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Weighting Positive versus Negative: The Fundamental Nature of Valence Asymmetry

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Abstract

Objective: The relation between weighting of valence information in attitude generalization and evaluation of novel/hypothetical situations was explored.

Method: Participants played a computer game, requiring them to learn which stimuli (beans) would increase/decrease their points (Fazio, Eiser, & Shook, 2004). Later, participants classified the valence of game beans and novel ones varying in resemblance to game beans. The weighting bias in attitude generalization was estimated as the average response to novel beans, controlling for game bean learning. We examined if this bias related to judgments of hypothetical situations concerning interpersonal relationships (Study 1), threat assessment (Study 2), risk propensities (Study 3), and risk behavior (Study 6). We also assessed if valence weighting is specifically predictive of novel situations (Studies 4 and 5). Finally, we explored participants' ability to self-report their weighting bias (Study 7).

Results: Valence weighting in attitude generalization was related to judgments of novel situations and risk-behavior. The performance-based measure did not correlate with responses to various questionnaires related to valence weighting.

Conclusions: There is a fundamental individual difference associated with valence weighting, resulting in the relation between two processes unrelated in content, but sharing the essential characteristic of valence weighting-- attitude generalization and evaluation of novel situations.

Keywords: Valence, Attitudes, Negativity Bias, Risk

Weighting Positive versus Negative: The Fundamental Nature of Valence Asymmetry

Throughout our lives, we are faced with a host of new situations that involve some mixture of positive and negative features. When confronted with such situations, we must determine whether the good outweighs the bad or vice versa, and make decisions based on this evaluation. The consequences of these decisions may be far-reaching in that they may impact many aspects of our health, happiness, and life. However, the question still remains - how does any given individual weigh the positives against the negatives in such novel situations? Does a mildly positive aspect neutralize the impact of a mildly negative aspect, or does one valence effectively carry more weight than the other?

We assert that individuals vary in extent to which they weight positives and negatives when making evaluative judgments of *novel* situations, and thus, there is a valence weighting bias associated specifically with such occurrences. Furthermore, the current research will propose a unique way of assessing this difference, by examining how individuals' pre-established attitudes generalize to similar but novel attitude objects. During attitude generalization, individuals evaluate a novel object based on its similarity to a known attitude object. If the novel object bears resemblance to both a positive and a negative object, which attitude dominates the generalization process will in part depend on how individuals weight the positive and negative information associated with the novel object. Similarly, when people make evaluative judgments of novel situations, they must also weigh how much the situation resembles similar past positive or negative occurrences. For some people, negative attitudes generalize much more than positive, and these individuals should also weight resemblance to a negative more strongly than positive when judging a novel situation, and thus have a more adverse assessment of the novel situation. We argue that these two processes (attitude generalization and evaluation of a novel situation), although not necessarily related in terms of content, should be associated because they both involve the weighting of positive and negative information.

Valence Asymmetry

The assertion that individuals do not give equal weight to positives and negatives is not new. In fact, there is a vast amount of research demonstrating this phenomenon. Across a variety of domains, it has been observed that people tend to overemphasize negative information relative to positive (see Baumeister, Bratslavsky, Finkenauer, &Vohs, 2001; Rozin & Royzman, 2001, for reviews). Additionally, research on approach and avoidance by Cacioppo and colleagues argues for the existence of a positive offset, or the tendency in a relativity neutral environment to approach. Still, this framework also posits a negativity bias or, given a non-neutral environment, the propensity for a unit of negative activation to exert more motivational impact than an equivalent unit of positive activation (Cacioppo, Gardner, & Berntson, 1997; Ito, Cacioppo, & Lang, 1998).

Researchers also have explored individual differences in the ways individuals understand and react to positive and negative information. For example, Norris, Larsen, Crawford and Cacioppo (2011) showed that individual differences in positivity offset and negativity bias predicted the implicit learning of positive and negative information. In addition, although people on average show greater sensitivity to losses than to gains (Kahneman & Tversky, 1979), some do so more than others. Individuals higher in prevention focus have more adverse reactions to a loss than those who are more promotion-focused (Idson, Liberman, & Higgins, 2000).

Variation in sensitivity towards positives and negatives is also a central aspect of many personality traits. For example, extraversion is associated with being sociable and optimistic, while neuroticism is marked by the tendency to worry and feel emotionally unstable (Costa and

MacCrae, 1992). Further, motivational systems of approach and avoidance, such as the behavioral activation system (BAS) and behavioral inhibition system (BIS) are also characterized by individuals' reactions to valenced information. The BAS is associated with behavioral responses to conditioned appetitive stimuli, a general approach orientation and positive affect, while the BIS is associated with avoidance or behavioral inhibition towards conditioned aversive stimuli and negative affect (Gray, 1987).

Perhaps most related to the current research is the recently examined core personality trait, approach/avoidance temperament (Elliot and Thrash, 2010). Approach temperament refers to a sensitivity to positives and behavioral predisposition towards such positive stimuli as rewards. In contrast, avoidance temperament is an orientation towards negatives and affective reactivity towards such stimuli (such as punishment). Thus, approach/avoidant temperament is a domain nonspecific sensitivity towards positives and negatives.

Even this brief literature review suggests that there should be variability in the extent to which people weight positive and negative information. Further, if people do have general sensitivity to positive versus negative information (e.g. Elliot & Thrash, 2010), it seems logical that two judgmental processes that are very different on the surface might be related to one another as long as each involves the weighting of positives and negatives. In particular, we are concerned with the propensities that individuals reveal when engaged in attitude generalization and their relation to assessments of novel situations and objects. We assert that how individuals generalize their attitudes, that is, the valence weighting that they reveal when engaged in attitude generalization, is similar to how they make an evaluative judgment of a novel situation, and thus we plan to explore the importance of individual differences in attitude generalization.

