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Positive versus Negative Valence:

Asymmetries in Attitude Formation and Generalization as Fundamental Individual Differences

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Abstract

Whenever individuals evaluate a novel object or situation, they must integrate its positive and negative aspects. We argue that such valence weighting is essentially an exercise in attitude generalization. Individuals must weigh how much the novel stimulus resembles past occurrences that proved to be positive versus past incidences toward which they have a negative attitude. We overview a program of research in which individuals' valence weighting tendencies are assessed by examining how their pre-established attitudes generalize to similar but novel attitude objects. Some individuals show evidence of their positive attitudes generalizing more strongly than their negative attitudes, essentially weighting resemblance to a known positive more heavily than resemblance to a known negative. Others show the reverse tendency. Numerous studies are reviewed demonstrating that individual differences in this valence weighting bias predict judgments of novel stimuli across a wide variety of domains, including sensitivity to interpersonal rejection, threat assessment, risk-taking, and exploratory behavior. Additional research highlights the conditions under which this individual difference is most likely to be apparent. Its causal influence is demonstrated through experiments in which individuals' valence weighting proclivities are recalibrated. We also discuss the relation between valence weighting and different forms of valence asymmetry that may arise during attitude formation. In so doing, we summarize additional research concerning an individual difference related to differential attitude learning upon the reception of positive versus negative outcome information, and we distinguish this learning bias from the weighting bias. As a whole, the research findings link basic attitudinal processes to personality, illustrating the value of viewing systematic variability in processes of evaluation as fundamental individual differences.

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I. Introduction

The program of research to be summarized in this chapter is aimed at establishing a linkage between the attitudes and the personality literatures. Obviously, this has been done many times in the past. The Authoritarian Personality work focused on specific attitudes that might accompany personality, in particular highly conventional or prejudicial attitudes (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). Need for cognition is another example in that the construct and measure concern the extent to which people process evaluative information carefully (Cacioppo & Petty, 1982). Similarly, self-monitoring relates to the type of persuasive information to which individuals are responsive (Snyder & DeBono, 1985). However, the linkage upon which we have focused is quite different, for we argue that differences in attitude formation and generalization per se represent fundamental individual differences.

Our daily lives consist of frequent decisions about whether to approach or avoid the objects, persons, or situations that we encounter. Sometimes these decisions follow easily and spontaneously from the evaluative associations (i.e., the attitudes) that are activated from memory regarding these stimuli (Fazio, 2007). In other cases, these approach-avoidance decisions involve at least somewhat more deliberation because the stimuli are more novel to us. As such, they require us to consider and weight the positive versus negative features of the stimulus in question. Depending upon just how motivated we might be (Fazio, 1990; Fazio & Olson, 2014), this might involve a very effortful and extensive analysis of whatever knowledge is available, or it might involve a comparison of only a few

momentarily salient features. Ultimately, however, the decision rests on valence weighting, a consideration of the extent to which one valence predominates over the other.

The central thesis on which we focus in this chapter is that any such valence weighting is essentially an exercise in attitude generalization. Individuals must weigh how much the novel stimulus resembles past occurrences that proved to be positive versus past occurrences toward which they have a negative attitude. For that reason, we believe that individuals' valence weighting tendencies can be assessed by examining how their pre-established attitudes generalize to similar but novel attitude objects. For some people, negative attitudes generalize much more than positive. These individuals weight resemblance to a known negative more strongly than resemblance to a known positive when judging a novel stimulus, and thus are likely to reach a more negative assessment of the target. For others, positive attitudes generalize more strongly and, hence, they are likely to develop a more positive assessment of the novel target. Because these attitude generalization tendencies, or what we will call valence weighting biases, should be relevant to any novel judgment situation, we argue that they represent a fundamental individual difference.

The chapter is devoted to a now lengthy program of research concerning the measurement of attitude generalization tendencies, the empirical basis for our assertion that individual differences in such valence weighting are fundamental, a consideration of the conditions under which the individual difference is most likely to be apparent, experimental manipulation of valence weighting biases aimed at establishing their causal influence, discussion of the relation between valence weighting and different forms of valence asymmetry that may arise during attitude formation, and research concerning an individual difference related to differential attitude learning upon the reception of positive versus negative outcome information. Before turning to these issues, however, it will be useful to consider, albeit briefly, previous discussions concerning valence asymmetries and the evidence for such asymmetries with respect to attitude formation and generalization.

A. Valence Asymmetry

The psychological literature includes many references to the possibility that positive and negative valence may not be equally informative or influential. Negative events and information are asserted to have a stronger impact than those characterized by positive valence (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Cacioppo, Gardner, & Berntson, 1997; Rozin & Royzman, 2001; Taylor, 1991). Although our own research highlights a tendency, on average, for negative attitudes to generalize more strongly than positive attitudes, we are hesitant to endorse such broad generalizations about valence. Indeed, empirical findings to be summarized shortly leave us skeptical about that very generality. Whereas there are some conditions under which a specific form of a negativity bias emerges in a seemingly inevitable manner, there are other conditions in which no such valence asymmetry is evident. Moreover, at a conceptual level, such general assertions are called into question by the inherent difficulty of unconfounding valence per se from its typical correlates. The impression formation literature provides a perfect illustration. As has been highlighted often, negative events and information are typically unexpected, surprising, and distinctive (Jones & Davis, 1965; Kanouse & Hanson, 1972) and for that very reason often more diagnostic (Skowronski & Carlston, 1989). Such diagnosticity is a critical determinant of the extremity of the trait inferences that perceivers draw when engaged in impression formation. Research by Skowronski and Carlston (1987) has demonstrated that negative information about a target person is viewed as more diagnostic in morality-related domains (e.g., honesty) and, hence, leads to the observation of a negativity bias. However, the reverse is true for ability-related domains (e.g., intelligence) for which a positivity bias emerges as a result of the greater diagnosticity of information that a target is skilled. Thus, diagnosticity, and not valence per se, is the critical feature determining the impact of positive versus negative information.

Our point is not that negativity biases do not exist, but simply that they may not be as broad and general as has been suggested. The observation of equivalent effects for positively- and negatively-

valenced items (e.g., Roskos-Ewoldsen & Fazio, 1992; Wentura, Rothermund, & Bak, 2000) and, more importantly, the reversals noted with respect to impression-formation call for caution in making general inferences about valence. In our own research program, we have found it useful to distinguish specific forms of valence asymmetry—one related to attitude learning and another related to attitude generalization—and to consider both the conditions that moderate observation of an asymmetry favoring negative valence and the variability in the extent to which individuals display such a negativity bias.

B. Attitude Development as a Function of Exploratory Behavior

Attitudes can form in any number of ways, including the transmission of information from others, observational learning, evaluative conditioning, and inference from one's own behavior. It was interest in a particular form of attitude development that led to the discovery of a valence asymmetry with respect to attitude learning. Sometimes, individuals develop attitudes as a function of their own exploratory behavior. They sample a novel object and, as a consequence, learn the outcomes that accrue from interaction with the object. Indeed, there is a dynamic interplay between the initial decision to sample, the experience of whatever outcome results, updating the hypothesis that governed the initial choice, and subsequent decisions to approach or avoid.

1. The BeanFest Paradigm

In order to examine the dynamic interplay between exploratory behavior and attitude formation, Fazio, Eiser, and Shook (2004) developed a computer game allowing for interaction with novel stimuli in a virtual world. Because this world consisted only of various types of stimuli referred to as "beans," the game was affectionately named "BeanFest." In its initial implementation, participants were assigned the goal of surviving in this virtual world by eating beans that increased their energy level and avoiding ones that depleted energy. The participant's energy level could range from 0-100, with 100

being the initial start value and 0 representing death. Because each trial of the game depleted energy by one unit, participants had to learn which beans to eat in order to survive.

The beans presented during the course of the game varied visually. Unbeknownst to the participants, they were selected from a 10 x 10 matrix defined by ten levels of shape (circular to oblong) and from one to ten speckles (see Figure 1). A total of 36 beans from six specific regions of the matrix were presented (see Figure 2). Three types of beans were associated with positive valence. When eaten, they increased energy by 10 units. Beans from the other three regions produced a loss of 10 units of energy, when eaten. If a participant decided not to eat a given bean, nothing happened other than the loss of one energy unit stemming from the trial's fixed cost. Thus, information about the value of a bean was contingent upon approach behavior. It was in this way that BeanFest implemented the fundamental difference between approach and avoidance behavior that exists in the real world. If one chooses to avoid an object, there is no feedback and, hence, no opportunity to learn about the correctness of the decision.

After undergoing three blocks of trials, each of which involved a single presentation of the 36 game beans, participants were informed that the game had concluded and that a test phase was to begin. During this test phase, they were to judge whether a presented bean was good (one "that you would eat, i.e., one that you believe has beneficial effects on your energy level") or bad (one "that you would not eat, i.e., one that you believe has harmful effects") by pressing one of two buttons on their response pads.

Participants' decisions to eat or not eat showed clear signs of learning during the game; accuracy increased across the three blocks. Moreover, judgments during the test phase were well above

chance levels. Thus, participants did learn.¹ However, a valence asymmetry was evident. Although both the positive and the negative beans were classified more accurately than chance, the negative beans were significantly more likely to be classified correctly than the positive beans.

2. The Learning Asymmetry

A subsequent experiment sought to differentiate two mechanisms that might underlie the production of the learning asymmetry. One possibility stemmed directly from the literature concerning a pervasive negativity bias. Perhaps, the participants had attended more extensively when a bean yielded a negative outcome and more strongly associated the outcome with that given bean, relative to what they did when a bean produced a positive outcome. Indeed, the very framing of the game may have encouraged greater attention and rehearsal following negative events. Participants began with a complete energy bank of 100 units and could experience only decreases from that level. Their mission was to survive and, above all, avoid death. Fazio et al. (2004, Experiment 2) reasoned that any such tendency to focus on the negative could be diminished by adopting a more gains-oriented framing to the BeanFest game. That is, if the learning asymmetry stemmed from an attentional and rehearsal mechanism, a framing manipulation should affect the extent of the asymmetry. It should be at least reduced, if not eliminated, by a gains framing. To implement the framing manipulation, the researchers stripped the BeanFest game of all references to survival, death, and energy loss via time. Instead, it was

¹ Subsequent research has indicated that the attitudes participants develop toward the game beans involve associations that are capable of automatic activation. Evidence of such automatic attitude activation was obtained in an experiment in which the game phase was followed by an implicit measure of attitudes toward some of the game beans. Specifically, participants completed the Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005). The AMP is an implicit measure of attitudes that asks participants to indicate whether Chinese ideographs presented as target stimuli are pleasant or unpleasant. Attitudes toward priming stimuli that are flashed before the ideographs have been shown to influence participants' judgments of the ideographs. Using this measurement approach, Rocklage, Pietri, Cone, and Fazio (2014) found that responses to the Chinese ideographs were significantly affected by the valence associated with the preceding bean image. When the Chinese ideographs were preceded by beans that participants had previously learned were positive, participants were relatively more likely to classify the ideograph as pleasant. The opposite was true for the Chinese ideographs preceded by beans participants had learned were negative. These results provide evidence that the BeanFest learning procedure can create evaluations of the beans that are automatically activated upon their later presentation.

presented as a game about points; some beans, when selected, would increase one's points, whereas others would decrease points. In the gains framing condition, participants began the game with 0 points and were instructed that their goal was to win games which they could do by reaching 100 points. In the loss framing condition, participants started with 100 points and were told that they were to avoid losing games which would happen if they reached 0 points.

