Of deadly beans and risky stocks: Political ideology and attitude formation via exploration depend on the nature of the attitude stimuli

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An attitude formation task examined how conservatives and liberals explore information about novel stimuli and form attitudes towards them. When framed as the BeanFest game, conservatives sampled fewer beans and exhibited a stronger learning asymmetry (i.e., better learning for negative than positive beans) than liberals. This has been taken as strong evidence that conservatives are more sensitive to negative stimuli than liberals. We argue that the learning asymmetry and sampling bias by conservatives is due to framing of the game. In addition to the BeanFest, we framed the game as StockFest (i.e., a stock market game) where participants learned about novel stocks. We replicated the pronounced learning asymmetry for conservatives in the BeanFest game, but found a pronounced learning asymmetry for liberals in the StockFest game. We suggest that conservatives and liberals are equally sensitive to negative stimuli but in different domains.

Statement of contribution

Shook and Fazio (2009, Journal of Experimental Social Psychology, 45, 995–998) used a food foraging game called BeanFest to show that conservatives explore novel food/health environments more cautiously and consequently form more negative attitudes than liberals (i.e., learn and remember more negative than positive beans). This finding is taken as strong evidence that conservatives are generally more negatively biased or threat-sensitive than liberals. However, it is not known whether such differences are independent or dependent on the nature of the task or stimuli. Although there are some indications that liberals may also be threat-sensitive in certain domains, most of the evidence comes from self-reported risk attitudes, which do not address the basic cognitive processes underlying attitude formation, including how liberals learn and remember negative information. We find that when the same task is framed as a stock market game, that is, StockFest, liberals explore novel financial environments more cautiously and consequently form more negative attitudes than conservatives (i.e., learn and remember more negative than positive stocks). Our findings show for the first time that conservatives do not generally form more negative attitudes than liberals. Rather, the basic cognitive processes underlying exploration of novel stimuli and attitude formation are similar for conservatives and liberals, but these processes are evoked by different kinds of stimuli.

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Background

It is commonly believed that conservatives and liberals differ in their psychological dispositions, which are assumed to explain their differences in political attitudes (Hibbing, Smith, & Alford, 2014; Hibbing, Smith, Peterson, & Feher, 2014; Jost, 2017; Jost, Glaser, Kruglanski, & Sulloway, 2003). Whereas evidence for these differences mostly comes from self-report measures, there is also evidence from basic cognitive functioning demonstrating that conservatives seem to explore and process negative information and, thereby, develop attitudes differently than liberals (Shook & Fazio, 2009).

In the current study, we argue that the difference in attitude formation could reflect the nature of the stimuli or task, rather than actual psychological differences between liberals and conservatives. To examine whether psychological processes are independent of the nature of the stimuli, one would have to vary the experimental stimuli as recommended by the representative stimuli sampling approach (Brunswik, 1947, 1955; Wells & Windschitl, 1999).

Based on this recommendation, we examine whether the assumed differences between liberals and conservatives are general differences or whether they are contingent on the nature of the stimuli. This procedure allows us to evaluate whether differences between liberals and conservatives are stimulus-unspecific (i.e., domain-general) or stimulus-specific (i.e., domain-specific).

Our study contributes to the existing literature by assessing for the first time whether basic cognitive processes of attitude formation through exploration of novel stimuli actually reflects fundamental psychological differences between liberals and conservatives when the stimuli are varied.

The Negativity Bias Hypothesis (NBH) is a recent influential proposal that links political attitudes to basic psychological and physiological reactions to negative information (Hibbing, Smith, & Alford, 2014). After reviewing a large body of evidence, the NBH suggests that the basic psychological difference between conservatives and liberals is conservatives’ greater sensitivity to negative stimuli compared to liberals. For example, conservatives exhibit stronger attentional biases (Carraro, Castelli, & Macchiella, 2011), physiological (Dodd, Hibbing, & Smith, 2011; Oxley et al., 2008) and neural responses to negative words, images, and sounds than liberals (Ahn et al., 2014; Amodio, Jost, Master, & Yee, 2007; Kanai, Feilden, Firth, & Rees, 2011). The NBH further argues that differences in negativity biases explain conservative’s greater support for protective policies, because they satisfy underlying needs to manage existential anxieties, a notion that has been echoed in many other studies (see Jost, 2017; Jost et al., 2003, for reviews).