A Performance-Based Measure of Valence Asymmetry in Attitude Generalization

To capture the weighting of positives and negatives in attitude generalization, we propose the use of a performance-based measure. Recently, a paradigm was developed to examine individuals' processing of positive versus negative information, one that focuses on attitude formation and generalization (Fazio, Eiser, & Shook, 2004). The BeanFest paradigm involves a computer game that assesses valence asymmetries in individuals' formation of attitudes toward novel stimuli and their generalization of those attitudes to visually similar stimuli. The novel objects, or beans, are either good or bad in the sense of their potential for yielding a positive or a negative outcome. The beans vary visually in two ways, shape (10 levels from circular to oblong) and number of speckles (1 to 10), forming a 10-by-10 matrix of beans that are available for presentation. In a typical game of BeanFest, six regions of the matrix, each containing five to seven beans (36 total), are presented (see Figure 1). On each trial, participants have to decide whether to approach or avoid the presented bean. If participants choose to approach, their points either increase or decrease based on the value of the given bean. As participants have no prior contact with or knowledge of these objects, they form attitudes towards these beans based only on their experiences during the game.

Following the learning phase, participants complete a test phase in which they are presented with the 36 game beans as well as the 64 novel beans from the matrix, which were not shown during the game. Participants indicate if they believe the bean to be good or bad. Thus, it is possible to examine the attitudes participants formed toward the game beans, and how these attitudes generalize towards novel beans varying in resemblance to the game beans.

In the initial studies, Fazio and colleagues (2004) observed two intriguing valence asymmetries. The first was a learning asymmetry. On average, participants showed evidence of having learned the negative game beans better than the positive ones. Subsequent experiments demonstrated that this asymmetry stemmed from a structural contingency. As in many real-world situations, information gain in the BeanFest environment was contingent upon approach behavior. If participants chose to avoid a bean, they never experienced its outcome. Hence, false beliefs that a bean was negative tended not to be corrected, because those beliefs promoted avoidance. In contrast, false beliefs that a bean was positive promoted approach behavior and, hence, were subjected to corrective feedback. When BeanFest was implemented such that feedback was not contingent on approach behavior, the learning asymmetry was no longer evident on average.

The second asymmetry that was observed is of particular interest to the current research. It concerned participants' classifications of the novel beans, those that had not been presented during the game phase, and it did not vary as a function of feedback contingency. Participants' attitudes clearly generalized; those novel beans bearing greater resemblance to a known positive (negative) were more likely to be classified as positive (negative). However, participants also displayed a generalization asymmetry; they were more likely to classify novel beans as negative than positive. Thus, negative attitudes were more likely to generalize to novel beans than were positive attitudes. Or, to put it another way, on average, participants weighted resemblance to a known negative more heavily than resemblance to a positive (see also Shook, Fazio, & Eiser, 2007).

Variability exists across individuals in the extent to which they display valence asymmetries in attitude learning or generalization. Thus, depending upon how the paradigm is implemented, BeanFest performance can provide an assessment of the extent to which individuals display various valence biases (Shook, Fazio, & Vasey, 2007). Furthermore, because we can explore asymmetries in attitude formation versus attitude generalization through the BeanFest paradigm, we have the ability to assess rather specific biases. Thus far, past research has successfully utilized BeanFest to explore individual differences in the learning asymmetry (Shook et al., 2007; Shook & Fazio, 2009). However, research has yet to explore individual differences in the generalization asymmetry, or how individuals weight positive and negative information when classifying a novel bean.

It is this *weighting bias* that forms the central focus of the present research, because it directly assesses attitude generalization. Thus, our current focus concerns the potential for individuals to display varying degrees of a generalization asymmetry when classifying novel beans that vary in resemblance to known attitude objects. Is a given individual like the "average" participant in weighting resemblance to a negative more heavily than resemblance to a positive? Does the individual do so even more than is typical? Or might the given individual display a tendency to weight resemblance to a positive more heavily?

Because the BeanFest paradigm involves novel objects that themselves vary in their resemblance to *experimentally-created* positives and negatives, it provides a pure assessment of valence weighting in attitude generalization, unconfounded by all the usual correlates of valence such as familiarity, distinctiveness, or diagnosticity.[1] 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. Thus a performance-based may be especially informative when assessing individual differences in attitude generalization.

The current research will utilize the BeanFest paradigm to explore the possibility that how individuals weight positive and negative information when engaged in attitude generalization captures a fundamental individual difference, and relates to how individuals evaluate events across a variety of domains (Studies 1-3). Furthermore, we will explore our assertion that the valence bias captured in attitude generalization relates specifically to assessments of hypothetical/novel situations (Studies 4 and 5). We also explore its relation to actual behavior in a novel situation (Study 6). Finally, we examine the possibility that individuals may not be able to introspect and accurately self-report their valence weighting bias. If so, our performance-based measure of valence weighting should not relate to various domain nonspecific self-report questionnaires of how individuals understand positive and negative information (Study 7).

Studies 1-3

In the first three studies, we wanted to demonstrate that the weighting bias in attitude generalization would relate to people's reactions to situations that are at least somewhat novel and, hence, require some weighting of positive versus negative valence when reaching an assessment. To accomplish this, in each study the outcome measure involved judgments about hypothetical situations. Specifically, in Study 1, we examined how the weighting bias related to individuals' fear of rejection when making a request of another person. In Study 2, we examined how the weighting bias related to individuals' judgments of ambiguous situations that may be threatening. Finally, in Study 3, we were interested in whether the weighting bias predicts judgments related to risk-taking. On the basis of our argument that the estimates provided by BeanFest of individuals' proclivities when engaged in attitude generalization represent a pure assessment of how people weight positive and negative information, we expected the valence weighting index to relate to judgments across these three different domains.

Method

Procedure

The procedure for BeanFest was the same as that employed in Experiment 4 of Fazio et al. (2004) and Shook et al. (2007). During each trial of the game, participants were shown a bean in the upper part of the monitor and had to indicate whether they wished to approach or avoid the bean. If participants approached the bean, they were shown the value of the bean they had selected (+10 or -10) and their points were updated accordingly. If participants did not approach the bean, their current point value did not change, but they were shown the value the bean would have had if it had been chosen. In other words, BeanFest was implemented in its full-feedback version in which information gain is not structurally contingent upon approach behavior.