A second possible mechanism was structural in nature and stemmed from the contingency built into the game between approach behavior and information gain. One received information about the value of the bean only if one chose to eat it. Avoidance behavior provided no feedback. This structural contingency has an important consequence. False beliefs that a given type of bean is negative produce avoidance behavior, which means that the BeanFest player will never learn that the bean is actually positive. In contrast, a false belief that a bean is positive will lead to approach behavior. When approaching a negative bean that one believes is positive, the experience of a negative outcome will provide disconfirmation of that false belief and promote learning that it is actually negative. In other words, false positive beliefs are subjected to testing and correction, but false negative beliefs are maintained. Eventually, one would have fewer false positive beliefs than false negative beliefs. That is, one is more likely to mistake a positive bean for a negative than one is to mistake a negative bean as positive. The end result is that more negatively-valenced objects are correctly learned than positively-valenced ones. The implication of this reasoning is that the provision of feedback on each and every trial, noncontingent upon approach behavior, should affect the learning asymmetry. Although all participants in the experiment received information when they selected a bean, because their point values changed accordingly, half the participants also received information regarding beans they did not select. In this full feedback condition, participants were told the effect that the bean would have had if they had selected it. No such information was made available in the contingent feedback condition, thus information gain remained contingent upon approach behavior.

The results of this 2 (gains versus loss framing) x 2 (contingent versus full feedback) experiment were very clear. The learning asymmetry was evident in the contingent feedback conditions and was not at all affected by the framing manipulation. However, the asymmetry was completely eliminated by the provision of full feedback. Thus, the learning asymmetry appears to stem from the structural contingency between approach-avoidance behavior and information gain. When avoidance prevents learning new information, false beliefs that an object is negative (i.e., beliefs that promote avoidance) persist despite their invalidity.

Subsequent experiments provided additional support for this structural explanation of the learning asymmetry (Fazio et al., 2004, Experiments 3-5). Manipulations that encouraged or discouraged approach behavior affected the sampling of beans during the course of the game and, consequently, the magnitude of the observed learning asymmetry. For example, one experiment instilled a promotion mindset, by coupling gains framing with the participants' completion of mazes that involved an animal's advancement toward a food, or a prevention mindset, by coupling loss framing with mazes that involved the animal's escaping a threatening predator (see Friedman & Foerster, 2001, for evidence that these promotion and prevention-focused mazes affect risk-taking and creativity). Another experiment encouraged risk-taking by assigning point values of +10 and -2 to positive and negative beans or discouraged such behavior with point values of -10 and +2. Both of these manipulations affected sampling behavior and the learning asymmetry. A final experiment directly manipulated the validity of initial beliefs regarding a particular type of bean, essentially focusing on the cultural transmission of initial prejudices. After having been led to believe that the experiment concerned learning across generations, participants received reports from both a first- and a second-generation partner indicating that circular beans with few speckles were good (or bad) and should be approached (or avoided). The actual valence of these beans also was manipulated, resulting in valid and invalid initial prejudices. Invalid positive prejudices were overcome, because they promoted sampling and, hence, revelation that

the bean was actually negative. However, invalid negative prejudices encouraged avoidance and participants never learned the actual positive value of the beans. Together, these experiments serve to illustrate the importance of sampling behavior and its role in the development of a negativity bias in learning when information gain is contingent on approach behavior.

Recall that no learning asymmetry was evident when information about a bean's valence was provided on each and every trial irrespective of the decision to approach or avoid. Participants showed no evidence, on average, of greater attention or rehearsal following the provision of information that a bean had a negative value than following positive information. It is this equivalence of learning that contributed to our earlier-expressed skepticism regarding assertions of a broad valence asymmetry in favor of the negative. The data suggest an important limitation to this general proposition. At least in situations in which positive and negative valence are equated in terms of their extremity and diagnosticity, we find no evidence that individuals, on average, learn more on the basis of negative than positive events. Nevertheless, some participants do show evidence of responding more strongly to negative outcome information, whereas others show evidence of responding more strongly to positive information. In other words, there is variability around the symmetry that is observed on average. In a later portion of this chapter, we shall present evidence that this variability is indeed meaningful, reflecting what we refer to as a *learning bias*, a tendency to learn the objects responsible for either positive or negative outcomes more strongly. First, however, we turn to yet another asymmetry that was evident in the initial BeanFest experiments, one that concerns not attitude development, but attitude generalization.

3. *The Generalization Asymmetry*

In each of the BeanFest experiments summarized above, the test phase included not only beans that were presented during the course of the game, but also novel beans that had not been seen before. These novel beans vary in their resemblance to positive and negative game beans. Such resemblance

can be estimated by the location of the novel bean in the 10 x 10 matrix and its Euclidean distance from the nearest positive game bean and the nearest negative game bean (see Figure 2). Some beans are more similar to a positive in that they are more proximal to a positive bean than a negative (e.g., the bean represented by cell X8:Y4 in Figure 2). Some are more similar to a negative (e.g., cell X7:Y3), and some are equidistant (e.g., cell X7:Y4). Participants' classification of these novel beans as positive or negative provided clear evidence that attitudes generalize, for such proximity mattered. Novel beans closer to a positive were more likely to be classified as positive and those closer to a negative were more likely to be judged as negative. However, each experiment also revealed evidence of an asymmetry in attitude generalization—evidence of a bias in favor of negativity. Resemblance to a known negative was given more weight than resemblance to a known positive. So, for example, equidistant beans, which bear some degree of resemblance to both positives and negatives, were more likely to be classified as negative than positive. Interestingly, this generalization asymmetry was immune to the manipulations that affected the learning asymmetry. For example, it was evident regardless of whether the game itself had involved contingent or full feedback, promotion or prevention mindsets, or the differential extremity of the positive and negative point values.

It is important to note that the generalization asymmetry was evident over and above the learning asymmetry. Naturally, given the clear evidence that attitudes generalize, the better a participant learns the negative beans relative to the positive, the more likely it is that the participant will view a novel bean as negative. That is, the learning asymmetry (the difference between the proportion of positive and negative game beans learned correctly) and the generalization asymmetry (the average response to the novel beans) are highly correlated (typically around .7). However, in each experiment, the generalization asymmetry was apparent even after controlling for the learning asymmetry, and even in the full feedback condition for which no learning asymmetry occurred. Thus, the generalization and learning asymmetries represented distinct biases.

On average, then, negative attitudes generalize more extensively than positive attitudes.

Relatively less resemblance to a known negative is required for an object to be judged negative than is true for judging an object positive. This represents a clear case of the negativity bias that has been discussed in the literature. Assuming that they have some relevant information, people in effect weight the negative features of a novel stimulus more heavily than the positive features.²

II. Individual Differences in Valence Weighting

With this background regarding valence asymmetries in attitude formation and generalization in mind, we now can turn our attention to the issue of individual differences. We shall focus first and foremost on individual differences in attitude generalization, but eventually also will consider individual differences related to attitude formation. As we have seen, individuals display a negativity bias in attitude generalization, on average. But, there is some variability across individuals in this regard. For many individuals, negative attitudes generalize more strongly, but others show no such asymmetry, and for some, positive attitudes generalize more strongly. It is this variability in what we term the *valence weighting bias* that forms the central focus of the chapter.

A. Measuring the Valence Weighting Bias

To capture variability with respect to attitude generalization tendencies, we have employed a regression equation predicting participants' average response to novel beans (scored as -1 or +1) from the proportion of positive game beans they classified correctly and the proportion of negative game beans they classified correctly. In other words, we predict responses to novel beans from the pattern of learning of the game beans that the participant exhibited. In the interest of obtaining stable regression estimates, Pietri, Fazio, and Shook (2013a) examined an aggregated sample of 321 participants. The resulting regression equation was: $\text{Novel} = .53(\text{Positive Correct}) - .78(\text{Negative Correct}) + .12$. Both

² See Shook, Fazio, and Eiser (2007) for research that examines attitude generalization to novel beans that vary in their resemblance to mildly and extremely positive and negative game beans. Similarity, valence, and extremity all related to attitude generalization.

predictor variables were highly significant and together they accounted for 42% of the variance. Also noteworthy, however, is that the regression weight for the negative variable is about 1.5 times the size of that for the positive. Thus, an individual who had learned the positive and negative beans equally well (e.g., proportions correct of .8) was likely to display an average response to the novel beans that was negative in value (-.08) according to the regression equation. This greater weight for the negative variable relative to the positive accords with the generalization asymmetry observed in the BeanFest studies reviewed earlier. On average, individuals display a negativity bias, more strongly generalizing their negative attitudes than their positive attitudes. However, variability in such attitude generalization tendencies is readily apparent when one examines a scatterplot and the regression line (see Figure 3). Some participants fall below the regression line, classifying more of the novel beans as negative than expected on the basis of their learning of the game beans. Others classify more novel beans positively than expected on the basis of their learning and, hence, fell above the regression line. Pietri et al. employed this deviation from the predicted value, the residual, as the estimate of an individual's weighting bias.³

In each of the studies conducted by Pietri et al. (2013a), as well as most of the other research we shall summarize, the points (as opposed to the original "survival") version of BeanFest was implemented, along with full feedback, so as to avoid the fostering of a general learning asymmetry. The test phase included not only the 36 game beans, but also all 64 remaining novel beans from the 10 x 10 matrix. The calculation of the weighting bias for any given individual proceeded by first noting the proportions of positive and negative game beans correctly classified. We then used the normative

³ The laboratory has collected considerably more data since the research reported by Pietri et al. (2013a). Hence, it is possible to update this normative regression equation with what is now an aggregated sample of 1,894 participants: $\text{Novel} = .59(\text{Positive Correct}) - .83(\text{Negative Correct}) + .08$. The predictor variables accounted for 41% of the variance in the average response to the novel beans. We would recommend that any researchers using the BeanFest paradigm employ this normative regression equation to compute the residuals that index the weighting bias, provided that their participants can be presumed to be similar to our college student sample. If not, a regression equation specific to the sample may prove more appropriate.

regression equation based upon the large, aggregated sample, to predict the participant's average response to the novel beans. The difference between the actual and predicted values (i.e., the residual) was then computed as the score of interest. More negative (positive) values indicate a tendency to classify more novel beans as negative (positive) than is to be expected from one's learning pattern. Or, stated differently, more negative (positive) values reflect a tendency when judging novel stimuli to more strongly weight resemblance to a negative (positive) than resemblance to a positive (negative), relative to what is typical in the aggregate sample.