Beyond evidence from self-report measures, strong support for the NBH comes from the intriguing study on the relationship among political ideology, information gain by exploration, and subsequent attitude formation (Shook & Fazio, 2009). The researchers argued that ideological differences in openness to experience may influence how conservatives and liberals explore their social world and form attitudes towards novel stimuli. They predicted that conservatives would exhibit greater caution in exploring novel stimuli that signal potential exposure to negative information. In contrast, liberals would tend to ignore signs of negativity and explore novel situations more indiscriminately. Conservatives’ cautious exploratory strategy would reduce their gain of information and, thereby, decrease correction of any potential negative attitudes towards the stimuli. Consequently, conservatives would exhibit a learning asymmetry and would overestimate the distribution of negative compared to positive stimuli. In contrast, liberal’s greater exploration will facilitate information gain, correction of negative
attitudes towards the stimuli, and consequently a balanced estimation of negative and positive stimuli.

To examine their hypothesis, Shook and Fazio (2009) used a performance task (called BeanFest) in which participants form attitudes based on the exploration of information about novel objects (Fazio, Eiser, & Shook, 2004). The game assesses how individuals explore their environment and form attitudes towards differently shaped and marked visual patterns of stimuli referred to as ‘beans’. The game requires participants to approach different beans in order to learn which are positive (i.e., good beans that increase points) and which are negative (i.e., bad beans that decrease points). If they approach a bean, they receive feedback that reveals whether the bean was negative or positive. If they avoid a bean, they do not receive feedback about the value of the bean. This means that only approach behaviour leads to gain or loss of points.

The findings from Shook and Fazio show that conservatives and liberals act differently in the game. Conservatives adopt a more cautious strategy by exploring fewer beans than liberals, whereas liberals adopt a more open strategy by exploring more beans than conservatives. Differences in exploration produce an asymmetry in learning as a consequence. Conservatives learn bad beans better than good beans (i.e., form more negative than positive attitudes), whereas liberals learn both bad and good beans equally well (i.e., form balanced attitudes). These findings are taken as strong evidence supporting the NBH (Hibbing, Smith, & Alford, 2014; Shook & Fazio, 2009).

The NBH argues that ‘in many respects, compared with liberals, conservatives tend to be more psychologically and physiologically sensitive to environmental stimuli generally but in particular to stimuli that are of negatively valenced, whether threatening or merely unexpected and unstructured’ (Hibbing et al., 2014, p. 303). Such a broad statement anticipates that conservatives would generally exhibit greater sensitivity to all kinds of negatively valenced stimuli than liberals. If this is true, then the relationship between political ideology and negativity bias is domain-general (i.e., does not depend on the type of negative stimuli).

However, one potential limitation of the NBH is that it conceptualizes negative valence very broadly but operationalizes this broad concept too narrowly. Critics have noted that most of the negative stimuli reviewed by the NBH may be subsumed under a general category of stimuli that have potential to cause direct physical or bodily harm (Crawford, 2017; Eadeh & Chang, 2019). Consequently, the functional stimuli sample size for the studies supporting the NBH is $N = 1$ (Wells & Windschitl, 1999). For instance, in the case of Shook and Fazio’s study (2009), only one instance of negative stimuli (i.e., bad or ‘poisonous’ beans) was used as experimental stimuli. This stimulus, arguably, falls under the category of food/health or the more general category of physically threatening stimuli. Besides these threats, there are other negative stimuli such as loss of money, poverty, financial scams, and bankruptcy. The NBH assumes, without explicitly testing, that conservatives would exhibit greater sensitivity to these categories of negative stimuli as well.

Under-sampling of a broad range of negative stimuli from non-physical domains poses a challenge for the NBH. First, stimuli under-sampling may overstate negativity bias in conservatives and understate negativity bias in liberals. For example, it is possible that liberals also exhibit greater negativity bias towards other stimuli besides physically threatening stimuli. But this may only be observed if other negative stimuli domains are included in research designs. Secondly, stimuli under-sampling precludes the generalizability of the findings to other stimulus domains (Brunswik, 1947; Kenny, 1985; Wells & Windschitl, 1999). For example, is negativity bias in conservatives restricted to physically
harmful stimuli or does this phenomenon generalize to non-physically harmful domains as well?

