1 through 3, affect proved relatively impervious to cognitive invalidation. Once attached to the neutral stimuli, the affect persevered despite the invalidation of the basis of that affect. Participants persisted in preferring Chinese ideographs originally associated with positive English words even after the participants were told that those associations were wrong and they learned new neutral English meanings for the ideographs. Study 2 demonstrated that the affective perseverance was not due to the participants' desire to appear consistent, and Study 3 demonstrated that the affective perseverance could not be accounted for by the weakness of the cognitive invalidation. Furthermore, item analyses in Study 1 and Study 3 found that the perseverance effect was strongest when examining only ideographs for which the original valenced cognition was most definitively invalidated. Taken together, these three studies strongly suggest that cognitive invalidation of affect is largely ineffective in changing an affective response. Affect perseveres even when the cognitive basis for the affect is invalidated.

Study 4 suggests that if the invalidating information carries an opposite valence, then it is possible for the original valence to be replaced and for affect to be changed. That is, invalidating information of opposite affective valence was successful, whereas neutral cognitive invalidation was not. In the examples described earlier, a surprise birthday party or an A on a test unquestionably carry opposite affective valences from feeling ignored on one's birthday or failing a test and thus are more likely to change the affect than more neutral information.

Thus, we propose that affect is less likely to persevere when the invalidating information has an opposite valence of its own. Consistent with neurophysiological evidence suggesting separate affective and cognitive systems (Damasio, 1994; LeDoux, 1989), as well as the attitude research suggesting separate cognitive and affective components of attitudes (Zanna & Rempel, 1988), the present research has found that appeals that feature opposite affective content could eliminate affective perseverance.

Limitations of the Present Research

The present set of studies was designed to provide an initial empirical demonstration of affective perseverance, the tendency of affective preferences to persevere even if the cognitive basis for those preferences is invalidated. We chose Chinese ideographs to be the stimuli in these studies because the participants in our studies had neither cognitive nor affective association with the stimuli; thus, we could attach and manipulate both the affective valence and cognitive meaning of the stimuli. However, although successful in leading to a clear demonstration of affective perseverance, this minimalist methodological strategy inhibits the generalizability of our findings. That is, although we believe the present research has implications for affective perseverance as it occurs in daily life, it is left for future research to explore the domains in which this occurs. We would like to begin this exploration by discussing psychological domains where the study of affective perseverance, we believe, holds particular relevance.

Implications for Other Psychological Phenomena

Our findings on affective perseverance raise important questions about the relationship between affective perseverance and belief perseverance. For example, affective perseverance may be an underlying factor in the belief perseverance study by Ross et al. (1975). The

authors suggested that affective factors are not likely to contribute to belief perseverance because observer participants, who were less emotionally involved in the experiment, exhibited similar belief perseverance as the actor participants. However, although less emotionally involved, affect may still have been generated among the observer participants in the Ross et al. (1975) study. In the present research, because we utilized stimuli that did not have high self-involvement for the participants, they were essentially observers as they learned the meanings of the ideographs. Thus, the findings lead us to speculate that affective perseverance may still be an underlying factor in belief perseverance, an intriguing direction for future research.

The tendency for affect to persevere despite cognitive invalidation holds relevance for other psychological phenomena. For example, affective perseverance may play an important role in person perception. Consider the case where one person is suspicious of another, as in the student who sees another member of the class obsequiously offer to carry the professor's bag. Consistent with this example, research on suspicion (Fein & Hilton, 1994; Fein, Hilton, & Miller, 1990) has demonstrated that individuals induced to be suspicious of an actor are more likely to interpret the actor's behavior in a negative way (e.g., believing the student has an ulterior motive) even if they are forced to admit that the reason for their original suspicion was unfounded. The state of suspicion may have an important affective component that the present analysis of affective perseverance could help clarify; namely, when one person is suspicious of an actor, there usually is a commensurate negative affect attached to the suspicious actor. Once this affect is attached to the actor, the affect is likely to persevere even after the reason for suspicion is invalidated. The present research suggests that for suspicious person perceivers, invalidating the reason for suspicion may be unsuccessful because the process of invalidation attempts to neutralize rather than replace the affective state. Unless the suspicious person is given an explanation for the actor's behavior that also carries an opposite emotional valence, the suspicious affective state is likely to persevere.

