



## Benefits of being ambivalent: The relationship between trait ambivalence and attribution biases

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Ambivalence refers to the experience of having both positive and negative thoughts and feelings at the same time about the same object, person, or issue. Although ambivalence research has focused extensively on negative consequences, recently, scholars turned their lens to the positive effects of ambivalence, demonstrating beneficial effects on judgements and decision-making processes. So far, this work has focused on state ambivalence, which is ambivalence as a direct response to a specific stimulus. However, there are substantial individual differences in ambivalence: Some people are just more ambivalent than others. Taking a first step in understanding how these individual differences relate to judgement and decision-making, we examine the relationship between trait ambivalence and cognitive bias in social judgements tasks. Specifically, we look at two of the most pervasive and consequential attribution biases in person perception: correspondence bias and self-serving bias. We find a negative relationship between trait ambivalence and correspondence bias. The higher individuals are in trait ambivalence, the smaller their bias towards attributing behaviour to a person's disposition (Study 1A and B). We find the same for self-serving bias (Study 2A and B). In sum, we show that trait ambivalence is negatively related to cognitive bias in person perception.

In everyday life, people often encounter situations in which they have mixed feelings (Trampe *et al.*, 2015). For instance, people can love a pecan pie for its great taste, while disliking it at the same time because of its high-calorie content. This experience, having both positive and negative thoughts and feelings at the same time, is called ambivalence (Cacioppo & Berntson, 1994; Kaplan, 1972; Larsen, McGraw, & Cacioppo, 2001; Priester & Petty, 1996; Schneider & Schwarz, 2017; van Harreveld *et al.*, 2015). Ambivalence is at the heart of many topics that people care deeply about. For instance, people can feel ambivalent about their romantic partner (Righetti *et al.*, 2020), their parents (Luescher & Pillemer, 1998; Maio *et al.*, 2000), vegetarianism (Povey *et al.*, 2001), abortion (Alvarez & Brehm, 1995; Schneider *et al.*, 2015), college graduation (Larsen *et al.*, 2001), marriage (Signorielli, 1991), exercise and food choices (Gillebaart *et al.*, 2016; Sparks *et al.*, 2004), and organ donation (Nohlen *et al.*, 2014), and.

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Research on ambivalence has mostly focused on its negative consequences, such as indecision, negative affect, and procrastination (for an overview, see van Harreveld *et al.*, 2015). However, recently scholars have started to focus on the potentially positive effects, in particular by showing that ambivalence is related to more balanced and accurate judgement and decision-making (Guarana & Hernandez, 2016; Pillaud *et al.*, 2013, 2018; Rees *et al.*, 2013; Rothman *et al.*, 2017). So far, this work has focused on state ambivalence, an experience that emerges in response to a specific stimulus. However, there is evidence that there are also stable individual differences in ambivalence (Simons *et al.*, 2020; Thompson & Zanna, 1995). That is, some people are chronically more ambivalent than others.

Research showing individual differences has mostly been data driven. For instance, in one study, participants rated different topics for ambivalence. Then, the internal coherence of the ratings within participants was assessed using Cronbach's alpha. The idea was that if the participant's ambivalence towards different attitude objects reliably co-varied with each other, this suggested individual differences. Indeed, individual ratings were related, with alphas of .66 and .77 (Thompson & Zanna, 1995). More recently, these findings were extended by work using multi-level modelling approaches, a larger data set, and a wider range of attitude objects. In this study, interindividual differences accounted for 16%–28% of the variance in state ambivalence over all included attitude objects (Simons *et al.*, 2020). These findings demonstrate that differences in ambivalence reflect a general tendency to be more ambivalent over situations and attitude objects. Thus, trait ambivalence can be conceptualized as an individuals' baseline level of undirected state ambivalence. We suggest that because of this, it will have similar positive effects on biased judgements as state ambivalence.

In this work, we extend previous research on the positive effects of state ambivalence in two ways. First, we examine the effect of trait ambivalence, focusing on individual differences rather than incidental states. Second, we examine bias in person perception. Although research has focused on the relationship between ambivalence and decision-making processes, its role in social judgement and behaviour has received less attention. Yet, insight in interpersonal consequences is crucial for understanding ambivalence in social and work life (Belkin & Rothman, 2017; Rothman & Melwani, 2017; Rothman & Northcraft, 2015; Rothman & Vitriol, 2018). As a first step in understanding the role of trait ambivalence in these domains, we turn to the most prevalent and persistent judgement biases in person perception, self-serving bias and correspondence bias. Because these biases are so well researched, the paradigms used to investigate them are robust and widely replicated (Gilbert & Malone, 1995; Jones, 1979, 1990; Jones & Nisbett, 1987; Krull *et al.*, 1999; Mezulis *et al.*, 2004; Ross, 1977), providing a solid testing ground for our ideas. Below, we describe each bias in brief.

Correspondence bias in social judgement relates to how people judge others. When interpreting other people's behaviour (e.g., someone slips on a banana peel), people tend to neglect the impact of external forces (the banana peel) and overestimate the role of factors that are internal to the person ('she is clumsy') (for a comprehensive overview, see Gawronski, 2004). So, despite clear evidence that external forces such as social history, situational factors, or the current environment often shape behaviour, people tend to interpret behaviour they observe mainly as a manifestation of qualities that are internal to the actor. The correspondence bias is among the most researched cognitive biases in social perception and 'the most robust and ubiquitous finding in the domain of interpersonal perception' (Jones, 1990, p. 164).