Participants' points could range from 0 to 100, and participants started the game with 50 points. If participants reached 0 points they would lose the game, and if they reached 100 points they would win the game. Any time participants won or lost, the game would restart with 50 points. All participants were shown three blocks of 36 beans no matter how many times they won or lost, after which, the game ended. For half of the participants, the beans were assigned the valuespresented in Figure 1, whereas for the other half of the participants the values were reversed. Thus, if a region of beans had a point value of 10 in the matrix shown in Figure 1, this region had a point value of -10 in the reversed matrix. This counterbalancing served to avoid any confound between the specific visual features of the beans and valence. As in past research (e.g., Fazio et al., 2004; Shook et al., 2007), this counterbalancing had no effect on learning of the game beans or on responses to the novel beans.[2]

Following the game, participants completed the test phase. They were shown each of the 100 beans from the matrix in two blocks of 50 randomized trials and indicated whether they believed a given bean to be good or bad, that is, would have produced an increase or decrease in points during the game.

The Residual Approach to the Estimation of Valence Weighting

Our approach to estimating the weighting bias involved considering the extent to which participants classified novel beans, ones they had not seen during the BeanFest game, as more likely to be positive (or negative) than was to be expected on the basis of their learning of the positive and negative game beans. It focused on a regression equation predicting the average response to the novel beans from the proportion of positive game beans learned correctly and the proportion of negative game beans learned correctly. For any given individual, deviation from this predicted value, that is, the residual, provided our estimate of the extent to which the individual weighed resemblance to a known positive versus resemblance to a known negative more heavily than the “average” participant. In other words, the residual indexed the extent to which the individual was showing a relative weighting bias in favor of one valence or the other.

The BeanFest procedure described in the method section was followed in all of the studies reported in this paper, in addition to other studies not reported in this paper. Given this commonality and our interest in locating a given participant in relation to a normative regression equation, it was useful to aggregate the BeanFest data across all the relevant studies. This provided a sample of 321 participants from which the regression parameters could be estimated very stably. Across the studies, three variables were generated from the test phase data and used in the regression equation. The first two concerned learning of the game beans: specifically, the proportion of positive game beans correctly classified and the proportion of negative game beans correctly classified. The remaining 64 beans from the matrix are novel ones that had not been presented during the game. Those judged to be positive were assigned a value of +1 and those judged to be negative a value of -1. The average response to the novel beans was then calculated and served as the outcome variable in the regression equation.

Naturally, the response to any given novel bean is partly a function of how well visually-similar game beans are learned. The earlier BeanFest research repeatedly demonstrated that attitudes toward the game beans generalize to visually similar novel beans (Fazio et al., 2004; Shook et al., 2007). Those bearing more resemblance to negative game beans are more likely to be judged negative and those more similar to positive beans are more likely to be deemed positive. Thus, we expected to see strong relations between the average response to the novel beans and the proportions of positive and negative game beans learned, which was indeed the case. In the aggregate sample, the proportion of positive game beans correctly classified and the proportion of negative beans correctly classified together accounted for 42% of the variance in average response to the novel beans, $F(2, 318) = 113.24$, $p < .001$. The multiple regression equation was:

$$\text{Novel} = .53(\text{Positive Correct}) - .78(\text{Negative Correct}) + .12$$

Both regression weights were highly significant: for the positive game beans correctly classified, β=.37, $t(320) = 8.33$, $p < .001$, and for the negative, β=-.56, $t(320) = 14.50$, $p < .001$. Also noteworthy, however, is that the regression weight for the negative 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 past BeanFest studies. On average, individuals display a negativity bias, more strongly generalizing their negative attitudes than their positive attitudes.

Although the relation between the response to the novel beans and the learning of positive and negative game beans is very strong statistically, there naturally is variability around this general trend. That variability is depicted in Figure 2, which displays a scatterplot of predicted values from the regression equation and actual values. Some participants fell below the regression line, classifying more of the novel beans as negative than is to be expected on the basis of their learning of the game beans. Others classified more novel beans positively than expected on the basis of their learning and, hence, fell above the regression line. We employed this deviation from the predicted value, the residual, as the estimate of an individual's weighting bias.[3] 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. The first three studies, as well as those to be presented later, focus on the predictive power of these estimates of individuals' weighting bias. In each study, residuals were calculated using the normative regression equation derived from the aggregate sample and those estimates of individuals' weighting bias were then used to predict the outcome variables of interest.[4]

Outcome measures

Study 1. The Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996) presented the 57 participants (29 females and 28 males) with various rejection-related hypothetical situations (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"). Participants first rated their level of anxiety concerning the outcome of the situation (e.g., "How concerned or anxious would you be over whether or not your boyfriend/girlfriend would move in with you") on a scale from 1 (very unconcerned) to 6 (very concerned) and then the likelihood that the person would accept the participants' request (e.g., "I expect that he/she would be willing to move in with me") on a scale from 1 (very likely) to 6 (very unlikely).

We obtained a rejection sensitivity score, using the same expectancy-value model employed by Downey and Feldman (1996). Specifically, we calculated a score for each situation weighting the likelihood of acceptance (i.e., the expectancy) by concern over the outcome. The expectancy rating was reversed-scored and then multiplied by the reported level of concern. The average of the 18 situation scores was calculated as the index of rejection sensitivity (M=8.32, SD=2.76, α=.70). Higher scores indicated higher rejection sensitivity.

Study 2. The Looming Maladaptive Style Questionnaire (LMSQ; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000) presents participants with six 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"). Following each situation, the 114 participants (74 females and 40 males) made three assessments. First, participants rated the situation's difficulty (i.e., "In this scene, are the chances of your having difficulty decreasing or expanding with each moment?") on a five-point scale from "decreasing" to "expanding." Next, participants assessed the threat (i.e., "Is the level of threat in the encounter staying fairly constant or is it growing rapidly larger with each passing moment?") on a five-point scale from "constant" to "growing." Finally, participants assessed whether or not the situation was becoming worse (i.e., "How much do you visualize your problem as in the act of becoming progressively worse?") on a five point scale from "not changing" to "becoming much worse." We averaged the three assessments to form the standard LMSQ score, with higher scores indicating more maladaptive style (M=3.0, SD=.52, α=.75).