Conclusion

The present research demonstrates affective perseverance and provides evidence that affect perseveres even if the cognitive basis for that affect is invalidated. In the original belief perseverance study utilizing the debriefing paradigm (Ross et al., 1975), it was found that describing the perseverance phenomenon in detail to participants via a process debriefing reduced the perseverance effect. In other words, adding additional cognitions helped reduce the cognitive perseverance. In

the present set of studies on affective perseverance, it was found that replacing the affective information with information of an opposite affective valence reduced the perseverance of affect. Adding affect of opposite valence succeeded, whereas adding cognition did not.

When people try to change how others feel about their favorite city, a certain car, or a type of food, they typically appeal to reasons as to why others should feel differently. It is not surprising, then, that these appeals are often unsuccessful. To persuade passion, this research proposes, one should present passion.

NOTE

1. A list of the terms and Chinese ideographs from every study is available from the authors on request.

REFERENCES

Aronson, E., Ellsworth, P., Carlsmith, J. M., & Gonzales, M. (1989). *Methods of research in social psychology* (2nd ed.). New York: Random House.

Breckler, S. J. (1984). Empirical validation of affect, behavior, and cognition as distinct components of attitude. *Journal of Personality and Social Psychology, 47,* 1191-1205.

Choy, R. M. (1999). *Understanding Chinese: A guide to the usage of Chinese characters.* Cupertino, CA: China West Books.

Cohen, J. D., MacWhinney, B., Flatt, M., & Provost, J. (1993). PsyScope: A new graphic interactive environment for designing psychology experiments. *Behavioral Research Methods, Instruments, and Computers, 25,* 257-271.

Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain.* New York: Putnam.

Darley, J. M., & Gross, P. H. (1983). A hypothesis-confirming bias in labeling effects. *Journal of Personality and Social Psychology, 44,* 20-33.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* San Diego, CA: Harcourt Brace Jovanovich.

Edwards, K. (1990). The interplay of affect and cognition in attitude formation and change. *Journal of Personality and Social Psychology, 59,* 202-216.

Edwards, K., & Bryan, T. S. (1997). Judgmental biases produced by instructions to disregard: The (paradoxical) case of emotional information. *Personality and Social Psychology Bulletin, 23,* 849-864.

Edwards, K., & Smith, E. E. (1996). A disconfirmation bias in the evaluation of arguments. *Journal of Personality and Social Psychology, 71,* 5-24.

Ellsworth, P. C. (1991). Some implications of cognitive appraisal theories of emotion. In K. T. Strongman (Ed.), *International review of studies on emotion* (Vol. 1, pp. 143-161). New York: John Wiley.

Fabrigar, L. R., & Petty, R. E. (1999). The role of affective and cognitive bases of attitudes in susceptibility to affectively and cognitively based persuasion. *Personality and Social Psychology Bulletin, 25,* 363-381.

Fein, S., & Hilton, J. L. (1994). Judging others in the shadow of suspicion. *Motivation and Emotion, 18,* 167-198.

Fein, S., Hilton, J. L., & Miller, D. T. (1990). Suspicion of ulterior motivation and the correspondence bias. *Journal of Personality and Social Psychology, 58,* 753-764.

Johnson, M. K., Kim, J. K., & Risse, G. (1985). Do alcoholic Korsakoff's syndrome patients acquire affective reactions? *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11,* 22-36.

Kunst-Wilson, W. R., & Zajonc, R. B. (1980). Affective discrimination of stimuli that cannot be recognized. *Science, 207,* 557-558.