There is some indication that the relationship between ideology and negativity bias could be domain-specific (i.e., depends on the type of negative stimuli) rather than domain-general. Prior self-report studies demonstrate that the relationship between ideology and risk attitudes differs depending on the risk domain (Choma, Hanoch, Gummerum, & Hodson, 2013; Choma, Hanoch, Hodson, & Gummerum, 2014; Choma & Hodson, 2017). Using the domain-specific risk-taking (DOSPERT) scale, Choma et al. (2014) showed that, compared to liberals, conservatives report less risk propensity in ethical and social domains, whereas a trend of higher risk propensity for conservatives emerges in the financial domain. However, in the financial domain, a more complex pattern emerges (three-way interaction) whereby conservatives show higher risk propensity when expected benefits and risk perceptions are high. In a recent study, Choma and Hodson (2017) demonstrated that risk perception may also vary according to the conceptualization of ideology. They differentiate between social and economic conservatism and show that social conservatism (measured as right-wing authoritarianism) tends to be positively related to risk perception, whereas economic conservatism (measured via social dominance orientation) tends to be negatively related to risk perception (see also Choma et al., 2013).

Furthermore, recent studies using simulated stock markets and real-world investment portfolios have demonstrated that liberals are less likely to participate in the stock market (Han, Jung, Mittal, Zyung, & Adam, 2019; Kaustia & Torstila, 2011; Moore, Felton, & Wright, 2010), because they perceive the stock market to be a more dangerous and risky place to invest money than conservatives (Fiagbenu & Kessler, 2019). These findings reveal that conservatives may not be generally risk-averse than liberals as they report higher risk propensity in the financial domain.

Despite the above evidence, the NBH is still broadly accepted. In their most current meta-analytic evidence in support of the NBH, Jost et al. (2017, p. 345) emphasized that researchers should ‘agree on the basic fact’ . . . ‘that conservatives are somewhat more sensitive than liberals to potentially threatening stimuli’. Moreover, proponents of the NBH suggest that Shook and Fazio (2009) provide a convincing argument in support of the NBH because the findings reveal the basic learning and memory processes underlying how conservatives form negative attitudes more than liberals.

Although previous studies (Choma et al., 2013, 2014; 2017; Han et al., 2019) have shown that liberals report greater risk aversion in the financial domain than conservatives, differences in the basic processes of exploration and attitude formation remain to be examined with respect to broader stimuli sampling. If the NBH is valid, conservatives should equally show cautious exploratory behaviour and a learning asymmetry across a variety of stimuli. In contrast, if cautious exploration of novel stimuli and learning asymmetry depend on the quality of the stimuli, then liberals and conservatives should equally exhibit cautiousness and learning asymmetry towards different kinds of stimuli.

The aim of the current study is to examine whether the relationship among political ideology, exploration of novel stimuli, and attitude formation is domain-specific or domain-general. The BeanFest paradigm is suitable for examining our competing hypotheses because it is amenable to framing. Previous studies have shown that the BeanFest can be framed as a neutral game whereby participants play for points, or as a life and death game whereby participants play for energy points in order to survive and to avoid dying (Fazio et al., 2004). Whereas Shook and Fazio
(2009) used the bland or neutral version, we decided to use the negative version in order to examine how negative framing influences attitude formation as a function of political ideology. Consequently, in addition to the BeanFest, we considered a different variant of the game, which we call StockFest. StockFest is a wealth-bankruptcy game in which participants learn about the same visual patterns referred to as ‘stocks’. Buying good stocks increases wealth points, whereas buying bad stocks decreases wealth and results in bankruptcy. Both StockFest and BeanFest have exactly the same structure and are represented by the same visual patterns, but only differ by how they are framed.

Both games are suitable for investigating whether the relationship between political ideology, exploration, and attitude formation depends on the nature of the attitude stimuli or not. The domain-general hypothesis predicts that in both games, conservatives would show more cautious exploration and would consequently form more negative attitudes than liberals whereas liberals would exhibit greater exploration and would form more positive attitudes than conservatives. Alternatively, the domain-specific hypothesis predicts that in BeanFest, conservatives would exhibit greater caution and form more negative attitudes, whereas liberals will be more exploratory and would form more positive attitudes as a consequence. A reverse pattern is expected in StockFest whereby conservatives would exhibit greater exploratory behaviour and form more positive attitudes, whereas liberals would be more cautious and therefore form more negative attitudes.

Method
Participants
Two hundred and forty undergraduates from a medium-sized university in Germany were randomly assigned to play BeanFest, \(N = 115\), 72% female, \(M(SD) = 22.14(3.36)\), range = 18–34, or StockFest, \(N = 110\), 72% female, \(M(SD) = 21.75(3.26)\), range = 17–34. We aimed at increasing the statistical power of our study in order to detect the small to medium effects sizes reported by Shook and Fazio. Thus, for each game condition, we chose in advance to collect about twice (i.e., \(N = 120\)) the sample size used in the original BeanFest study. We terminated data collection as soon as the planned sample size was reached. Data from eight participants were excluded because of computer glitches during the learning or test phases of the experiment and another seven participants were excluded because of missing ideology scores.