Study 3. The Choice Dilemma's Questionnaire (CDQ; Wallach, Kogan, & Bem, 1962) consists of 12 scenarios, in which participants are faced with the dilemma of choosing between two alternative courses of actions. One option is more attractive but carries with it a risk of a potentially bad outcome, whereas the other is less attractive but relatively safe. For example, one situation involves the possibility of "Mr. A" leaving his stable modest paying job for a lucrative job with an uncertain future. Upon reading each scenario, the 30 participants (13 females and 17 males) had to decide how high the probability of the positive outcome occurring would need to be in order for them to choose the more attractive option (i.e., "don't choose," "9 in 10," "7 in 10," "5 in 10," "3 in 10," or "1 in 10"). We calculated the average response to all 12 situations, with higher scores indicating higher risk tendencies (M=3.64, SD=.69, α=.74).

Results and Discussion

Each study revealed a correlation between the weighting bias and the outcome measure in the predicted direction: for the RSQ[5], r=-.25, p<.06; for the LMSQ, r=-.22, p<.05, and for the CDQ, r=.38, p<.05. Collectively, then, the first three studies demonstrated that how individuals weight positive and negative information when engaged in attitude generalization relates to their judgments of hypothetical situations across a variety of domains – interpersonal relationships, threat assessments, 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.

Study 4: Neophobia

In Study 4, we examined how the weighting bias relates to the anxiety people report at the prospect of encountering new experiences. New occurrences have the potential to be both exciting and frightening. Thus, we reasoned that how individuals weight positive and negative information would correlate with scores on the General Neophobia Scale (GNS; Pliner & Hobden, 1992), which assesses how fearful people are of new experiences and people.

This study also aimed to establish discriminant validity. We hoped to demonstrate that the weighting bias as captured via our attitude generalization index relates specifically to individuals' understanding of positive and negative information in novel situations, and not to a more general individual difference concerning self-doubt. All the dependent measures in the earlier studies, as well as the GNS in the current study, can be characterized as relating to a general uncertainty in one's ability to make a correct decision while accommodating to a potentially difficult situation. For example, if people doubt their capacity to make a correct judgment, they may be less likely to select a risky alternative or to risk the possibility of rejection. Such individuals may also be more inclined to feel helpless in a potentially dangerous situation and, as a result, come to see it as relatively more threatening. They also may be generally inclined to avoid novel objects or settings that have the potential to be unsafe. Such self-doubt may also relate to attitude generalization within BeanFest. People who doubt their ability to make sound decisions might require a higher threshold of positive information before classifying a novel object (e.g., a bean) as positive, which would lead them to display a negative weighting bias. One might argue, then, that the weighting bias, although estimated from how individuals weight resemblance to a known positive versus resemblance to a known negative, has been predictive of reactions to hypothetical situations simply because of its potential covariation with feelings of self-doubt. People who doubt their ability to make sound decisions may assess such hypothetical scenarios negatively and such people may also be relatively likely to obtain negative weighting bias scores in BeanFest.

With this possibility in mind, we included not only the GNS in the current study, but also the Judgmental Self-Doubt Scale (JSDS; Mirels, Greblo, & Dean, 2002). The JSDS is an individual difference measure examining people's wariness in their ability to make correct/beneficial decisions and their general feelings of self-doubt. Thus, if our performance-based measure of valence weighting in attitude formation simply reflects a doubt in one's ability to make correct decisions, then it should relate to not only the GNS but also the JSDS. However, if as we argue, the weighting bias reflects the appraisal of positive versus negative features regarding a novel object, person, or situation, then it should correlate more strongly with the GNS than the JSDS.

Participants

Sixty-nine (39 females and 30 males) introductory psychology students completed this study for research credit.

Procedure

Participants first played the BeanFest game, then underwent the test phase, and then completed the GNS and JSDS. The GNS consists of eight statements relating to being anxious or uncomfortable in new situations or meeting new people (e.g., "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"). Participants rated how much they agreed with each statement from -3 (Not at All) to 3 (Very much Agree). We calculated mean response to the statements as a measure of general neophobia, with higher scores indicating higher neophobia (M=-.75, SD=1.00, α=.73). The JSDS has 19 statements pertinent to individuals' confidence in their ability to make decisions (e.g., "I have difficulty making decisions," "I often have a sense that others know better than I do"). Participants rated their agreement with each statement on a -3 (strongly disagree) to +3 (strongly agree) scale. We calculated the mean response to the statements, with higher scores indicating higher self-doubt (*M*=-.23, *SD*=1.20, α=.93).

Results and Discussion

As predicted, we found a significant negative correlation between the weighting bias and the general neophobia scores, *r*(68)=-.30, *p*<.02, indicating that participants with a more negative weighting bias had higher neophobia scores than participants with a more positive bias. The weighting bias did not correlate with the JSDS scores, *r*(68)=.06. Indeed, these two correlations differed significantly from one another, *t*(66)=3.02, *p*<.01, even though participants' judgmental self-doubt scores and general neophobia scores correlated substantially, *r(*68)=.50, *p*<.001. 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. Even though judgmental self-doubt and neophobia correlate, presumably because both reflect or stem from an uncertainty in one's ability or a feeling of unease, the weighting bias does not appear to be a result of these same general processes. Instead, its focus seems specific to the assessment of novel situations that involve some blend of positive and negative valence.

Finally, we ran a multiple regression predicting the GNS scores from the JSDS scores and the weighting bias, which showed that the two predictors accounted for a significant proportion of variance, R^2=.36, *F*(2,66)=18.52, *p*<.001. Both JSDS (*B*= .52, *t*(68)=5.30, *p*<.001) and weighting bias scores (*B*=-.33, *t(*68)=3.30, *p*<.01) contributed uniquely to the prediction of the GNS scores. Therefore, at a more methodological level, it is useful to note that the weighting bias predicted participants' general neophobia over and above the impact of their judgmental self-doubt scores.