Before reviewing some empirical findings, it is useful to highlight what we regard as advantages of this measurement approach. The BeanFest paradigm involves novel objects with which individuals have no prior history. Attitudes toward different types of beans are experimentally created, and participants then judge novel beans that vary in their resemblance to the learned positives and negatives. As a result, BeanFest provides a pure assessment of valence weighting in attitude generalization, unconfounded by all the usual correlates of valence that we discussed earlier, such as familiarity, distinctiveness, or diagnosticity. Moreover, BeanFest provides a performance-based measure of valence weighting. It does not require participants to introspect upon and accurately report their sensitivity to varying kinds of information. Indeed, it may be difficult for individuals to report any such tendencies in a valid manner, and we shall report some data to that effect in a later section. For these reasons, we believe that a performance-based measure is especially informative when assessing individual differences in attitude generalization.

B. Predicting Responses to Novel Situations

1. Reactions to Hypothetical Scenarios

As was noted earlier, the issue of attitude generalization should apply most closely to situations, objects, or events that are at least somewhat novel and, hence, require the construction of an evaluative response. It is such novel instances that necessitate generalization from pre-existing attitudes

and the weighting of positive versus negative valence. Hence, many of the outcome measures that the research program has attempted to predict from our valence weighting measure have a particular characteristic. Typically, they are measures that seek to assess a relevant construct, not by asking individuals to report general beliefs about themselves, but by considering their reactions to hypothetical situations. The hypothetical nature of the scenarios respondents are asked to evaluate ensures that their judgments are inherently constructive in nature, at least to some degree, as opposed to a belief they have about themselves or a learned response to a familiar stimulus.

Initial studies by Pietri et al. (2013a) focused on three such measures, which concerned such disparate domains as sensitivity to interpersonal rejection, threat assessment, and risk tolerance. The first involved Downey and Feldman's (1996) Rejection Sensitivity Questionnaire (RSQ). This measure presents respondents with hypothetical scenarios involving actions that expose one to the possibility of interpersonal rejection (e.g., "You ask someone in class if you can borrow his/her notes," "You ask someone you don't know well out on a date," "You ask your boyfriend/girlfriend to move in with you."). Participants are asked to rate "how concerned or anxious" they would be about making the request and the likelihood that the person would comply with the request. Scores are computed in accord with an expectancy-value model by multiplying the reported level of concern by the likelihood of rejection. Higher RSQ scores have been associated with detrimental consequences for relationships, such as general dissatisfaction and even dissolution (Downey & Feldman, 1996; Downey et al., 1998). Participants completed the RSQ after playing BeanFest, and just as predicted, individuals' valence weighting tendencies and rejection sensitivity scores were correlated ($r = -.25$). A more negative weighting bias was associated with greater sensitivity to possibility of interpersonal rejection.

Another study focused on threat assessment, by administering The Looming Maladaptive Style Questionnaire (LMSQ; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). The LMSQ measures individuals' judgments of ambiguous situations that have the potential to become negative or

threatening (e.g., “You speak in front of a large audience of strangers,” “You hear a strange engine noise from your car as you are driving on the expressway in heavy rush-hour traffic”). For each scenario, respondents assessed the situation by rating the extent to which: the “chances of your having difficulty” are “decreasing or expanding with each moment,” the “level of threat” is “staying fairly constant” or “growing rapidly larger with each passing moment,” and the “problem” is “becoming progressively worse.” LMSQ scores have been shown to prospectively predict the development of anxiety disorders (e.g., Riskind et al., 2000). Participants with a more negative weighting bias had higher LMSQ scores ($r = -.22$). They rated the threats as being more likely to escalate.

The final study of this sort concerned risk assessment. Participants completed Wallach, Kogan, and Bem’s (1962) Choice Dilemmas Questionnaire, which presents respondents with hypothetical scenarios involving the pursuit of a high risk but high payoff option versus a low risk but low payoff option (e.g., accepting a high paying job with prospects of advancement at a newly founded company with an uncertain future as opposed to remaining in a current low paying position with little opportunity for advancement but promise of a secure future). Participants with a more positive weighting bias expressed stronger preferences for the riskier options ($r = .38$).

Obviously, the correlations observed in these three studies were not overwhelming. They ranged in absolute value from .22 to .38 (and that range is typical of other studies we have conducted as well). Nevertheless, we find it quite remarkable that attitude generalization in the BeanFest paradigm relates to assessments of hypothetical situations across a variety of domains—interpersonal relationships, potentially threatening events, and a consideration of decision alternatives varying in their riskiness. These relations were observed even though the performance-based measure provided by BeanFest bears no similarity in terms of content to the judgments of rejection sensitivity, threat escalation, or risk. What the measures do share in common is the need for valence weighting.

2. *Neophobia*

We have argued that, when assessing novel hypothetical situations, people must weight and integrate positive and negative information. The findings suggest that those with a more negative weighting bias reach more guarded, more cautious, or generally more negatively-toned judgments of novel situations. Repeated experiences of this sort may lead such individuals to consistently feel apprehensive of unfamiliar people and situations. From such experiences, an accurate self-understanding may develop. Hence, reactions to novelty seemed a domain in which general beliefs about the self might indeed relate to individuals' valence weighting proclivities. To test this reasoning, Pietri et al. (2013a) conducted a study in which the BeanFest paradigm was followed by administration of the General Neophobia Scale (GNS; Pliner & Hobden, 1992). The GNS involves ratings of the extent of agreement or disagreement with such statements as: "I feel uncomfortable when I find myself in novel situations," "I avoid speaking to people I do not know when I go to a party," "I am afraid of the unknown," and "I don't like sitting next to someone I don't know." Just as predicted, a significant correlation was observed ($r = -.30$); those with more negative valence weighting proclivities reported more apprehension regarding novel people and situations.

This particular study had an additional purpose, aimed at establishing discriminant validity. Is it possible that the weighting bias, although estimated from how individuals weight resemblance to a known positive versus resemblance to a known negative, relates to neophobia and reactions to hypothetical situations simply because of its potential covariation with general feelings of self-doubt? People who doubt their ability to make sound decisions may assess hypothetical scenarios in a guarded fashion and they may be apprehensive of the unknown. Such people also may be relatively cautious about endorsing novel beans in BeanFest as positive and, hence, are likely to obtain relatively negative weighting bias scores. To assess this possibility, participants completed the Judgmental Self-Doubt Scale (JSDS; Mirels, Greblo, & Dean, 1992), a measure examining individuals' confidence in their ability to make correct or beneficial decisions. The scale involves ratings of the extent of agreement or

disagreement with such statements as: “I have difficulty making decisions,” “I often have a sense that others know better than I do,” “I often don’t trust myself to make the right decision.” Although self-doubt scores and neophobia scores did indeed correlate substantially ($r = .50$), self-doubt bore no relation whatsoever to the valence weighting score ($r = .06$). Thus, those who weight negative valence more heavily can be just as certain (or uncertain) about their ability to make sound decisions as those who weight positive valence more heavily. Moreover, a multiple regression revealed that both self-doubt and the valence weighting index contributed uniquely to the prediction of neophobia scores. This finding provides some initial evidence regarding the predictive value of the performance-based measure of valence weighting over and above a relevant self-report measure.

3. Risk Intentions and Behavior

Yet another study reported by Pietri et al. (2013a) provided further support for our reasoning that individuals’ attitude generalization proclivities should be more closely related to their assessments of novel situations than familiar ones. This study focused on the prediction of intentions to engage in a variety of risk-related behaviors. Participants completed the Domain-Specific Risk-Taking Scale (DOSPERT; Weber, Blais, & Betz, 2002), which inquires about the likelihood of engaging in 40 different risky behaviors across a variety of domains, including, for example, social (e.g., “Disagreeing with your father on a major issue”), recreational (e.g., “Trying out bungee jumping at least once”), health (e.g., “Engaging in unprotected sex”), and ethical domains (e.g., “Forging somebody’s signature”). As expected, composite scores on the DOSPERT correlated with the weighting bias index ($r = .29$), conceptually replicating what had been observed with respect to risk assessment with the Choice Dilemmas Questionnaire.

However, the DOSPERT scale items were of interest for yet another reason. The scale includes a variety of actions that the typical undergraduate student is likely to have experienced (e.g., “Exposing yourself to the sun without sunscreen”) and others that the typical undergraduate most likely has never

encountered (e.g., “Investing 5% of your annual income in a conservative stock”). To assess such familiarity, an independent sample of students was asked to rate their degree of experience with each risk situation on a scale ranging from 1 (“never been in a similar situation”) to 5 (“been in that exact situation”). Averaging across the ratings provided by these judges, it was possible to sort the items into three categories: (a) those with a mean experiential rating greater than 3 and, hence, very likely to have been experienced (e.g., “Admitting that your tastes are different from those of your friends”), (b) those with a mean rating between 2 and 3 (e.g., “Going camping in the wilderness, beyond the civilization of a campground”, and (c) those with a mean rating less than 2 and, hence, unlikely to have been experienced (e.g., “Chasing a tornado or hurricane by car to take dramatic photos”). The correlations between the participants’ weighting bias scores and their mean behavioral intention ratings for each of these three categories were .00, .18, and a statistically significant .35, respectively. Thus, as expected, the weighting bias related to participants’ assessment of novel behaviors, but significantly less so to their risk tendencies regarding behaviors they were likely to have encountered in the past. For any such situations, individuals can presumably rely upon their past experience when rating their likelihood of taking that risk. For example, if people engaged in a certain risk in the past, they may be likely to take that risk again; or if they had taken the risk but experienced a negative outcome, they may now be wary of the situation.

The data also provided yet another opportunity to examine the unique variance accounted for by the valence weighting measure, over and above the impact of a relevant self-report variable. Participants’ intention scores concerning the more novel behaviors were predicted simultaneously from their weighting bias scores and their intentions regarding the risk situations classified as very likely to have been experienced. Unsurprisingly, riskiness with respect to this latter class of familiar situations was highly related to risk tendencies for the more novel behaviors. However, the weighting bias

predicted responses to the novel risk behaviors over and above this relation between familiar and more novel situations.

A final study by Pietri et al. (2013a) involved, not verbal assessments of risk or reports of likelihood of pursuing a risky action, but actual risk behavior. Participants completed the Balloon Analogue Risk Task (BART) developed by Lejuez and colleagues (2002) as a behavioral measure of risk tendencies. On each trial of the BART, individuals can gain money by pumping a computer image of a balloon with air. The more individuals inflate the balloon, the more value the balloon accrues and the more money they can potentially gain. At any point during a trial, they can decide to stop pumping and collect their earnings. However, if they overinflate the balloon, causing it to burst, they earn nothing. Thus, people must weigh inflating the balloon more in the interest of a larger payoff against the possibility of popping the balloon and receiving nothing. As predicted, those with a more positive weighting bias engaged in riskier behaviors, delivering more pumps to the balloons ($r = .30$).

4. Additional Evidence Regarding Actual Events and Behaviors

Additional research, beyond that involving the BART task, attests to the relevance of the valence weighting measure to situations involving actual events and behaviors. Pietri, Fazio, and Shook (2012) found that the BeanFest measure predicted emotional reactivity to an actually experienced, but novel, stressful event. Participants completed an anagram task that had been framed as a brief test of verbal intelligence. The task required them to complete as many anagrams as possible within three minutes. It began with a fairly easy item that most participants solved, but then progressed through a randomly-ordered set of very difficult and unsolvable anagrams. Participants found themselves “passing” much more frequently than offering an answer, thus creating a failure experience, albeit one whose import was open to interpretation. Mood was assessed both before and after the anagram task. Naturally, the failure experience worsened participants’ mood states. However, the extent to which this happened

varied as a function of valence weighting. Those characterized by a more negative bias in attitude generalization were more upset by the failure experience.