Procedure
BeanFest consists of a virtual world filled with visual patterns called ‘beans’, (see Figure 1). The appearance of the beans varies along two attributes: shape (10 levels from round to oblong) and number of speckles (1–10). The levels of each attribute are combined to form a \(10 \times 10\) matrix of 100 beans. BeanFest consists of a game (or learning) phase and a test phase. The game phase consists of 36 beans that are carefully selected from different regions of the matrix (see Fazio, Eiser, & Shook, 2004 for details regarding the matrix). Of these, 18 are chosen as good beans and assigned a point value of +10 and 18 are bad beans with a point value of −10. The game requires learning to associate each type of bean with its value. All 36 game beans are presented individually in three blocks, making a total of 108 trials. In the
test phase, all 100 beans are presented to test how well the game beans were learned.

The goal of the game phase is to accumulate survival points by making good decisions about which beans to eat (approach) and which beans to reject (avoid). Survival in the game is represented by current energy level shown on the lower left of the screen. The energy level ranges from on 0 to 100 points. Reaching 0 indicates a loss and death, whereas reaching 100 indicates a win and survival. The energy level is adjusted according to the point value of the bean approached. Approaching a good bean increases energy by 10 points, whereas approaching a bad bean depletes energy by 10 points. Feedback about the value of a bean approached is immediately provided in the form of gain and loss of points. There is no loss or gain of energy when a bean is rejected. Thus, learning about a bean’s value is contingent upon approach behaviour.

The instructions (see Appendix) for the BeanFest game followed previous studies (Fazio, Eiser, & Shook, 2004; Shook & Fazio, 2009). After reading instructions, participants began the game with six practice trials. On each trial, each bean was randomly presented on the computer screen and participants pressed two keys corresponding to approach or avoid on a keyboard. Each participant began the game with 50 energy points. This was intended to provide a neutral point with respect to gain versus loss framing. Participants were notified after each win or loss and the game restarted at 50 points. They completed all 108 trials regardless of how many times they won or lost.

StockFest retained the same game structure as BeanFest. The same visual patterns of ‘beans’ were now referred to as ‘stocks’. In addition, StockFest was stripped of all references to food, eating, beans, and survival/death (see Appendix for instructions). Participants were instructed that StockFest was about foraging for stocks in a virtual stock market consisting of good and bad stocks. The goal is to accumulate wealth by making good decisions about which stocks to buy (approach) and which to reject (avoid). The current financial level is shown on the screen. Reaching 0 financial points represents a loss and bankruptcy, whereas reaching 100 financial points represents a win and solvency. To foster task engagement, a payoff scheme similar to Shook and Fazio’s study was provided. Participants received €1 for each win and 50 cents was deducted for each loss. Participants could win €0–€10.

After the game phase, participants completed the test phase, which assessed their learning of the beans or stocks. Each of the 100 stimuli was randomly presented and participants indicated which beans or stocks they believed to be helpful (i.e., increased energy points or financial points, respectively) or harmful (depleted energy points or financial points, respectively).

Following this, participants reported their political identity on a scale ranging from political left (1) to political right (5), BeanFest: $M(SD) = 3.40(1.13)$; StockFest: $M(SD) = 3.45(1.31)$. They also rated 24 political issues (e.g., ‘homosexuality’ and

![Figure 1. Example stimuli in the BeanFest and StockFest games.](image-url)
‘abortion’) ranging from disapproval (1) to approval (5) from the German version of the well-known Wilson-Patterson Conservatism Scale (Schiebel, Riemann, & Mummendey, 1984), BeanFest, α = .72, M = 3.19, SD = 0.35; StockFest, α = .79, M = 3.61, SD = 0.40. The single-item political identity measure and the political issue scores were correlated, in the BeanFest, r(113) = .60, p < .001, and the StockFest, r(108) = .65, p < .001. Thus, for each game condition, we averaged the two scores to create a single index of political ideology, with higher scores indicating greater conservatism. A similar pattern of results was obtained, using either measure by itself.

Results
BeanFest and StockFest game indices
Amount won
There was no difference in average amount of money won in BeanFest (M = 2.30€) and StockFest (M = 2.38€), t(222) = 0.37, p = .708, 95% CI = [−0.49, 0.33].

Approach behaviour
The average proportion of beans (M = 0.55) and stocks (M = 0.57) approached by participants did not differ as a function of framing, t(223) = 1.16, p = .247, 95% CI = [−0.07, 0.02].