Lazarus, R. S. (1982). Thoughts on the relations between emotion and cognition. *American Psychologist, 37,* 1019-1024.

LeDoux, J. E. (1989). Cognitive-emotional interaction in the brain. *Cognition and Emotion, 3,* 267-289.

Lerman, C., Trock, B., Rimer, B. K., Boyce, A., Jepson, C., & Engstrom, P. F. (1991). Psychological and behavioral implications of abnormal mammograms. *Annals of Internal Medicine, 114,* 657-661.

Lingle, J. H., & Ostrom, T. M. (1981). Principles of memory and cognition in attitude formation. In R. Petty, T. Ostrom, & T. Brock (Eds.), *Cognitive responses to persuasion.* Hillsdale, NJ: Lawrence Erlbaum.

Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology, 37,* 2098-2109.

Millar, M. G., & Millar, K. U. (1990). Attitude change as a function of attitude type and argument type. *Journal of Personality and Social Psychology, 39,* 217-228.

Munro, G. D., & Ditto, P. H. (1997). Biased assimilation, attitude polarization, and affect in reactions to stereotype-relevant scientific information. *Personality and Social Psychology Bulletin, 23,* 636-653.

Murphy, S. T., Monahan, J. L., & Zajonc, R. B. (1995). Additivity of nonconscious affect: Combined effects of priming and exposure. *Journal of Personality and Social Psychology, 69,* 589-602.

Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology, 64,* 723-739.

Ostrom, T. M. (1969). The relationship between the affective, behavioral, and cognitive components of attitude. *Journal of Experimental Social Psychology, 5,* 12-30.

Pratto, F., & John, O. P. (1991). Automatic vigilance: The attention-grabbing power of negative social information. *Journal of Personality and Social Psychology, 61,* 380-391.

Rosenberg, M. J., & Hovland, C. I. (1960). Cognitive, affective, and behavioral components of attitude. In M. J. Rosenberg (Ed.), *Attitude organization and change: An analysis of consistency among attitude components.* New Haven, CT: Yale University Press.

Ross, L., & Lepper, M. R. (1980). The perseverance of beliefs: Empirical and normative considerations. In R. A. Shweder & D. Fiske (Eds.), *New directions for methodology of behavioral science: Fallible judgment in behavioral research.* San Francisco: Jossey-Bass.

Ross, L., Lepper, M. R., & Hubbard, M. (1975). Perseverance in self-perception and social perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology, 32,* 880-892.

Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 63,* 379-399.

Urdang, L. (1992). *The Oxford thesaurus.* New York: Oxford University Press.

Wegner, D. M., & Gold, D. B. (1995). Fanning old flames: Emotional and cognitive effects of suppressing thoughts of a past relationship. *Journal of Personality and Social Psychology, 68,* 782-792.

Winkielman, P., Zajonc, R. B., & Schwarz, N. (1997). Subliminal affective priming resists attributional interventions. *Cognition and Emotion, 11,* 433-465.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151-175.

Zajonc, R. B. (1984). On the primacy of affect. *American Psychologist, 39,* 117-123.

Zajonc, R. B. (1998). Emotions. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., pp. 591-632). New York: McGraw-Hill.

Zanna, M. P., & Rempel, J. K. (1988). Attitudes: A new look at an old concept. In D. Bar-Tal & A. W. Kruglanski (Eds.), *The social psychology of knowledge* (pp. 315-334). Cambridge, UK: Cambridge University Press.

Zola-Morgan, S., Squire, L. R., Alvarez-Royo, P., & Clower, R. P. (1991). Independence of memory functions and emotional behavior: Separate contributions of the hippocampal formation and the amygdala. *Hippocampus, 1,* 207-220.

Zuwerink, J. R., & Devine, P. G. (1996). Attitude importance and resistance to persuasion: It's not just the thought that counts. *Journal of Personality and Social Psychology, 70,* 931-944.