A prospective study by Rocklage, Pietri, and Fazio (2015) provided an especially striking real-world test. The study concerned the idea that valence-weighting relates to individuals' willingness to approach novel stimuli. It focused on the friendship networks that college freshmen developed during their first few months on campus. Early in the Fall semester, students completed BeanFest, as well as a survey that inquired about friends on campus whom they knew prior to arriving and friendships that had developed since their arrival. Eight weeks later, a second survey assessed new friendships that developed since the first session. Naturally, the number of new friends that students listed (by initials) at the beginning of the Fall semester, as well as students' self-reported extraversion, were predictive of the number of new friends they developed during the subsequent eight weeks. However, over and above these variables, individuals with a more positive weighting bias established a more extensive friendship network. Such individuals may have been more willing to initiate interactions with unfamiliar students, more responsive to any overtures they received, and more likely to interpret ambiguous information about the strangers and their actions more positively, all of which could then have contributed to their developing more friendships.

Yet another prospective study examined changes in depressive symptoms among college students beginning a new and potentially stressful academic term (Pietri, Vasey, Grover, & Fazio, 2014). In an initial session held early in the quarter, participants completed both BeanFest and The Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995). The depression subscale of this inventory was the focus of the study. It consists of 14 statements (e.g., "I felt sad and depressed," and "I could see nothing in the future to be hopeful about") that participants are asked to rate in terms of applicability to themselves. Toward the end of the academic term, the students completed the DASS a second time. Naturally, depression scores at Time 1 related to depression scores at Time 2. However, over and above

this, valence weighting scores also predicted later depression symptoms. Students who gave more weight to positive information when generalizing their attitudes were characterized by lower depression scores later in the quarter. Students with a positive weighting bias presumably were reacting better to a new academic term, and in turn experienced fewer depressive symptoms. Interestingly, these effects continued to hold even when controlling for Negative Affectivity as assessed by the trait version of the Positive and Negative Affect Schedule (T-PANAS; Watson, Clark, & Tellegen, 1988), a self-report measure known to be a common correlate of depression. Indeed, Negative Affectivity did predict changes in depression over time, but so did weighting bias scores.

C. The Fundamental Nature of Valence Weighting

The research summarized to this point demonstrates that the way in which individuals weight positive and negative information during attitude generalization relates to how they make evaluative judgments regarding novel objects, events, and situations. Strikingly, this relation has been observed across a wide variety of domains. Individuals' valence weighting proclivities have proven relevant to sensitivity to interpersonal rejection, threat assessment, neophobia, decisions about risky alternatives, intentions to engage in novel risk behaviors, actual risk behavior, emotional reactivity to a failure experience, the expansion of friendship networks, and changes in depressive symptoms. The very breadth of these findings forms the essence of our argument for viewing valence weighting as a fundamental individual difference. The proclivities that characterize individuals as they generalize from their positive versus negative attitudes to novel stimuli have broad implications. This individual difference variable appears relevant to any judgment that requires the integration of positive and negative information. Thus, how individuals engage in the process of attitude generalization can itself be regarded as a fundamental personality characteristic.

III. Some Questions about Valence Weighting

Having offered our case for the importance of valence weighting and the value of assessing attitude generalization via the BeanFest paradigm, we now turn to a series of questions that we have asked about valence weighting – questions that we suspect many readers will have generated themselves.

A. Self-Reports of Valence Weighting Tendencies

Are individuals able to introspect and accurately report the extent to which they weight positive versus negative valence? We suspected not, largely for three reasons. First, it has been our observation based on post-experimental interviews with BeanFest participants that individuals typically cannot articulate the internal processes that led them to classify the novel beans as positive or negative. It is also the case that participants rarely seem accurate in noting how many beans they classified as positive or negative and, hence, appear unaware of the valence biases they exhibit as they progress through the BeanFest task. Second, as we noted earlier, valence in real-world situations is often confounded by differential distinctiveness and diagnosticity. Such natural confounds may make it difficult for individuals to discern how responsive they are to valence per se, as opposed to some correlate thereof. Finally, self-presentation issues always arise when individuals are asked to report beliefs about themselves. Some individuals may not want to believe or acknowledge that they have tendencies in either the Pollyanna direction or the Eeyore direction.

To investigate this question empirically, Pietri et al. (2013a) conducted a study in which a sample of 89 participants completed BeanFest, as well as two relevant self-report measures. The first was a four-item Weighting Bias Questionnaire (WBQ) that was created to inquire directly about individuals' valence weighting tendencies. The items explicitly asked participants about their weighting of positive and negative information (e.g., "To what extent do you tend to give more weight to positive information over negative information?"; "If you see something that has both negative and positive aspects, in general which do you give more weight to?"). Participants also completed the Approach/Avoidance

Temperament Questionnaire (ATQ, Elliot & Thrash, 2010). The ATQ was employed largely because it has been shown to assess a core personality trait and can be considered an “umbrella” measure for a host of related distinctions regarding sensitivity toward positives versus negatives, such as extraversion versus neuroticism (Costa & McCrae, 1992), behavioral activation versus behavioral inhibition systems (Gray, 1987), and promotion versus prevention focus (Higgins, 1997). The ATQ consists of six items asking participants how they respond to positive information or approach temperament (e.g. “Thinking about the things I want really energizes me,” “When good things happen to me, it affects me very strongly”) and six regarding how they respond to negative information or avoidance temperament (e.g. “I feel anxiety and fear very deeply,” “I react very strongly to bad experiences”).

Just as expected, scores on the WBQ correlated significantly with both of the ATQ Scales. People who reported weighting positive information more heavily than negative information had higher scores on the Approach Temperament Scale ($r = .27$) and lower scores on the Avoidance Temperament Scale ($r = -.32$). However, the weighting bias index provided by BeanFest did not relate to any of these self-report measures. Since the Pietri et al. (2013a) study, the laboratory has included the WBQ in many additional studies. The latest aggregated sample includes over 500 participants and has yielded a correlation of essentially zero ($r = -.003$) with the valence weighting measure. Thus, paralleling our observations from the post-experimental interviews, it appears that individuals cannot introspect and report on how they weight valence during attitude generalization. The performance-based index of valence weighting provided by BeanFest appears to capture a process about which individuals have difficulty accurately reporting. We suspect that BeanFest is a useful predictor largely because it utilizes novel stimuli, experimentally associates those stimuli with differing valence, and examines how those attitudes then generalize to yet other novel stimuli. As a result, the performance-based index provides an assessment of valence weighting per se.

Although somewhat of a digression, it may be useful at this point to review briefly what the laboratory has learned about other potential personality correlates of the weighting bias measure. The lack of a correlation with the ATQ scales is not at all atypical. When time in any given laboratory session has permitted, we often have included potentially relevant personality measures in our BeanFest studies. Although the sample sizes vary considerably, null correlations have been obtained with: (a) each of the trait subscales (openness, conscientiousness, extraversion, agreeableness, and neuroticism) of the Big Five Aspects Scale (DeYoung, Quilty, & Peterson, 2007; $n=57$), (b) the same five personality domains using the Ten-Item Personality measure (Gosling, Rentfrow, & Swann, 2003; $n=171$), (c) the extraversion subscale of the Eysenck Personality Questionnaire – Revised (Eysenck & Eysenck, 1991; $n=57$), (d) the Rosenberg Self-Esteem Scale (Rosenberg, 1965; $n=131$), (e) the General Self-Efficacy Scale (Chen, Gully, & Eden, 2001; $n=227$), (f) the BIS/BAS scales (Carver & White, 1994; $n=46$), (g) the Promotion/Prevention Scales (Lockwood, Jordan & Kunda, 2002; $n=46$), and (h) the attachment scales of the Experiences in Close Relationships-Revised Questionnaire (Fraley, Waller, & Brennan, 2000; $n=253$). Earlier we also noted the lack of a correlation with the Judgmental Self-Doubt Scale (Mirels et al., 1992; $n=69$). Essentially, then, questionnaires that assess individuals' beliefs about themselves have not proven to relate to the weighting bias. The exception, as noted earlier, is the General Neophobia Scale, which proved more fruitful, we believe, because individuals are likely to develop an accurate self-understanding on the basis of their consistent reactions to a specific issue like unfamiliar people and situations. Moreover, this domain is closely related to the matter of valence weighting in that any approach-avoidance decision regarding a novel object inherently involves a consideration of potential risks versus benefits.

Unlike questionnaires that inquire about individuals' self-beliefs, a recent advance in the attitudes and personality literature offered by Hepler and Albarracín (2013) appears more related to our interest in and measurement of valence weighting. These researchers have posited that individuals are

characterized by a “dispositional attitude” in the sense that some are more likely to report positive attitudes than negative ones, or vice versa. To assess this individual difference, they developed the Dispositional Attitude Measure (DAM), which asks respondents to report their attitudes toward each of 16 attitude objects (e.g., camping, Japan, rugby, and taxes) on a 7-point scale of favorability. The more positive their attitudes are on average toward these 16 objects, the more positive the individual’s dispositional attitude. Might the DAM relate to our valence weighting measure? As Rocklage and Fazio (2014) noted, a case can be made for such a prediction, based on the notion that individuals with a more negative weighting bias may be more likely to develop and maintain negative attitudes. However, as they also noted, the viability of any such linkage likely depends on the currently unknown mechanisms that might underlie scores on the DAM. A dispositional attitude may stem from multiple forces, instead of, or in addition to, the particular valence weighting mechanism upon which our more process-oriented individual difference measure focuses. Indeed, a recent study by Hatchett and Fazio (2014) involving a sample of 66 participants observed a non-significant correlation of only .08 between the BeanFest weighting bias measure and scores on the DAM. Obviously, the study may lack sufficient power to uncover a potential relation. Nevertheless, the small correlation coefficient leads us to speculate that the DAM may be sensitive to factors in addition to valence weighting, such as the deliberative reasoning that may occur after individuals’ valence weighting proclivities influence their initial evaluative responses (see the next section concerning the “when” question) and the standards that individuals employ when deciding on the appropriateness of such evaluative labels as “extremely favorable” (or “extremely unfavorable”). In any case, further research obviously is needed to clarify the relation between valence weighting and the DAM, as well as that between the weighting bias and the general likelihood of holding positive or negative attitudes toward a diverse and large sample of attitude objects.

B. The “When” Question

When is the individual difference variable upon which we have focused--individuals' valence weighting tendencies--most likely to matter? As noted earlier, valence weighting is integral to the evaluative process whenever an individual must construct a response, i.e., when the entity in question is sufficiently novel that the individual cannot rely upon immediate construals stemming from a single automatically-activated attitude. Some, at least minimal, deliberation is necessary. But, as we shall argue, more extensive deliberation may diminish the impact of the individual's general valence proclivities.