Learning
To examine whether participants learned the beans and stocks, we computed the phi coefficient, a standard procedure used by previous BeanFest studies. The phi coefficient indexes the strength of the relationship between the actual valence of the stimuli and responses to the stimuli during the test phase. The average phi coefficient for beans was .39, which was much better than chance t(114) = 16.4, p < .001, 95% CI = [0.35, 0.44]. The average phi coefficient for stocks was .41, which was also much better than chance t(109) = 17.9, p < .001, 95% CI = [0.37, 0.46]. This indicates that participants did learn the beans and stocks rather than randomly responding to them. The average phi coefficient did not significantly differ for beans and stocks, t(223) = 0.59, p = .555, 95% CI = [−0.08, 0.05], indicating that the beans and stocks were learned equally well.

Learning asymmetry
Overall learning was above chance for bad beans (M = 0.76), t(114) = 14.65, p < .001, 95% CI = [0.73, Inf], and bad stocks (M = 0.75), t(109) = 13.58, p < .001, 95% CI = [0.72, Inf], as well as for good beans (M = 0.59), t(114) = 5.73, p < .001, 95% CI = [0.57, Inf] and good stocks (M = 0.63), t(109) = 7.92, p < .001, 95% CI = [0.59, Inf]. However, a 2 (Framing: BeanFest vs. StockFest) × 2 (Stimuli valence: bad vs. good) ANOVA with stimuli valence entered as a repeated measure revealed better learning of bad than good stimuli, F(1, 223) = 66.11, p < .001, η² = .22, 95% CI = [0.16, 0.31]. This indicates that a learning asymmetry emerged. The learning asymmetry did not differ as a

1 Factor analysis revealed a general factor of conservatism, rather than social and economic dimensions of conservatism, consistent with previous studies using the same scale (Fay & Frese, 2000; Schiebel et al., 1984).
function of framing, $F(1, 223) = 0.65, p = .421$, nor did framing moderate the learning asymmetry, $F(1, 223) = 1.28, p = .259$.

**Political Ideology and game indices**

**Correlations**

First, we examined the relationship between game indices and political ideology. Bivariate correlations are shown in Table 1. Average approach behaviour significantly correlated negatively with learning asymmetry in the BeanFest, $r(113) = -0.56, p < .001$, 95% CI $= [−0.68, −0.42]$, and in the StockFest, $r(108) = −.69, p < .001$, 95% CI $= [−0.77, −0.57]$, indicating that the more participants approached the beans or stocks, the smaller their learning asymmetry. Moreover, ideology significantly correlated negatively with average approach behaviour in the BeanFest, $r(113) = −.24, p = .011$, 95% CI $= [−0.40, −0.06]$, an indication that conservatives adopted a more cautious strategy by exploring fewer beans, whereas liberals adopted a more exploratory strategy by exploring more beans. In contrast, ideology significantly correlated positively with average approach behaviour in the StockFest, demonstrating that conservatives adopted a more exploratory strategy by exploring more stocks, whereas liberals adopted a more cautious strategy by exploring fewer stocks, $r(108) = .26, p = .005$, 95% CI $= [0.07, 0.43]$. The two correlation coefficients were not significantly different, $z = .15, p = .875$, indicating that conservatives and liberals approached the beans and stocks to the same extent in both games.

Furthermore, ideology significantly correlated positively with learning asymmetry in the BeanFest, $r(113) = .23, p = .014$, 95% CI $= [0.05, 0.39]$, an indication that the learning of positive and negative beans varies as a function of political ideology. However, a reverse pattern emerged whereby ideology significantly correlated negatively with learning asymmetry in StockFest, $r(108) = −.22, p = .022$, 95% CI $= [−0.39, −0.03]$, demonstrating that the learning of positive and negative stocks varies as a function of political ideology. The two correlation coefficients did not differ significantly from each other, $z = 0.08, p = .938$, indicating that the magnitude of the learning asymmetry was similar for conservatives and liberals in both games.

| Game indices                  | BeanFest    | StockFest   |
|-------------------------------|-------------|-------------|
| Average approach behaviour    | -.24**      | .26**       |
| Block 1 approach              | -.28**      | .22*        |
| Block 2 approach              | -.16        | .20*        |
| Block 3 approach              | -.22*       | .27**       |
| Overall learning              | .03         | .01         |
| Learning asymmetry            | .23*        | -.22**      |