Study 5: Risk Attitudes

In Study 5, we sought to provide further support for the hypothesis that the valence weighting bias as captured via the attitude generalization index is specific to individuals' understanding of *novel* experiences. Furthermore, we aimed to conceptually replicate Study 3, and show that this bias is related to risk assessment. The Domain Specific Risk Taking Scale includes risk-related behaviors across a variety of domains, and measures individuals' likelihood of engaging in each (DOSPERT; Weber, Blais, & Betz, 2002). The DOSPERT is especially useful for the present purposes, because it includes a variety of actions that the typical undergraduate student may 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"). If the valence weighting bias assesses how individuals integrate the potentially positive and negative aspects of novel situations, it should be more predictive of individuals' reactions to risky situations with which they have had relatively little experience. Attitudes toward more frequently experienced situations are likely to be based on past behavior and knowledge, and, hence, are unlikely to require a current assessment and weighting of potential valences. In line with this reasoning, Van Boven, Kane, and McGraw (2009) assert that when a situation has yet to be experienced it is not constrained by reality and is characterized by uncertainty, because an individual does not have facts from the past to utilize. Certainly, the risk attitudes that individuals report for situations they have experienced should be highly predictive of their likelihood of taking a risk in more novel situations. However, we believed that the weighting bias would predict risk tolerance regarding novel behaviors above and beyond self-reported riskiness in familiar domains. Thus, as with Study 4, the current study aimed to both (a) provide evidence of discriminant validity and (b) show that the valence weighting in attitude generalization relates to individuals' understanding of novel situations beyond that which is predicted from a self-report measure.

Method

Participants

Fifty-eight (29 females and 29 males) individuals from the Ohio State University campus were recruited for participation in exchange for a payment of $10.

Procedure

As in the earlier studies, participants first played the BeanFest game and then completed the test phase. They then were administered the DOSPERT, which is a 40 item scale used to examine people's risk tendencies across a variety of domains. Specifically, participants are asked to rate their likelihood of engaging in a given risky behavior on a scale ranging from 1(Very Unlikely) to 5 (Very Likely). The scale consists of eight items relating to risky behaviors in the social domain (e.g., "Disagreeing with your father on a major issue"), the recreational domain (e.g., "Trying out bungee jumping at least once"), the health domain (e.g., "Engaging in unprotected sex"), and the ethical domain (e.g., "Forging somebody's signature"). In addition, the scale includes four items related to the area of gambling (e.g., "Gambling a week's income at a casino") and another four concerning investment scenarios (e.g., "Investing 5% of your annual income in a very speculative stock"). We calculated the mean rating for each of the six specific domains. In addition, we created a composite DOSPERT score, by standardizing the scores for each domain and computing the average of these z-scores (α=.66).

Importantly, some of the items on the DOSPERT were likely to have been experienced by the participants, whereas other behavioral situations were unlikely to have been encountered by a typical college student. Thus, we also were interested in how weighting bias scores relate to participants' likelihood of taking risks that they are likely to have encountered in the past versus ones they are not likely to have experienced. We conducted a pilot study, in which 47 undergraduates considered the question: “In the past have you been a situation where you could…?” for each of the 40 DOSPERT behaviors. Participants rated each behavior on a 1 (Never been in a similar situation) to 5 (Been in that exact situation) scale. We calculated means for each of the 40 behaviors. Based on these pilot data, we classified those behaviors with a mean of three or higher as likely to have been experienced, those with a mean between two and three as moderately likely, and those with a mean less than two as unlikely to have been experienced.

For each of the Study 5 participants, we computed the mean rating they provided regarding their likelihood of engaging in the nine behaviors classified as “likely to have been experienced” (e.g., “Admitting that your tastes are different from those of your friends.”), M=3.29, SD=.62, α=.55; the 13 items classified as “moderately likely to have been experienced” (e.g., “Going camping in the wilderness, beyond the civilization of a campground.”), M=2.61 SD=.58, α=.71; and the 18 items classified as “unlikely to have been experienced” (e.g., “Chasing a tornado or hurricane by car to take dramatic photos”), M=2.53, SD=.55, α=.76. Thus, each participant had a mean likelihood rating for engaging in behaviors that were likely, moderately likely, and unlikely to have been experienced in the past, and we could examine the relation of the weighting bias to each variable.

Results and Discussion

The correlations between the weighting bias and the scores for each of the six separate domains of the DOSPERT are presented in Table 1. Each of the correlations was in the positive direction, with two reaching a statistically significant level. Given this pattern, the composite DOSPERT score correlated significantly with the weighting bias, $r(57)=.29$, $p<.03$. Thus, participants with a stronger weighting bias in the negative direction were generally less risky than those characterized by a more positive bias.

This general positive relation between the weighting bias and risk varied as a function of whether the situation in question was one which undergraduates were likely to have encountered: for the behaviors classified as likely to have been experienced, $r(57)=.00$; for the moderately likely, $r(57)=.18$, $p=.18$; and for the unlikely, $r(57)=.35$, $p<.01$. A statistical test of the difference between two dependent correlations showed that the coefficient for the unlikely behaviors (i.e., the more novel) was significantly higher than that for the very likely behaviors, $t(55)=2.40$, $p<.02$. Thus, as expected, the weighting bias related to participants' assessment of novel behaviors, but not 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 (e.g., if people took 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).

We also ran a regression predicting participants' scores concerning the more novel behaviors from their weighting bias scores and their assessments of 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 ($B=.36$, $t(56)=2.99$, $p<.01$). However, the weighting bias predicted responses to the novel risk behaviors over and above this relation between familiar and more novel situations ($B=.31$, $t(56)=2.63$, $p=.01$).

Study 6: Risk Behavior

To complement Studies 3 and 5, we were interested in how the weighting bias in attitude generalization would predict risk-taking behavior in a novel situation in which participants could experience real monetary gains or losses. Specifically, we employed 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 money they can potentially gain, but 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. We posited that participants who weight negative information more strongly than positive would show less risky behavior on the BART, that is, deliver fewer pumps to the balloons, than participants who have a more positive weighting bias.

Method

Participants

Individuals participated in this study in return for a fixed monetary compensation of $10, as well as whatever amount of money they won during the BART. Two participants were excluded from the analysis because they showed signs of not taking the BART task seriously, barely pumping the balloons so as to simply finish the task quickly. The final sample consisted of 55 participants (29 female and 26 male).

Procedure

Before beginning the experiment, participants were told they would first play the BeanFest game followed by another task that may relate to performance on the game. The BeanFest procedure was implemented just as in the earlier studies. Once participants finished BeanFest, they were introduced to the BART. Importantly, the instructions told participants that they would be paid depending on their performance on the task and explained the details of the payoff scheme summarized below.