Rocklage and Fazio (2014) proposed a view of valence weighting as a means to an initial default response. Given that the process of distilling and integrating positive and negative features appears to occur across a number of domains, it seems that individuals are likely to become quite practiced at such a valence weighting procedure. As a result, individuals' weighting biases may facilitate their quick appraisal of a novel stimulus and the development of an initial attitude toward it. Under certain circumstances, this evaluative response may prove sufficient for behavioral decisions. That is, the initial appraisal resulting from the weighting bias may provide an acceptable default basis for action toward the object. Rocklage and Fazio sought to illuminate this possibility by considering the circumstances under which individuals' weighting proclivities might prove influential from the perspective of the Motivation and Oppportunity as Determinants (MODE) model (Fazio, 1990; Fazio & Olson, 2014), which maintains that the evaluative processes underlying decisions and behavior vary as a function of individuals' motivation to engage in effortful deliberation and their opportunity to do so (e.g., sufficient time, cognitive resources, or general ability). Individuals' general valence weighting tendencies are likely to influence their initial assessments of a novel stimulus. Whether this suffices as a default basis for action is likely to depend on the individual's motivation and opportunity to engage in further deliberation. If it is the case that valence weighting proclivities influence the formation of initial default

responses, their relation to behavior should be most apparent under conditions characterized by little opportunity or little motivation to deliberate further.

1. Opportunity

To test the importance of the opportunity factor, Rocklage and Fazio (2014) conducted an experiment in which the time that participants had to make decisions was restricted or not. If the weighting bias is appropriately characterized as influencing an initial default response, then participants should rely on this response to a greater extent when they have little time to do otherwise. All participants first completed the BeanFest tasks, so that their valence weighting tendencies could be assessed. They then were introduced to a similar game called DonutFest, in which the donuts varied in color (yellow to red in 10 levels) and in the size of the middle hole (also 10 levels). Unlike what the participants had encountered in BeanFest, in the DonutFest game, learning about a given donut was contingent on approach behavior. This contingency was implemented so that each trial, especially those in the first block of the game when participants had not yet accrued information about the value of donuts of any given color and hole size, would involve a risk. Participants found themselves in the position of weighting the potential positive outcome of earning points and gaining information about the novel DonutFest environment against the relative negative outcome of selecting a potentially harmful donut and losing points in the game. Although the BeanFest game had followed the standard self-paced regimen, when continuing on to DonutFest, half of the participants had 5000 ms to make a decision of whether to approach or avoid each of the novel donut stimuli (essentially an unrestricted time condition) whereas the other half were given only 1000 ms to decide (restricted time condition).

Weighting bias scores interacted with condition when predicting the proportion of trials on which participants decided against approaching a donut, despite the fact that this was the only way to learn its value. Those with a more negative weighting bias avoided more often. However, decomposition of the interaction revealed that this was true only in the restricted time condition. Moreover, the effect

was further moderated by block, indicating that the effect of weighting bias scores within the restricted time condition was especially evident for the first block when the donuts were novel and participants had not yet learned much about which had positive and which had negative values.

The findings indicate that individuals' valence weighting tendencies have a larger impact when they are under time pressure and do not have opportunity for more extensive deliberation. The implication is that behavioral decisions are likely to begin with the construction of an initial evaluative response that is influenced by individuals' valence weighting tendencies. Given greater opportunity, participants apparently updated and modified these initial appraisals as they utilized their developing theories and predictions regarding the visual characteristics of positive versus negative donuts.

2. Motivation

In a subsequent experiment, Rocklage and Fazio (2014) focused on the motivation factor highlighted by the MODE model. Their experimental manipulation was aimed at creating two contrasting conditions that differed in the extent to which they encouraged more extensive deliberation. After completing the BeanFest task and in the context of what was presumably a second study concerning psychology articles that had appeared in the popular press, participants were exposed to three newspaper articles, which they rated on various dimensions. The final article, attributed to The New York Times, constituted the manipulation. In one condition, it was headlined "Trusting gut-reactions leads to the best decisions," and summarized ostensible scientific research showing that following one's intuition or gut-instinct leads to a longer, healthier, and more successful life. The headline in the other condition read "Overcoming gut-reactions leads to the best decisions" and the article reported evidence indicating that overriding one's intuition yielded these same benefits. Immediately thereafter, participants were introduced to what was ostensibly a third study in which they completed the BART task described earlier. Recall that the BART focuses on the number of times participants are willing to pump up a virtual balloon in order to increase its value. Participants have to

weigh the risk of popping the balloon and receiving no points from that round, against pumping the balloon fewer times, but also earning fewer points. As anticipated, the motivation condition interacted significantly with participants' weighting bias scores in predicting their pumping behavior. Those who had been exposed to an article touting the benefits of following one's intuitions showed the hypothesized relation. A more positive weighting bias was associated with greater risk-taking as indicated by more pumping. No such relation was observed among those who had been motivated to override their initial responses. Thus, the findings provide additional evidence for a view of individual differences in the weighting of positive versus negative valence as critical to the construction of an initial default response that can inform decision making, if one is not motivated to engage in further deliberation.

C. More on the “Why It Matters” Question: Implications for Attitude Change versus Maintenance

We already have summarized some research findings that highlight why valence weighting matters, by illustrating the relevance of the individual difference to such consequential outcomes as friendship networks, emotional reactivity, and depressive symptoms. We now turn to a chain of reasoning, and an experimental test of the reasoning, that elucidates an especially important downstream consequence of valence weighting biases – their implications for achieving an accurate understanding of a novel environment. As noted earlier, willingness to sample is absolutely critical in situations in which information gain is contingent on approach behavior. Exploratory behavior is essential to overcoming invalid assumptions about novel objects and learning their true value. The BeanFest experiment that was described earlier on culturally-transmitted prejudices illustrates this nicely (Fazio et al., 2004). People are likely to overcome invalid positive prejudices, because the assumption of positivity promotes approach behavior, but they are unlikely to overcome invalid negative prejudices because the negativity leads to avoidance behavior. In other words, negative

attitudes are maintained because they are not subjected to the sort of testing that would provide information indicative of their invalidity and, hence, motivate attitude change.

Rocklage and Fazio (2014) reasoned that such maintenance of negative attitudes would be particularly true for individuals with a more negative weighting bias. They would give greater weight to any initial information hinting at an object's potential negativity, likely heed that information, and hence, engage in more avoidance behavior. If the negative information was actually incorrect, their failing to explore these stimuli fully would lead to the maintenance of the mistaken view. Conversely, those with a positive weighting bias may give less weight to this negative information, engage with the stimuli to a greater extent, and thereby acquire a more accurate view.

To test this reasoning, the experimenters had BeanFest participants play a variation of the BART in which the balloons varied in color, although not in any other way. Prior to actually playing, participants were provided with handwritten reports from a pair of "first-generation partners" who had played the game earlier. In response to a question on the form that invited suggestions regarding the balloon game, one of these players advised that one particular balloon color seemed very strong, capable of being pumped extensively and, hence, was a "good" balloon. The player did admit that sometimes balloons of that color popped early, but asserted that they were strong in general. The other player indicated that another color balloon seemed very weak and, hence, a "bad" balloon. This information was meant to prejudice participants' initial attitudes toward the two balloon types, despite the fact that the two did not actually differ in strength. Indeed, the questions of interest were whether these invalid "hints" would affect participants' pumping behavior and, ultimately, their assessments of balloons of each color. They did, but more so for individuals with more negative valence weighing tendencies.

In general, participants pumped the "good" balloon much more than the "bad" balloon, with balloons of the three colors about which the participants had not received any initial biasing information

(“neutral”) falling in the middle. However, the pumping data revealed an interaction between individuals’ weighting bias scores and the good versus bad balloons (see Figure 4). Those with a more negative weighting bias differentiated between the two much more so than did those with a more positive weighting bias. The former pumped the supposedly “bad” balloon very minimally, whereas those with more positive valence weighting tendencies pumped the “bad” balloon similarly to how they pumped the “neutral” balloons. In other words, those with a more negative weighting bias showed more evidence of heeding the previous generation’s admonition regarding the “bad” balloon.

The differential pumping behavior ultimately produced a different understanding regarding the balloon environment. At the end of the BART, participants were asked to evaluate each of the different colored balloons with respect to such dimensions as how dangerous, safe, unpredictable, positive, or negative they were. Again, an interaction was evident between the supposed balloon valence and participants’ valence weighting scores (see Figure 5). A more negative weighting bias was associated with more disparate evaluations, whereas participants with a more positive weighting bias showed no significant differentiation between the balloon types. Given that there was actually no difference between the balloon types, this means that those with a more positive weighting bias uncovered the truth, whereas those with a more negative weighting bias continued to believe the misleading information they had been transmitted.

Thus, a more negative weighting bias can lead to greater acceptance of even tentative information suggesting that a novel object might yield negative outcomes. Because they are less likely to put a hypothesis involving negativity to the test, individuals characterized by negative valence weighting will maintain their initial negative beliefs. Those with a more positive weighting bias seem more willing to entertain the possibility that the negative warning is inaccurate, approach and explore the associated stimuli more fully, and thereby overcome the initial false information. The end result is that individuals

can leave an initially novel environment with entirely different perceptions of how threatening and risky it is to interact with the stimuli, despite the fact that they received the exact same initial information.

D. The Causality Question: Recalibrating Individuals' Valence Weighting Tendencies

We have reviewed a considerable amount of evidence demonstrating that the process-oriented individual difference on which we have focused predicts judgments and behavior across a wide variety of domains. It must be recognized, however, that all of this research is correlational in nature. Does the valence weighting individual difference exert a causal influence on judgments, or might the observed correlations simply stem from a common dependence on some third variable?

It seems likely that how individuals weight positive and negative information in attitude generalization would exert a causal influence on how they assess novel judgmental situations. One means of demonstrating this theoretical causal direction is to experimentally manipulate attitude generalization tendencies and then test whether the manipulation affects subsequent judgments. Pietri, Fazio, and Shook (2013b) pursued exactly this approach. Their work was inspired by the success of cognitive modification paradigms first introduced by Macleod et al. (2002) that have been used to train anxious individuals to direct attention away from threatening stimuli. Such attentional training procedures have yielded subsequent decreases in anxious symptoms (e.g., Amir et al., 2008; Amir, Taylor, & Donohue, 2011; Dandeneau et al., 2007). Thus, Pietri et al. aimed to recalibrate participants' attitude generalization tendencies regarding novel beans in the BeanFest environment and then examine how such a manipulation would influence attitude generalization proclivities beyond BeanFest. Across four experiments, they found evidence that recalibrating individuals toward more equal weighting of positive and negative information in their attitude generalizations regarding the novel beans influenced subsequent judgments concerning various novel situations.

1. The Recalibration Procedure

The procedure began with participants playing the usual BeanFest game, with the exception that it involved a simplified matrix. Instead of presenting beans from 6 different regions of the matrix during the game, only beans from each of the four corners of the matrix (10 from each corner) were involved during the game phase. This was done for two reasons. First, given the interest in generalization, the researchers wanted to ensure nearly perfect learning of both positive and negative beans. The simplified matrix, along with a classification practice exercise, accomplishes that. In a typical experiment, participants classify 90-95% of the game beans correctly. Second, the structure of the matrix allows for the objective classification of each of the novel beans as more closely resembling either positive or negative game beans, for the matrix can simply be divided into quadrants.