**Notes.** Higher scores indicate greater conservatism. Phi coefficient between actual valence of bean (or stocks) and classification of the bean (or stocks) during the test phase. Proportion of negative beans correctly classified minus proportion of positive correctly classified. *p < .05; **p < .01.
**Simple mediation**

To examine the role of approach behaviour as a mediator in the relationship between ideology and learning asymmetry, we conducted separate mediation analyses for the BeanFest and the StockFest using PROCESS macro Model 4 (Hayes, 2013). The analyses revealed that the indirect effect of ideology on learning asymmetry through approach behaviour was significant in the BeanFest, \( b = 0.05, \text{SE} = 0.01, 95\% \text{CI} [0.01, 0.09] \), as well as in StockFest, \( b = -0.06, \text{SE} = 0.01, 95\% \text{CI} [-0.11, -0.02] \). These results replicate previous findings of the BeanFest, but reveal an opposite pattern in the StockFest game.

**Moderated mediation**

The analyses above suggest that the indirect effect of ideology on learning asymmetry through approach behaviour depends on the moderator (i.e., game framing). However, to demonstrate this formally, we examined whether ideology, framing (BeanFest vs. StockFest; effects coded −1 and 1, respectively), and their interaction significantly predicted approach behaviour and learning asymmetry. The moderation analysis showed that neither framing, \( b = 0.01, \text{SE} = 0.01, t(221) = 1.19, p = 0.235, 95\% \text{CI} [-0.01, 0.03] \), nor ideology predicted approach behaviour, \( b = 0.00, \text{SE} = 0.02, t(221) = 0.28, p = 0.779, 95\% \text{CI} [-0.04, 0.03] \). Similarly, framing, \( b = 0.02, \text{SE} = 0.02, t(221) = 1.15, p = 0.250, 95\% \text{CI} [-0.05, 0.01] \), or ideology, \( b = 0.01, \text{SE} = 0.02, t(221) = 0.32, p = 0.751, 95\% \text{CI} [-0.04, 0.06] \), did not predict learning asymmetry.

However, ideology \( \times \) framing significantly predicted approach behaviour, \( b = 0.06, \text{SE} = 0.02, t(221) = 3.79, p < 0.001, 95\% \text{CI}[0.03, 0.09] \), and learning asymmetry, \( b = -0.08, \text{SE} = 0.02, t(221) = 3.40, p = 0.001, 95\% \text{CI} [-0.13, -0.03] \). Test for conditional effects across game framing revealed that in BeanFest, average approach behaviour decreased significantly for conservatives (+1 SD above mean) compared to liberals (−1 SD below mean), \( b = -0.06, p = 0.007, 95\% \text{CI} [-0.11, -0.02] \); see Figure 2. The opposite pattern emerged in StockFest whereby approach behaviour increased significantly for conservatives compared to liberals, \( b = 0.05, p = 0.008, 95\% \text{CI} [-0.01, 0.09] \). Likewise, the learning asymmetry increased significantly for conservatives compared to liberals in BeanFest, \( b = 0.09, \text{SE} = 0.01, p = 0.014, 95\% \text{CI} [0.02, 0.16] \), but significantly decreased for conservatives compared to liberals in StockFest, \( b = -0.07, \text{SE} = 0.01, p = 0.019, 95\% \text{CI} [-0.14, -0.01] \); see Figure 2.

**Discussion**

In the current study, we presented an attitude formation task in two framings (BeanFest and StockFest) and examined the information exploration and attitude formation of liberals and conservatives. The different framings examined two competing hypotheses: (1) conservatives generally react more strongly to negative stimuli from all domains than liberals (Hibbing, Smith, & Alford, 2014; Jost *et al.*, 2003) and (2) both conservatives and liberals react to negative information but within specific domains (Choma *et al.*, 2014; Choma & Hodson, 2017). Consistent with previous findings (e.g., Shook & Fazio, 2009), the results show in the BeanFest condition that conservatives are more cautious in exploring novel information and consequently form more negative attitudes than liberals. This evidence supports the Negativity Bias Hypothesis (Hibbing, Smith, & Alford, 2014). However, in the StockFest condition, the pattern reverses. Here, conservatives are less
cautious in exploring novel information and consequently form less negative attitudes than liberals, which contradicts the Negativity Bias Hypothesis.

Taken together, the current findings support the idea that the relationship between ideology and negativity bias depends on the domain of the negative stimuli. Conservatives did not reveal a general tendency to form more negative attitudes towards beans and stocks than liberals. Rather, conservatives were more cautious in the BeanFest game, but more exploratory in the StockFest game. The reverse is true for liberals. Consequently, these findings reveal for the first time that the basic learning and memory mechanisms involved in attitude formation via exploration of novel stimuli are similar for conservatives and liberals, but such processes are evoked by different stimuli.