During a trial of the BART, participants were presented with a small balloon on the left side of the computer screen and a button labeled “Pump up the balloon” under the balloon. On the right, there was a display indicating the number of the balloon participants were currently pumping (e.g., #5 of 20), the number of pumps delivered to the balloon, and their total winnings thus far. Below this display was a button labeled “collect”. During a trial, participants clicked the pump button to inflate the balloon, which grew 5% per pump. Participants needed to decide the point at which to stop inflating the balloon. They could end the trial by clicking the “collect” button, which would increase their earnings by the number of pumps delivered to the balloon multiplied by $.05. However, the trial could also end if the balloon popped, which was visually displayed on the computer screen if it happened. In such cases, participants would receive no additional earnings. Thus, in order to win the most amount of money, participants had to balance maximizing the number of pumps against the possibility of popping the balloon. When a balloon would pop varied randomly from trial to trial between a minimum of 1 and a maximum of 25 pumps. Participants completed a total of 20 balloon trials. Once finished with the BART, participants were thanked and paid their total earnings.

Following Lejuez and colleagues (2002), we simply calculated the total number of times participants pumped balloons during the BART as our index of risk behavior. Participants who were demonstrating risky behavior would choose to pump a balloon many times in order to have the potential to earn more money, even though they risked popping the balloon and losing their earnings for that trial.

Results and Discussion

As predicted, the weighting bias in attitude generalization correlated significantly with total number of pumps, $r(54)=.30$, $p<.03$. Participants with a more negative weighting bias pumped the balloon less, displaying less risky behavior, than participants characterized by a more positive weighting bias. Thus, this individual difference in the tendency to weight positive aspects versus negative aspects relates not only to judgments of hypothetical situations involving risk, but also to decisions that involve actual monetary outcomes in novel experiences.

Study 7

In Studies 1-5, participants expressed their judgments and reactions towards novel situations, and in all studies participants reported whether they believed novel beans to be positive or negative. Although individuals clearly weight positive versus negative information when offering such assessments, are they able to introspect and accurately report the extent to which they weight positive versus negative? It has been our observation based on post-experimental interviews with BeanFest participants that individuals typically cannot articulate their internal processes when classifying the novel beans. Furthermore, participants rarely seem accurate in noting how many beans they classified as positive or negative, and hence appear unaware of their own valence biases as assessed by BeanFest. To examine this question empirically, we created a questionnaire inquiring directly about individuals' valence weighting tendencies. We also were curious as to whether our performance-based measure of the weighting bias captures something different than other domain non-specific self-report measures that assess individuals' understanding of positives and negatives. Specifically, we examined the performance-based weighting index's relation to the Approach/Avoidance Temperament Questionnaire (ATQ, Elliot & Thrash, 2010). Our performance-based measure of the weighting of positive and negative information is observed in relation to attitude generalization, and accurately reporting one's tendencies may be difficult. As a result, the behavioral measure may capture a different process than these various dispositional measures assess.

Method

Participants

Eighty-nine (40 females and 49 males) introductory psychology students completed this study for research credit.

Procedure

Participants first completed the BeanFest paradigm, and then completed the two questionnaires of interest. The Weighting Bias Questionnaire (WBQ) consisted of four questions explicitly asking participants how they weight positive and negative information ("To what extent do you tend to give more weight to positive information over negative information?"; "To what extent do you tend to give more weight to negative information over positive information?"; "If you see something that has both negative and positive aspects, in general which do you give more weight to?"; "If you see something that appears equally negative and equally positive, how would you tend categorize it?"). Participants answered each on a 7-point scale. We reversed scored the second question and calculated the mean across items, with higher scores indicating self-reports of a more positive weighting bias (*M*=4.19, *SD*=.99, *α*=.73). Participants also completed the ATQ, which consists of 12 questions asking participants how they respond to positive information or approach temperament (e.g. "Thinking about the things I want really energizes me") and how they respond to negative information or avoidance temperament (e.g. "I feel anxiety and fear very deeply"). Participants rated how much they agreed with each statement on a 7-point scale from 1(strongly disagree) to 7 (strongly agree). We created a mean score for avoidance temperament (*M*=4.12 *SD*=1.27, *α*=.85) and approach temperament (*M*=5.19 *SD*=.96, *α*=.83).

Results and Discussion

The weighting bias as measured by BeanFest did not correlate significantly with the questionnaire measure of valence weighting ($r(88)=.04$ $p=.72$), Approach Temperament ($r(88)=.09$ $p=.38$), or Avoidance temperament ($r(88)=.16$ $p=.13$). However, the valence weighting questionnaire did correlate significantly with both Approach Temperament ($r(88)=.27$ $p<.05$) and Avoidant Temperament ($r(88)=-.32$ $p<.01$). These results suggest that individuals may rely on their general sensitivity to positives and negatives, as measured by the ATQ, when self-reporting how they weight valence information to classify a novel object. However, neither questionnaire correlated with the performance-based measure of the weighting bias. Thus, paralleling our observations from post-experimental interviews, it appears that individuals cannot introspect and report on how they weight valence in attitude generalization.

General Discussion

The above studies demonstrated across a variety of domains that the way in which individuals weight positive and negative information during attitude generalization relates to how individuals make evaluative judgments regarding novel or hypothetical situations. We found that participants with a more negative weighting bias in attitude generalization expressed more concern about the possibility of rejection (Study 1) and the potentially threatening nature of ambiguous situations (Study 2). Furthermore, this individual difference in the weighting of positive versus negative information also correlated with how likely participants were to assume hypothetical risks (Study 3), actual risk behavior (Study 6), as well as general neophobia (Study 4). However, the weighting bias did not correlate with a measure of self-doubt about making decisions, presumably because this measure did not focus on how individuals understand new situations. Although judgmental self-doubt correlated with neophobia, the weighting bias predicted neophobia scores over and above that relation. Study 5 found similar results, in that the weighting bias correlated with how probable participants were to take risks that they were unlikely to have experienced in the past, and not ones concerning situations about which they had very likely made decisions in the past. The risk levels assumed for the likely-experienced events strongly predicted risk with respect to the unlikely-experienced ones; however, as with Study 4, the weighting bias was predictive of novel risk-taking over and above the variance accounted for by the self-reported risk-taking. Thus, Studies 4 and 5 demonstrated that the weighting bias specifically relates to reactions to novel situations, and illustrated how the valence weighting in attitude generalization may complement more traditional dispositional measures. Furthermore, variability in weighting bias as measured through attitude generalization in BeanFest did not correlate with a questionnaire version of the weighting bias or approach/avoidance temperament (Elliot & Thrash, 2010). Thus, the performance-based index of valence weighting provided by BeanFest appears to capture a process about which individuals have difficulty accurately introspecting and reporting.