After participants played the game (and, hence, learned the value of the game beans), the test phase began. Each of the 100 beans from the matrix (i.e., the 40 game beans and the 60 novel beans that had not been presented during the game) was displayed on a random basis and participants had to decide whether the bean would have been good or bad during the game. Participants' responses to the novel beans require their consideration of each bean's resemblance to the previously learned positive and negative game beans and, hence, reflect their attitude generalization tendencies. It was these responses that we sought to modify. Hence, the recalibration manipulation occurred during the test phase. Approximately half of the participants were assigned to the recalibration condition, and the other half to the control condition. In the recalibration condition, after participants indicated whether a given bean was good or bad, they received feedback about their decision. If participants classified the bean correctly, they were presented with "Correct! This was Positive (or Negative)!!" If participants incorrectly classified the bean, the message would read "Error! This was Positive (or Negative)!!" Such feedback was presented for every single bean. In contrast, the control condition received no feedback; the participants simply classified each bean as it was presented.

The recalibration procedure does something for participants that the real world rarely does – provide repeated feedback as to whether one is weighting positive versus negative appropriately. In each of the four experiments conducted by Pietri et al. (2013b), immediate effects of the recalibration feedback were evident. Whereas those in the control condition displayed the typical generalization asymmetry in that they classified significantly more novel beans negatively than positively, those in the recalibration condition did not. Moreover, signal detection analyses revealed that those in the recalibration condition classified the positive and negative novel beans more accurately than those in the control condition. Thus, participants were trained to give more equal weight to positive and negative resemblances, which led to their more accurately classifying the novel beans. More interestingly, effects of recalibration were observed on outcome variables beyond the BeanFest environment. Across the experiments, these measures included: (1) attitude generalizations regarding other novel visual stimuli (novel donuts from a “DonutFest” game varying in resemblance to donuts that participants had learned to be positive or negative), (2) interpretations of hypothetical ambiguous situations (e.g., “Your supervisor calls you into the office. Why?” Does the supervisor intend to “promote you,” have “a question for you,” or plan to “fire you?”), (3) risk apprehension, as operationalized by responses to a modified version of Wallach et al.’s (1962) Choice Dilemmas Questionnaire (greater concern about pursuing a high risk but high payoff option relative to a low risk but low payoff option, e.g., accepting a high paying job with an uncertain future as opposed to remaining in a current low paying but secure position), and (4) actual risk behavior, as operationalized by risk-taking in the BART (inflating an imaginary balloon more so as to increase its monetary value as opposed to ceasing and collecting earnings for that trial before the balloon bursts).

Indeed, in each experiment, Pietri et al. observed an interaction between condition (recalibration versus control) and a proxy measure of individuals’ initial valence weighting tendencies. The proxy was the number of times participants selected a bean during the very first block of the

BeanFest game. Each such selection represents gambling on whether the bean will increase or decrease one's points. The extent of such risky approach behavior during the first block has been found to correlate at .50 with the standard measure of valence weighting (Rocklage, Pietri, & Fazio, 2014). The observed interactions involved initially cautious participants coming to weight positive valence more strongly as a result of recalibration and the initially risky weighting negative valence more strongly, relative to control participants. Thus, the initially cautious participants who underwent the recalibration procedure (1) were relatively more positive in their classification of novel donut stimuli, (2) offered relatively more positive interpretations of ambiguously-described events, (3) expressed relatively less apprehension concerning high risk but high payoff decision alternatives, and (4) engaged in riskier behavior, pumping balloons in the BART task more extensively. In contrast, recalibration promoted change in the opposite direction among the initially risky participants, making them more cautious.

A more recently completed experiment assumed even more of an intervention posture (Pietri & Fazio, 2014). Individuals likely to display problematic overweighting of negative valence relative to positive valence were identified and recruited for participation in the experiment. Specifically, eighty students who had scored in the upper quartile of the distribution of scores on the Rejection Sensitivity Questionnaire (RSQ) during an initial prescreening session participated. Thus, the sample consisted of individuals characterized by a hypersensitivity to the possibility of interpersonal rejection. After coming to the laboratory and undergoing either the recalibration or control procedure, they completed the RSQ again. Naturally, in the control condition, a substantial correlation was observed between initial RSQ scores and the post-experimental scores. That relation was attenuated in the recalibration condition. Indeed, a regression analysis yielded both a main effect of condition and an interaction with initial scores. Recalibration reduced rejection sensitivity, and did so all the more for those higher in initial sensitivity. At an initial RSQ score one standard deviation above the mean in the experimental sample, the simple effect of recalibration was statistically significant. One week later, 67 of the 80 participants

responded to an email request to complete the RSQ yet again. The effect of recalibration persisted.

Thus, the findings provide initial evidence that individuals who are overly sensitive to the possibility of rejection can be recalibrated to weight negative valence to a lesser degree and subsequently exhibit reduced sensitivity to rejection.

These experiments point to the potential value of the recalibration procedure as an intervention tool. The recalibration paradigm may especially benefit individuals with valence weighting tendencies that are extreme, in either the positive or the negative direction. Recalibrating people with a strong negative weighting bias may prove beneficial for their subjective well-being. Similarly, recalibration may promote a greater concern for safety among individuals who too frequently engage in risky actions. Any such potential remains to be tested more extensively in future research. However, in terms of their theoretical significance, these experiments are critical. The findings establish the *causal* influence of valence weighting tendencies on individuals' assessments of novel situations. Thus, they provide additional reason to believe that valence weighting should be regarded as a fundamental individual difference.

IV. Valence Asymmetries in Attitude Learning

The main focus of this chapter is on the weighting bias in attitude generalization. However, as noted earlier, valence asymmetries in attitude formation also have been observed and assessed utilizing the BeanFest paradigm. In the next sections, we will discuss individual differences related to the formation of attitudes, specifically asymmetries in the development of attitudes toward the positive and negative game beans. To preview the discussion, under certain specifiable conditions, a valence asymmetry in attitude learning can emerge as a function of the weighting bias itself. Under other conditions, we argue, variability in the differential learning of positive versus negative attitudes represents yet another fundamental individual difference, what we refer to as the *learning bias*. We will

summarize research concerning correlates of this learning bias and speculate on how and why it may be distinct from the valence weighting bias on which we have focused.

A. Learning Asymmetry as a Function of Differential Sampling Behavior

As noted earlier in our discussion of the findings regarding environments in which information gain is contingent on approach behavior, an asymmetry in learning may arise from differential sampling behavior. Often, environments do not provide individuals with information as to whether a stimulus is truly good or bad unless they are willing to approach it and experience its value. In this way, approaching novel stimuli leads to gaining information and, in the long run, a more accurate understanding of the novel environment. Avoiding, on the other hand, leads to no information gain and can therefore lead to a more biased, often more negative, understanding of the novel environment. If individuals believe a novel stimulus to be positive, for instance, they will likely approach this stimulus and therefore learn its true value. If individuals believe a novel stimulus to be negative, however, they will likely avoid it and therefore maintain their currently held belief that the stimulus is negative as they received no additional information. In many situations, this can lead individuals to maintain the false belief that a stimulus is negative when it is in fact positive. This biased sampling creates an asymmetry in learning such that positives are not learned as well as negatives.

1. The Role of Valence Weighting

We already have reviewed a considerable amount of evidence documenting the critical importance of the structural contingency between approach behavior and information gain for the emergence of a learning asymmetry. As summarized earlier (Fazio et al., 2004, Experiment 5), participants found it difficult to overcome invalid information that a bean was negative because that invalid belief promoted avoidance behavior. By not sampling, participants never learned the truth and maintained the transmitted prejudicial belief that the bean was harmful. Invalid positive beliefs, on the other hand, were overcome, because those transmitted prejudices promoted sampling.

However, as also noted earlier, the decision to approach a novel stimulus is itself a function of valence weighting tendencies. A novel stimulus can bear some degree of resemblance to objects toward which one had a positive attitude and to objects toward which one has a negative attitude. Thus, attitude generalization and valence weighting are critical for approach-avoidance behavior and, therefore, the development of an asymmetry in learning. The influence of individual differences in valence weighting is known to be especially strong when individuals are neither motivated nor have the opportunity to deliberate extensively. Their importance was especially apparent when participants were induced to trust their initial intuitions or when their behavioral decisions were rushed. In these cases, those with a more positive weighting bias were more likely to explore the novel stimuli, i.e., to sample novel “donuts” more frequently or to pump novel balloons more extensively (Rocklage & Fazio, 2014, Experiments 1 & 2). Moreover, individuals with a more negative valence weighting bias were found to place more credence in an invalid transmitted suggestion that a particular colored balloon was weak and should not be pumped extensively. They pumped balloons of that color less extensively than did participants with a more positive weighting bias and, consequently, displayed more persistent beliefs in the truth of the invalid negative suggestion (Rocklage & Fazio, 2014, Experiment 3).

The relevance of valence weighting to sampling behavior is also evident in other research findings that were summarized earlier. In various studies, valence weighting has been found to correlate with individuals’ apprehension regarding unfamiliar people, situations, or risks (Pietri et al., 2013) and with the development of friendship networks during college students’ first semester on campus (Rocklage et al., 2014). By encouraging exploratory behavior in a novel environment, a more positive weighting bias generally promotes information gain. As a consequence, it also lessens the likelihood that asymmetries in attitude learning will arise from the structural contingency associated with approach versus avoidance behavior.

2. Political Ideology

The extensive and growing literature on political ideology led Shook and Fazio (2009) to hypothesize that ideology may be associated with sampling behavior and the subsequent emergence of an asymmetry in the learning of positive versus negative attitudes. Considerable evidence suggests that political conservatives tend to perceive the world as more dangerous or threatening than do liberals and that political liberals tend to be more open to new experiences than are conservatives (see Jost, Glaser, Kruglanski, & Sulloway, 2003, for a review). Such findings imply that there may be a fundamental difference in the way that political conservatives and liberals choose to explore novel environments and test new stimuli. Shook and Fazio (2009) tested this possibility in a study involving the contingent feedback version of BeanFest. Politically conservative participants pursued the game in a more cautious manner. They approached fewer beans during the course of the game than politically liberal participants did ($r = -.30$). When their understanding of the various game beans was later tested, politically conservative participants exhibited better learning of the negative beans than the positive beans, compared to politically liberal participants (who learned about the two valences more equally). The relation between political ideology and the asymmetry in the learning of the game beans ($r = -.28$) was fully mediated by the differential sampling behavior during the game. That is, political conservatives approached fewer stimuli, thus gaining less information, than liberals. As such, they were unable to correct negative misconceptions, which resulted in their relatively poorer identification of positive stimuli, compared to liberals.

Presumably, the more extensive sampling behavior displayed by the more liberal individuals stemmed from their being characterized by more positive valence weighting proclivities. A more recent study involving the full-feedback implementation of BeanFest provided the opportunity to assess the weighting bias variable via our standard measurement system (Shook & Clay, 2014). Participants who endorsed more conservative political beliefs exhibited a significantly more negative weighting bias than those who endorsed more liberal political beliefs ($r = -.22$). That is, when classifying the novel beans,

political conservatives weighted resemblance to negative game beans relatively more heavily than resemblance to positive game beans, compared to political liberals.