Conservatives’ greater fear of loss and intolerance of uncertainty (Jost et al., 2003) were revealed in the life-death situation simulated in BeanFest. Their greater reluctance to explore the beans reflects their greater tendency to avoid situations that signal potential threat to physical safety. In contrast, liberals’ greater exploration of the beans suggests that they are more open to approaching situations that may potentially violate their physical safety. These findings directly replicate previous results from Shook and Fazio (2009) and are also consistent with studies showing that conservatives are more sensitive to physical threats than liberals (Hibbing, Smith, & Alford, 2014; Jost et al., 2003).

However, a reverse pattern of behaviour was observed when the task was framed as a wealth-bankruptcy game as simulated in StockFest. Here, conservatives explored more stocks than liberals, indicating that in novel situations where there is a possibility to accumulate wealth, conservatives are more willing to expose themselves to potentially threatening information than liberals. In contrast, liberals adopted a more cautious strategy by exploring fewer stocks than conservatives, indicating that liberals are less willing to explore novel financial situations because of their greater fear of potential financial harm than conservatives. These findings are consistent with studies showing that liberals and conservatives differ in their reported risk propensity across domains (e.g., health, finance; Choma et al., 2014; Kaustia & Torstila, 2011). It is also consistent with

Figure 2. Results of the moderation analyses. Average approach behaviour (a) and learning asymmetry (b) as a function of ideology and game framing.
conservatives’ greater affinity and interest in money (Sheldon & Nichols, 2009) and business-related themes relative to liberals (Kemmelmeier, Danielson, & Basten, 2005).

Our domain-specific account concurs with the previous domain-general account espoused by the NBH because it acknowledges deep-seated ideological differences between liberals and conservatives. However, it is inconsistent with the domain-general account because it suggests that ideological differences are often malleable and influenced by different contextual features. Consequently, the current findings build on previous studies that suggest that ideology and context interact. One may argue that the interactionist approach enriches our understanding regarding how and what makes ideological differences and similarities wax and wane across different situations.

The findings also illustrate the value of stimuli sampling in political psychology. Wells and Windschitl (1999) stressed that insufficient stimuli sampling (i.e., ‘the use of multiple instances of a stimulus category in research’, p. 1115) is a ‘serious problem that plagues a surprising number of experiments’ (p. 1115). The present study extends this argument to assess ideological differences in threat perception. The examination of individual differences with a limited selection of stimuli may lead to spurious findings of differences that may actually reflect the selection of the stimuli used in the studies. For example, the assumption that conservatives are more resistant to social change than liberals is true only with some political and societal issues but reverses with other issues (Proch, Elad-Strenger, & Kessler, 2019). Similarly, higher disgust sensitivity of conservatives reflects the selection of items used in disgust scales rather than actual differences between liberals and conservatives (Elad-Strenger, Proch, & Kessler, 2019).

One important extension of the present study is that stimulus sampling also affects basic processes of information exploration and attitude formation in addition to self-reported opinions and attitudes. Although the present study did not randomly sample stimuli, we have been successful in using two instances (i.e., financial threat and physical threat) of a stimuli category (i.e., negative) to demonstrate that the relationship between political ideology and negativity bias depends on characteristics of the stimuli category. By doing so, our study is the first to show that the basic cognitive processes underlying political ideology, exploration, and attitude formation depend on the nature of the attitude stimuli.

The current study has some limitations that raise questions for future research. Choma and Hodson (2017) showed that right-wing authoritarianism is positively related to risk perception, whereas social dominance orientation is negatively related to risk perception. However, in many situations, both scales are highly correlated which may render differential predictions unstable (Roccato & Ricolfi, 2005). Moreover, whereas Choma and Hodson (2017) directly measured risk attitudes of participants, our experimental procedure assessed how attitudes are formed via information exploration of novel stimuli, which may not necessarily be related to risk-taking (Fazio et al., 2004).

Secondly, in contrast to Shook and Fazio (2009), we did not examine ideological differences in attitude formation in a ‘neutral’ context. It is therefore unclear whether results observed by Shook and Fazio in the ‘neutral’ BeanFest would also emerge in a ‘neutral’ StockFest. However, since all framings relate to some content, it is not clear whether there can actually be a neutral framing context. This is a reason to use stimulus sampling as a method to examine whether assumed differences between liberals and conservatives are domain-general or domain-specific.