Given that the weighting of positive and negative information in attitude generalization relates to such a variety of judgments and behaviors, it appears to be a fundamental individual difference. As such, it may have important implications for quality of life and general well-being. Research shows that many of the measures we used as the outcome variables of interest in the above studies have important consequences for individuals' well-being. For instance, we observed in Study 1 that participants with a more negative weighting bias tended to have higher scores on the rejection sensitivity questionnaire, which a considerable body of evidence shows can have detrimental consequences for relationships, such as general dissatisfaction and dissolution (Downey & Feldman, 1996; Downey, Freitas, Michaelis, & Khouri,1998). Related to mental health and specifically anxiety disorders, we also found in Study 2 that the weighting bias correlated with the Looming Maladaptive Styles Questionnaire, or how individuals perceive ambiguous situations as potentially growing in threat. Higher scores on the LMSQ are associated with a variety of anxiety disorders and prospectively predict the onset of these anxiety symptoms (Riskind et al., 2000). Conversely, a strong weighting bias in favor of the positive may relate to very risky and potentially detrimental behaviors. For example, an individual with a very positive weighting bias may be inclined to gamble, or engage in dangerous thrill-seeking activities. Thus, there could be potentially harmful aspects of having either an extreme positive or an extreme negative weighting bias. An obvious objective for future research is to explore the real life consequences of differential valence weighting tendencies.

Although we cannot know exactly how individuals develop a valence asymmetry in favor of either positive or negative when assessing novel objects or occurrences, it is possible to speculate on the basis of research from other areas of psychology. Researchers have identified genes that modulate specific aspects of dopaminergic function and that are linked to the learning of positive versus negative stimuli, as well as a gene associated with exploratory decisions intended to reduce uncertainty (Frank, Doll, Oas-Terpstra, & Moreno, 2009). Independent of genetics, the dispositions displayed by parents and how they socialize their children should also have important consequences for the children's understanding of the world as requiring more or less emphasis on security versus advancement (Higgins & Silberman, 1988). More specifically related to negativity biases, mothers' and children's interpretations of ambiguously threatening situations have been found to correlate (Creswell & O'Connor, 2006). Researchers also have found that children from abusive homes attend more to angry or threatening faces (Pollack & Trolley-Schell, 2003). Thus, in addition to passing along a genetic predisposition, it is possible that the home environment parents create may foster the development of certain valence biases in their children.

It is important to keep in mind that our consideration of this individual difference regarding valence weighting in attitude generalization begins with a performance-based measure. Indeed the weighting bias as measured by BeanFest did not correlate with a questionnaire directly assessing valence weighting, suggesting that individuals may not be able to introspect and report their attitude generalization tendencies. We suspect that BeanFest is a particularly useful performance-based measure largely because it utilizes novel stimuli and experimentally associates those stimuli with differing valence. As a result, it provides an assessment of valence weighting per se, unconfounded by the differential distinctiveness and diagnosticity that often accompany positive versus negative information (e.g., Skowronksi & Carlston, 1989). Those natural confounds may play a role in the difficulty individuals appear to have when asked to report on their valence weighting tendencies.

Past research has successfully utilized BeanFest as a performance-based individual difference measure, examining biases other than the valence weighting evident in attitude generalization. Prior BeanFest research of this type focused not on generalization, but on learning per se, how well individuals learned that various stimuli (the beans presented during the game) yielded positive versus negative outcomes. Any learning asymmetry may itself be influenced by two components, and thus, there are potentially two individual difference biases related to it. The first is observed when participants play the contingent feedback version of the game (i.e., when they are presented the value of a bean only if they approach it), and has been termed the *sampling bias* (Shook, Fazio, & Vasey, 2007). The sampling bias is concerned with how much participants are willing to approach beans they believe may possibly be negative in the interest of acquiring valuable feedback. Thus, if an individual displays a negative sampling bias, they are overly cautious about exploring beans about which they are uncertain. As previously mentioned, when participants play with this structural contingency, they typically display a strong learning asymmetry on average. When information about a bean's value is provided irrespective of decisions to approach or avoid, individuals no longer show a learning asymmetry on average. However, some participants still learn the beans of one valence better than beans of the other valence, and any such differential learning has been termed a *learning bias* (Shook et al., 2007). As sampling behavior does not influence any valence asymmetry observed under full feedback conditions, this learning bias reflects how much participants rehearse and attend to negative outcomes more than positive outcomes.

Shook and colleagues (2007) examined if individual differences in the learning bias observed in BeanFest related to measures of cognitive susceptibility to emotional disorders. Displaying better learning of the negative beans than the positive was correlated with more negative cognitive styles and greater self-reports of depressive and anxious tendencies (see also Conklin, Strunk, & Fazio, 2009). Shook and Fazio (2009) examined how the sampling bias related to measures of political ideology. Participants who were more conservative were less likely to approach beans during the game than those participants who endorsed a liberal ideology.

The current research is the first to focus specifically on the weighting bias in attitude generalization and its relation to judgments across a variety of domains. In all of the above studies, we could not examine the sampling bias because we employed the full feedback version of the game. We could, however, consider correlations between the learning bias and the outcome variables. It did not significantly correlate with any of the measures examined in these studies, *p*s > .25. Thus, an advantage of the BeanFest paradigm is its ability to capture precise valence asymmetries (sampling, learning, versus weighting), offering a level of specificity that may not be present in other domain-general measures of sensitivity to positives and negatives.