In sum, we have reviewed a variety of evidence from the BeanFest paradigm indicating that selective sampling behavior in novel environments can lead to an asymmetry in attitude learning. In doing so, we also explicated the connection between the weighting bias and sampling behavior. In essence, individuals' valence weighting tendencies are a major contributor to their exploratory behavior. Those with a more positive weighting bias (and those who are more politically liberal) are more likely to approach and fully test a novel environment, thereby learning the true value of stimuli, and therefore obtaining a more accurate understanding of them. They are less likely to show an asymmetry in learning in a context in which the acquisition of information is contingent on approach behavior. They will also, however, be more likely to incur negative outcomes along the way as they sample more stimuli that turn out to be negative. Those with a more negative weighting bias (and those who are more politically conservative) are more likely to avoid novel stimuli within an environment, not learn the true value of stimuli, and show an asymmetry in learning such that, upon leaving an environment, they may mistakenly believe that environment to include relatively more negative stimuli than positive ones. They are, on the other hand, also less likely to incur negative outcomes along the way.

B. The Learning Bias

As we have seen, variability in the differential learning of positive versus negative attitudes can arise as a function of individuals' valence weighting tendencies in a context involving the contingency between approach behavior and information gain. However, such variability also can emerge in contexts that lack such a contingency, i.e., in situations in which information about the value of a stimulus is available on each and every exposure to the object, irrespective of any approach-avoidance decision. In such a case, any learning asymmetry that is observed represents, not the outcome of the information acquired through sampling, but individuals' responsiveness to the information that they have received

about the object's positive or negative value. As noted earlier, this *learning bias* can be viewed as yet another fundamental individual difference. This valence bias is most appropriately assessed via the full-feedback version of the BeanFest game, when learning the value of the bean is not contingent upon approach behavior. With such an implementation, differential learning reflects participants' responsiveness to information about the harmful or beneficial point value associated with a given bean. Thus, individuals who have a negative learning bias show a negative learning asymmetry in that they remember the negative beans better than the positive. To index the learning bias, we simply calculate the difference between the proportion of positive and the proportion of negative game beans they correctly classify during the test phase of BeanFest. We have observed some interesting correlates of this individual difference variable.

1. *Emotional Disorders*

Shook, Fazio, and Vasey (2007) argued that the learning bias may be particularly relevant in the domain of psychological well-being, given that theories of depression and anxiety emphasize pervasive rumination about negative events (Abramson, Metalsky, & Alloy, 1989; Beck, 1987; Riskind, 1997). For this reason, it seemed plausible that a tendency to learn negative beans better than positive might be related to emotional disorders. To test this reasoning, Shook et al. (2007) had participants complete various indicators of vulnerability to developing depression and anxiety after playing the full-feedback version of BeanFest. Specifically, participants completed the Cognitive Styles Questionnaire (CSQ; Abramson et al., 1998), in which they rated their reactions to various positive and negative situations. In prospective studies, the CSQ has reliably predicted major depressive episodes (Alloy et al., 2006). Participants also completed the Beck Depression Inventory-II (BDI; Beck, Steer, & Brown, 1996), and the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) to assess their general level of depression and anxiety, respectively. Generally speaking, the learning bias related to each of these three measures (significantly in the case of the CSQ). That is, participants who exhibited better learning of

negative beans than positive beans in BeanFest were more predisposed to depression and anxiety based on their scores on the self-report measures. Interestingly, these relations were driven by relatively poor classification of the positive beans, rather than by relatively better learning of the negative beans. None of the self-report measures correlated with the proportion of negative beans that participants classified correctly. However, the proportion of positive beans classified correctly correlated significantly with all three measures (r 's of -.48, -.42, and -.30, for the CSQ, BDI, and BAI, respectively). Thus, individuals with vulnerabilities towards developing depression or anxiety displayed a lack of appreciation for the positive beans they had encountered during the BeanFest game.

Although this study provided initial evidence for a relation between the learning bias and emotional disorders, its relevance is somewhat limited given that the sample was comprised of healthy college students. Thus, in a follow-up study, Conklin, Strunk, and Fazio (2009) recruited clinically-depressed participants in order to examine whether they too would show this under-appreciation for positive stimuli. These participants were screened using the Structured Clinical Interview for the DSM-IV (SCID; First, Spitzer, Miriam, & Williams, 2002) and met the clinical criteria for major depressive disorder. A control group of participants with low depressive symptoms as measured by the Beck Depression Inventory-II (Beck, Steer & Brown, 1996) and the Hamilton Rating Scale for Depression (Hamilton, 1960; Williams, 1988) also was recruited. Both groups of participants came into the laboratory and played the full feedback version of BeanFest. The depressed participants had a negative learning bias (i.e., their learning bias scores were significantly below 0), whereas the non-depressed participants were characterized by a neutral learning bias. However, again, the negative learning bias was driven by a lack of appreciation of the positive beans. There was no difference between the depressed and non-depressed group with respect to their learning of negative beans, but the depressed group showed significantly poorer learning of positive beans than the non-depressed group. Furthermore, within the depressed group, participants experiencing more severe depressive episodes as

measured by the SCID displayed poorer learning of the positive beans than did participants with less severe episodes ($r = -.52$). Thus, in both a healthy college sample and a sample meeting the criteria for major depressive disorder, a relation was observed between difficulty in learning the positive game beans and depression symptoms (Conklin et al., 2009; Shook et al., 2007).

2. Trait Happiness

Because a more negative learning bias correlated with depression and anxiety, it also seemed likely that a positive learning bias might be associated with beneficial outcomes and positive flourishing. Therefore, subsequent research examined the relationship between the learning bias and happiness (Pietri, Fazio, & Turowski, 2014). Specifically, participants played BeanFest, and then completed the Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999), which measures individuals' dispositional tendencies to feel happy. There was a significant correlation between the learning bias and trait happiness ($r = .28$), such that happier individuals correctly identified more positive beans relative to negative than less happy individuals.

A second study replicated the finding ($r = .42$) and explored a potential mechanism responsible for the learning bias' relation with trait happiness. Researchers have found that when happy individuals reflect back on a good event or time in their lives, they tend to savor the occurrence, whereas unhappy people focus on how different their current life situation is from that happy occurrence. When remembering a negative event, unhappy individuals tend to ruminate about the event and feel bad, whereas happy people think about the improvements in their current lives since that event (Lieberman, Boehm, Lyubomirsky, & Ross, 2009). Because the learning bias indexes how well individuals remember positive versus negative beans, happy individuals' more positively-oriented memory processes (i.e., their savoring of past positives and contrasting away from past negatives) may relate to their positive learning biases in attitude formation. The second study assessed these valence memory tendencies using the Positive and Negative Endowment and Contrast Scale (Lieberman et al., 2009). In line with previous

research, participants high in subjective happiness reported more positive memory processes than less happy participants ($r = .82$). Less happy individuals indicated that they ruminated about negative memories and contrasted away from positive memories, whereas happier individuals indicated they savored positive memories and contrasted away from negative memories. These positive memory processes were, in turn, associated with a more positive learning bias ($r = .42$).

Obviously, the research that we have reviewed on the learning bias, emotional disorders, and happiness is correlational in nature. As a result, the findings do not speak to whether a positive learning bias caused individuals to feel less depressed and happier, or whether happier individuals tend to learn positive outcome information relatively more readily than negative information. Phrased in terms of negativity, individuals with poorer psychological well-being may be relatively less inclined to focus on and rehearse positive information, or individuals who consistently form and remember negative attitudes better than positive ones may be more vulnerable to developing depressive symptoms and unhappiness. Most likely, the relation is both reciprocal and recursive.

3. Mindfulness and the Learning Bias

Research with stronger causal implications has been conducted by Kiken and Shook (2011), who focused on the possibility that improved psychological well-being might affect the relative learning of positive versus negative outcome information. These researchers utilized a mindfulness induction, during which individuals maintain a state of awareness of their environment and current experiences (Brown, Ryan, & Creswell, 2007). Researchers have found that inducing participants to adopt a state of mindfulness decreases symptoms of depression and anxiety and enhances reports of general well-being (Brown et al., 2007). In this experiment, participants underwent either a 15-minute mindful breathing exercise, or what is a standard control condition in such research, an unfocused attention exercise, in which they were told to let their mind wander freely (e.g., Arch, & Craske, 2006). All participants then completed the non-contingent version of BeanFest. The mindfulness group exhibited a more positive

learning bias than the unfocused attention control group. Furthermore, the learning of positive beans drove this difference. Participants in the mindfulness condition learned the positive beans better than did participants in the control group, but the two conditions did not differ in their learning of the negative beans. Thus, this experiment suggests that improved psychological well-being may in fact cause relatively better learning of positively-valenced stimuli. Although no empirical work yet speaks directly to the possibility, we also believe that changes in individuals' learning bias may exert a causal influence on psychological well-being.

C. Distinctions between the Weighting Bias and the Learning Bias

As must be very evident, all of the observed correlates of both the weighting bias and the learning bias center around valence (e.g., depression, happiness, the potential positive and negative outcomes associated with risky actions, etc.). However, the weighting bias and the learning bias do not correlate indiscriminately with any variable associated with valence. For example, in the initial weighting bias research reviewed earlier (Pietri et al., 2013a), the learning bias did not correlate with any of the outcome variables (e.g., rejection sensitivity, threat assessment, neophobia, or risk tolerance). Furthermore, in the more recent trait happiness research, the weighting bias did not correlate with trait happiness or the valence memory measures (Pietri, Fazio, & Turowski, 2014). At one level, these findings are unsurprising. Our approach to the calculation of the weighting bias controls for the learning of positive and negative beans, thus making the weighting bias and learning bias variables orthogonal to one another. Given that they are distinct variables, it is not surprising that one correlates with some outcome variable whereas the other does not. Nevertheless, this independence raises important questions. What should each valence bias uniquely predict? And what is the theoretical reasoning that might underlie any such differential relations?

Although definitive data are lacking, the very nature of these two valence biases, as well as the findings observed for each, allow us to theorize about the potential differences. Recall that the learning

bias is estimated via a BeanFest implementation that provides feedback about a bean's valence irrespective of sampling behavior. Hence, it is not a reflection of the differential valence weighting observed when individuals are assessing the extent to which a novel entity bears resemblance to a known positive versus a known negative. Instead, the learning bias focuses on the responsiveness to valence information once it has been received. The event, i.e., the appearance of a given bean, has occurred and has now concluded. The feedback, i.e., whether the bean is harmful or helpful, is definitive and unambiguous. What the individual then does with this information is the issue. Does the individual associate the outcome information with the specific bean and rehearse that association sufficiently that the attitude is likely to be activated when that specific bean or a very similar one is presented later? In real world settings, the parallel would involve the rehearsal or re-experiencing of positive or negative events after they have occurred, ruminating about a negative experience or musing about a joyful one. Thus, in temporal terms, the focus of the learning bias is inherently upon the past. Once clearly valenced outcome information has been received, individuals vary in the extent to which they cogitate about, dwell upon, or more generally, show evidence of having been impacted by the positive versus a negative experience. Some are relatively more responsive to positive occurrences, whereas others react more strongly to negative occurrences. These tendencies are reflected in the findings noted earlier regarding the valence memory processes reported by individuals of varying trait happiness. Happier people exhibit a relatively more positive learning bias, and both of these individual difference variables are themselves associated with tendencies to muse relatively more about past positive occurrences and to be relatively more dismissive of past negative events. Such rumination tendencies are central not only to the experience of happiness, but also depressive symptoms.