Finally, whereas the present study shows that task framing influences the relationship between ideology and attitude formation, it does not address mechanisms behind the reversal of attitude formation in conservatives and liberals. However, we hope that the
current findings would encourage increased scrutiny of whether other presumed differences between liberals and conservatives are due to the nature of the stimuli with which these differences are assessed.

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**Data Availability Statement**

Research data are not shared.

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Appendix

BeanFest instructions
Humans spend a lot of time deciding which foods are worth eating and which foods are not. Eating good food is necessary for good health and long-life. In contrast, eating bad food may result in malnutrition, illness, or even death. It is therefore necessary to eat good food and avoid bad food. This is a game we call BEANFEST, which involves eating beans. Good beans are positive and are helpful because they increase your health points. Bad beans are negative and are harmful because they decrease your health points. The goal of the game is to carefully learn which beans are good to eat and which beans are bad to avoid. To learn which beans are good or bad, it is important to know that they vary in two ways: from circular to oval to oblong and from one to few to many speckles as shown in Figure A1. On each trial, you will be presented with a bean as shown in Figure A2 and must decide within 5 s whether or not to choose to eat it by using the corresponding keys on the keyboard. If you decide to choose the bean, you will gain 10 health points if it is a good bean, or you will lose 10 health points if it is a bad bean. If you decide not to choose it, it will have no effect on your total health points. Feedback about your decision and the effect of the bean and your points would be displayed as shown in Figures A3, A4, and A5. Use the feedback to guide your decision to choose or avoid the bean on future trials. The health meter displays your current health points as a green and red bar. You can win or lose health points ranging from 0 to 100. You will start the game with 50 health points. Reaching health 100 points represents winning the game which means survival. Reaching 0 health points represents losing the game which means death.

Try to get as many wins as possible and avoid dying! After each win or loss, you will restart the game with 50 points. The game phase is divided into three sessions. At the end of each session, you may decide to take a short rest or continue.

Figure A1. Example of bean types that you will see.
After the game is over, you will be shown each bean again without a health meter as shown in Figure A6. We want you to judge which beans you believe to be helpful or harmful by using the respective keys on the keyboard. No feedback will be displayed. If you are unsure, you may guess. Each bean would be presented for 5 s, so try to respond as accurately and as quickly as possible.

**StockFest instructions**

Investors spend a lot of time deciding which stocks are worth buying and which stocks are not. Buying good stocks increases investment profits, which increases wealth and financial security. In contrast, buying bad stocks may result in losing lots of money or even bankruptcy. It is therefore necessary to buy good stocks and avoid bad stocks. This is a
game we call STOCKFEST, which involve choosing stocks. Good stocks have a positive value and are helpful because they increase your profit points. Bad stocks have a negative value and are harmful because they decrease your profit points. The game has two phases, that is, a learning phase and a test phase. The goal of the learning phase is to carefully learn which stocks are good to buy and which beans are bad to avoid. To learn which stocks are good or bad, it is important to know that they vary in two ways: from circular to oval to oblong and from one, to few to many speckles as shown in Figure A1. On each trial, you will be presented with a stock as shown in Figure A2 and you must decide within 5 s whether or not to choose to buy it by using the corresponding keys on the keyboard. If you decide to choose the stock, you will gain 10 profit points if it is a good stock, or you will lose 10 profit points if it is a bad stock. If you decide not to choose it, it will have no effect on your total profit points. Feedback about your decision and the effect of the stock and your points would be displayed as shown in Figures A3, A4, and A5. Use the feedback to guide your decision to choose or avoid the stock on future trials. The profit meter displays your current profit points as a green and red bar. You can win or lose points ranging from 0 to 100. You will start the game with 50 points. Reaching 100 points represents winning the game which means you are currently accumulating wealth. Reaching 0 points represents losing the game which means bankruptcy.

Try to get as many wins as possible and avoid bankruptcy! After each win or loss, you will restart the game with 50 points. The study phase is divided into three sessions. At the end of each session, you may decide to take a short rest or continue.

After the game is over, you will be shown each stock again without a profit meter as shown in Figure A6. We want you to judge which stocks you believe to be helpful or harmful by using the respective keys on the keyboard. No feedback will be displayed. If you are unsure, you may guess. Each stock would be presented for 5 s, so try to respond as accurately and as quickly as possible.

![Figure A5. Feedback after choosing a bad bean.](wileyonlinelibrary.com]

![Figure A6. A bean as shown on the test phase.](wileyonlinelibrary.com]