Obviously, the current research does not permit us to draw causal inferences. All of the studies were correlational in nature, which limits the appropriateness of arguing that being characterized by a negative weighting bias causes individuals to be more sensitive to rejection, risk averse, etc. Future research will need to focus on establishing causal relationships between the weighting bias and these various judgments and behaviors. Researchers examining biases in other performance-based measures such as attention and interpretation have had participants undergo training designed to foster specific biases (whether they be positive, neural, or negative) and have successfully demonstrated that these attentional biases cause certain reactions and behaviors (e.g., Dandeneau et al. 2007; Macleod et al., 2002). Furthermore, there have been many successful paradigms design to foster change in individuals' attitudes towards neutral objects (e.g. Olson & Fazio, 2001). Given the ability to change attitudes, it seems possible that one might be able to influence the way individuals generalize their positive and negative attitudes towards novel stimuli. Future research should explore if recalibrating individuals to weight positive and negative information more equally, or away from their initial tendencies, results in changes in individuals' evaluative judgments of novel situations.

Despite the limitations associated with correlational research, the current studies have provided an important first step in successfully demonstrating that how individuals weight positive and negative information in attitude generalization is pertinent to their responses to a wide variety of novel situations involving a mixture of positive and negative aspects.

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Footnotes

[1]Developments in the literature on impression formation well illustrate the importance of typical correlates of valence. Information that a target person is characterized by negative traits or has behaved in a negative manner (e.g., dishonestly) typically influences overall judgments of the target's favorability more than does information about positive traits or behaviors (see Kanouse & Hanson, 1972, for a review). Yet, negative behaviors are often less frequent, more distinctive, and hence, more diagnostic of a person's disposition than positive behaviors (Skowronksi & Carlston, 1989). Hence, the valence asymmetry with respect to impression formation is likely to stem from a difference in diagnosticity.

[2]In all the studies to be reported, there was no moderating effect of matrix condition (original versus reversed) on the relation between the weighting bias index and any of the outcome measures.

[3]Given our reliance on the computation of residuals, a cautious reader might be concerned about the possible problem of heteroscedasticity. The Breusch-Pagan test revealed no evidence of conditional heteroscedastivity (χ^2=.01, p=.99).

[4]We examined reliability of the weighting bias estimates by calculating the average response to novel beans separately for blocks 1 and 2 of the test phase. The resulting regression residuals correlated significantly with each other, $r(320)=.52$, $p<.001$. In each of the studies reported in this paper, examination of estimates based on block one versus block two revealed similar results, with no consistent superiority for one block over the other.

[5]We found this relationship was driven mainly by the correlation between the weighting bias and ratings of how concerned participants would be about asking for the favor, $r(56)=-.24$, $p=.07$, rather than ratings of how likely the person was to comply with the request, $r(56)=-.07$.

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
X1	10	10	10			-10	-10	-10		
X2	10	10			-10	-10	-10			
X3						-10				
X4									10	
X5		-10						10	10	10
X6	-10	-10	-10						10	10
X7	-10	-10								
X8					10					
X9				10	10	10			-10	-10
X10			10	10	10			-10	-10	-10

Figure 1. Bean Matrix. X= shape from oval (1) to oblong (10). Y= number of speckles from 1 to 10. The cells with a point value present the beans presented during the game.

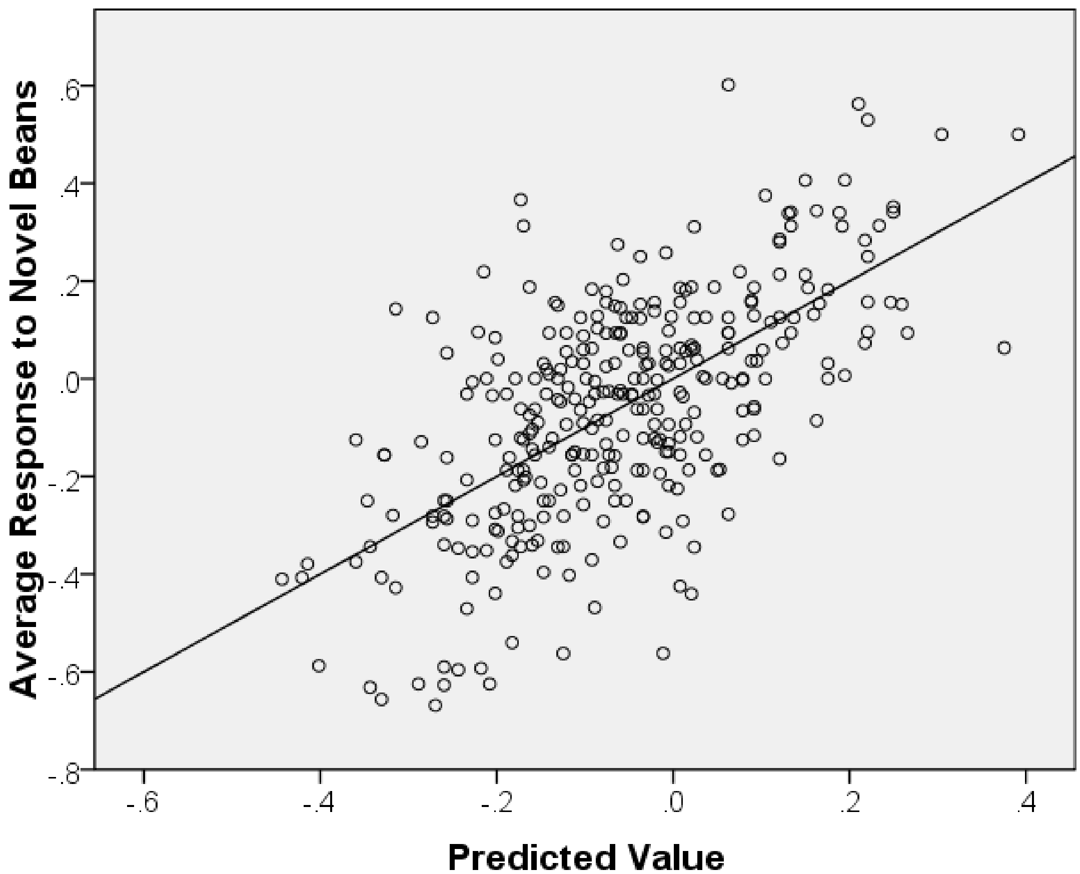

Figure 2. The predicted values from the regression equation and actual response to novel beans.

Table 1
Correlations between the six domains in the DRAS and the weighting bias

DRAS Domains	Weighting bias
Gamble	.29*
Recreational	.25*
Invest	.21
Social	.14
Ethical	.11
Health	.03
Composite	.29*

*p<.05