In striking contrast, the weighting bias concerns stimuli whose valence is ambiguous. The focus is on the appraisal of novel stimuli that vary in their resemblance to stimuli known to be positive or known to be negative. Weighting and integrating those positive and negative resemblances into an

overall assessment is the task at hand. The focus is on the current appraisal of an unknown entity (a novel bean). In the real world, events that are just unfolding, have yet to begin, or are hypothetical at that given point in time are characterized by this uncertainty regarding their likely valence. It is such entities that require the weighting of positive versus negative resemblances when, for example, one needs to arrive at an appraisal in order to accommodate an upcoming decision to approach or avoid. Thus, in temporal terms, the weighting bias is oriented toward the present and the future. Indeed, the findings that we have reported regarding the weighting bias highlight this central element of novelty. We have observed systematic variation as a function of individual differences in valence weighting when the outcome measures focus on the assessment of novel objects or situations. The appraisal of such entities shares the same fundamental process--distilling and weighting positive versus negative valence--that is captured by attitude generalization within the BeanFest task. In sum, our theorizing leads to the proposition that the weighting bias should be more likely to relate to assessments of novel or future events, whereas the learning bias should be more likely to relate to judgments about past experiences and the self-beliefs that those judgments subsequently influence.

As emphasized earlier, at the measurement level, the weighting bias and the learning bias are orthogonal to one another. At first blush, such independence may not seem appropriate at the conceptual level. Would we not expect people who overweight resemblance to a known negative when judging a novel stimulus to also show evidence of having been impacted more strongly by information that a given stimulus is negative? Shouldn't whatever developmental forces are responsible for a more negative weighting bias also foster a more negative learning bias?

Given our conceptual framework, these are questions about valence asymmetries in attitude *formation* versus attitude *generalization*. They also are complex questions that require a much deeper understanding of the developmental dynamics than is currently available. Yet, a consideration of the temporal dynamics and forces that are likely to influence attitude formation processes versus

generalization processes does suggest that the two asymmetries have the potential to arise differentially. The key dynamic is that attitude generalization processes may come to affect attitude formation processes. That is, individuals' valence weighting bias may exert an influence on the extent to which they develop and display a learning bias. Consider an individual who tends to overweight positive valence when assessing novel stimuli. This individual is likely to develop a positive expectancy about the entity and approach it. But, what if the end result is a negative experience? Surprising, expectancy disconfirming events are salient; they are known to promote attention and deliberation (e.g., Hastie, 1980; Srull & Wyer, 1989; Stangor & McMillan, 1992). Thus, the individual's very own weighting tendencies are likely to make negative outcomes, when they do occur, all the more salient and impactful. Repeatedly confounding salience and negativity in this way could lead the individual to respond more strongly to negative outcome information, even though the person weights resemblance to a positive more heavily than resemblance to a negative.

A parallel dynamic may unfold for an individual with a negative weighting bias. Although that negativity will lead the individual to be very cautious about approaching a novel object or situation, when the person does, he or she may experience a surprisingly positive outcome. Thus, this person's weighting bias may make positive events all the more unexpected, salient, and impactful. The person may come to savor these unanticipated pleasures and, thus, develop a relatively positive learning bias, despite the negative weighting bias.

The literature on affective forecasting also points to this possibility of relative independence between the learning bias and the weighting bias, especially in light of our argument that the latter is more future-oriented than the former. Individuals tend to predict that they will feel an emotion in the future more strongly than is actually the case (Gilbert, Pinel, Wilson, Blumber & Wheatley, 1998). This discrepancy is thought to arise because, when a positive or negative event occurs, people make sense of the event, rationalizing the experience to fit relevant schemas. As a result of these processes, the

situation seems more normal and less emotionally evocative. However, people tend not to realize that they have such rationalization tendencies and, hence, fail to account for their likely impact when making predictions about their future emotions (Gilbert et al., 1998). Such findings suggest that how positively or negatively individuals think about a future event, which should relate to their valence weighting bias, need not cohere with their rationalized reflections about events that already have occurred, which may relate more strongly to their learning bias.

V. Conclusions

The major focus of this program of research has concerned the valence asymmetries that arise when individuals form and generalize attitudes. The research has indicated that clear individual differences exist in both of these processes. When provided with valence information about objects in their environment, some individuals learn that object-evaluation association more strongly when positivity is involved, whereas others respond more strongly to negative information. This variability results in what we call the *learning bias*.

Attitude generalization is all the more critical and has occupied most of our attention in the research program, largely because the appraisal of any novel object, person, or situation can be regarded as an exercise in attitude generalization. To what extent does the novel target resemble entities toward which the individual has a pre-existing positive attitude? To what extent does it resemble an entity involving a negative attitude? Which generalizes more strongly, the positive or the negative attitude? Judgments of novel entities require the distillation and integration of positive and negative resemblances. Systematic variability is evident in this process of attitude generalization and, hence, in the extent to which individuals weight positive versus negative valence when assessing novel objects, which we refer to as the valence *weighting bias*.

As we have seen, these valence proclivities can be assessed via the BeanFest paradigm, which has the advantage of providing a performance-based measure and, hence, does not require individuals

to introspect and report on their valence tendencies. The predictive power of these estimates across a wide variety of judgment domains leads us to view the learning bias and the weighting bias as fundamental individual differences. As such, the research program links basic attitudinal processes to personality. It illustrates the value of viewing personality not solely as a bundle of unobservable traits or self-reported beliefs about oneself, but as systematic variability in fundamental processes of evaluation. Although many more research questions remain to be addressed, the findings to date highlight the value of such an approach and, we hope, will spark further interest in the fundamental process of valence weighting.

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Figure Captions

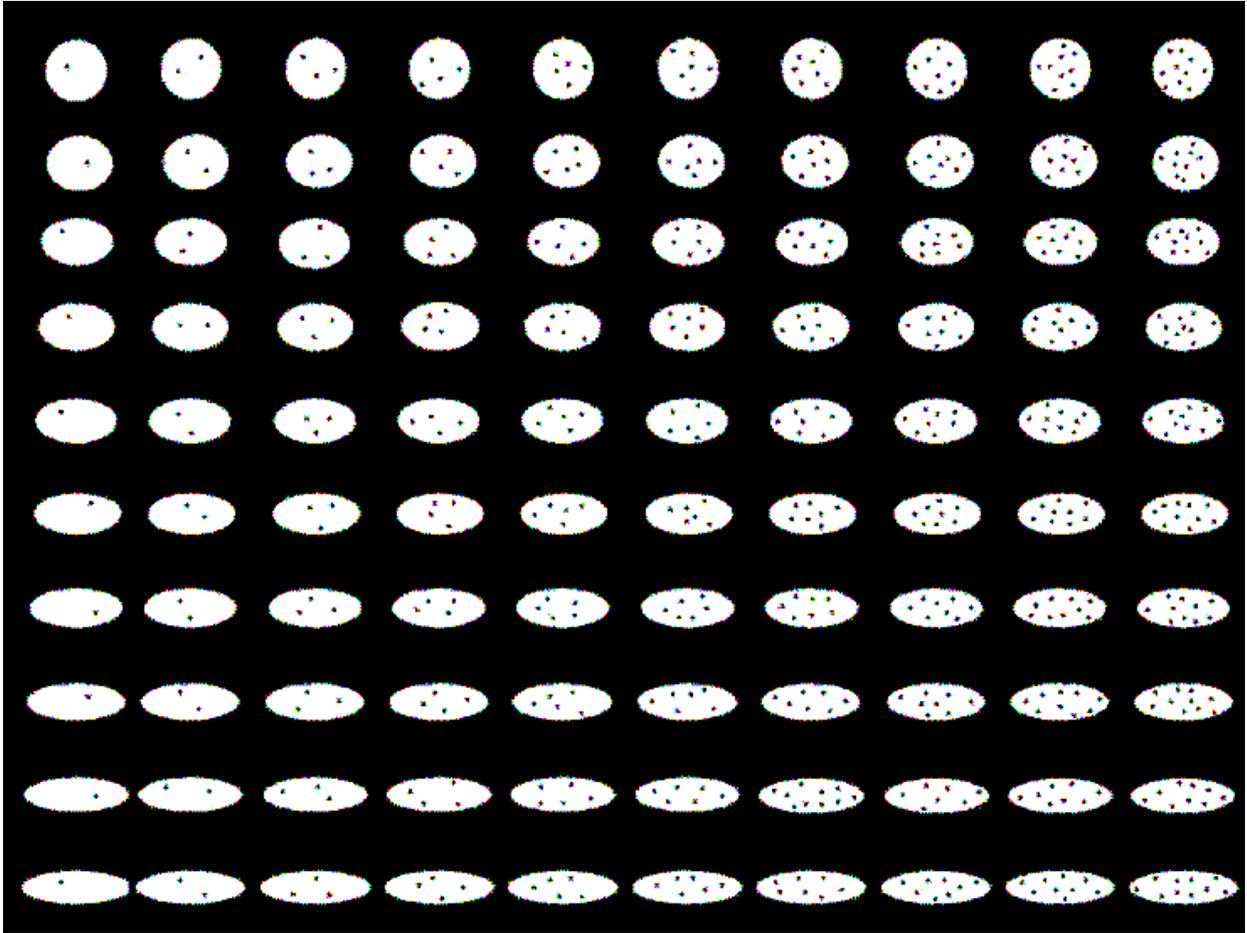
Figure 1. The population of bean stimuli forming the 10 x 10 matrix. Reprinted from Deutsch and Fazio (2008).

Figure 2. The bean matrix. X refers to shape, from circular (1) to oblong (10); Y refers to the number of speckles, from 1 to 10. The beans presented during the learning phase of the BeanFest procedure are noted with their corresponding positive (+) or negative (-) value. In any given study, the bean values are typically reversed for half the participants. This counterbalancing has not been found to influence outcomes.

Figure 3. Scatterplot of the actual responses to the novel beans and the predicted values based on the regression equation predicting average response to the novel beans from the proportion of positive game beans and the proportion of negative games beans correctly classified. Reprinted from Pietri et al. (2013a).

Figure 4. Graph of three separate linear regression equations relating individuals' weighting bias with their pumping behavior within the BART. Values on the x-axis range from the minimum to the maximum scores within the sample. Reprinted from Rocklage and Fazio (2014).

Figure 5. Graph of three separate linear regression equations relating individuals' weighting bias with their post-task evaluations of each balloon type. Values on the x-axis range from the minimum to the maximum scores within the sample. Reprinted from Rocklage and Fazio (2014).



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
X1	+	+	+			-	-	-		
X2	+	+			-	-	-			
X3						-				
X4									+	+
X5		-						+	+	+
X6	-	-	-						+	
X7	-	-								
X8					+					
X9				+	+	+			-	-
X10			+	+	+			-	-	-