The second bias we examine is related to judging oneself. When interpreting own behaviour, people tend to attribute success (e.g., scoring well on a test) more strongly to internal ('I am smart') than to external factors ('The test was easy'). Conversely, people tend to attribute failure more strongly to external ('The test was bad') than to internal factors ('I didn't study enough'). The self-serving bias is positively related to self-esteem and self-regulation (for a review, see Blaine & Crocker, 1993) and influences real-life behaviour in work-related contexts (Larwood & Whittaker, 1977) and relationship contexts (Sedikides *et al.*, 1998) – among others.

Both biases described above fall into the class of attribution biases. Attribution biases are quantified as the difference in strength between internal and external attributions (Kitayama *et al.*, 2006; Sedikides *et al.*, 1998). Thus, when an individual makes very strong internal attributions but no external attributions (or vice versa), this large difference constitutes maximum bias. At the other end of the spectrum, when individuals' internal and external attributions do not differ in strength at all – that is, they are equally strong – there is no bias either way. As noted above, when people are in a state of ambivalence, they tend to be less biased in the information they seek out and weigh, incorporating multiple, rather than one, sides of an issue (Fong, 2006; Rees *et al.*, 2013; Rothman *et al.*, 2017).

Building on this, we suggest that trait ambivalence should lead to a smaller bias in attribution biases, because higher trait ambivalence is associated with a smaller difference between internal and external attributions. An example makes this clear. Consider again the person slipping over the banana peel. An individual low in ambivalence presumably focuses on one side of the issue: They assume the person slipped because they are clumsy (internal attribution) – all but neglecting the fact that the banana peel had an influence (external attribution). Here, there is a large difference between internal and external attributions, and thus large bias. In contrast, an individual high in ambivalence is more balanced in their judgement: They might also think the person is clumsy, but they also believe the person slipped because there was a banana peel on the floor. Here, there is a small difference between the strengths of attributions and, thus, small bias.

To summarize, we expect that the difference in strength between internal and external attributions should be smaller to the degree that individuals are higher in trait ambivalence, leading to a negative relationship between trait ambivalence and attribution biases (i.e., correspondence bias and self-serving bias).

### **Current studies**

Below, we report the results of four studies in which we examine the relationship between trait ambivalence and degree of correspondence bias (Study 1A & B) and self-serving bias (Study 2A & 2B). In all studies, we measured trait ambivalence using the Trait Ambivalence Scale, which we describe below. We report how we determined our sample size, all data exclusions (if any) and all measures in the studies. All participants were treated in accordance with the ethical guidelines from the American Psychological Association (American Psychological Association, 2017). Data, materials, and analyses scripts can be found here: (<https://osf.io/4vp3c/>).

**Table 1.** Trait Ambivalence Scale (TAS) with Item-level Results for Reliability and Factor Analyses. Instructions: Please indicate for each statement how much it applies to you. Scale ends: 1 Does not apply to me - 7 Strongly applies to me. Scoring: average over all items

Item	$\alpha$ if item deleted	ITC	Factor loading
1. My thoughts are often contradictory	.884	.674	.719
2. Many topics make me feel conflicted	.883	.684	.735
3. I usually see both the positive as well as the negative side of things	.900	.394	.438
4. I often experience both sides of an issue pulling on me	.882	.697	.724
5. I often find that there are pros and cons to everything	.899	.415	.459
6. I often feel torn between two sides of an issue	.879	.744	.785
7. Most of the time, my thoughts and feelings are not necessary in accordance with each other	.885	.647	.701
8. Sometimes when I think about a topic, it almost feels like I am physically switching from side to side	.884	.668	.711
9. My feelings are often simultaneously positive and negative	.883	.679	.727
10. I often experience that my thoughts and feelings are in conflict when I'm thinking about a topic	.876	.788	.848

### **Trait ambivalence scale**

The items of the Trait Ambivalence Scale (TAS) are based on theory and previous research on state ambivalence (See Table 1). The ten items reflect experiences related to state ambivalence but worded as a general tendency. Three items assess the tendency to feel both positive and negative simultaneously, a central property of ambivalence (Kaplan, 1972; Thompson *et al.*, 1995; van Harreveld *et al.*, 2015) (items 3, 5, and 9). Four items are based on items taken from well-validated state measures of ambivalence (Jamieson, 1993; Priester & Petty, 1996) (items 2, 6, 7, and 10). Two items are based on the metaphorical linguistic associations with the experience of ambivalence (Kwapil *et al.*, 2002; Schneider *et al.*, 2013) (items 4 and 8), and one item reflects the contradictory nature of ambivalence (item 1).

### *Reliability and factor analyses*

In the sample collected for Study 1A ( $N = 229$ , detailed sample description under Study 1A), Cronbach's alpha for the 10 ambivalence items was .90. Cronbach's alpha when an item is deleted is presented in Table 1, as are corrected item total correlations (ITC). The alpha for the TAS was not substantially improved by the removal of any of the items. ITCs were acceptable with all above .35. We extracted a single factor using principal axis factoring, which explained 52% of the variance in responses (first five eigenvalues = 5.25, 1.55, .61, 0.57, and 0.48). See Table 1 for all factor loadings. Factor loadings for all items were above .40 or higher (See Table 1) and are considered acceptable.

## **STUDY 1A & 1B: TRAIT AMBIVALENCE AND CORRESPONDENCE BIAS**

In Study 1A & 1B, we examined the relationship between trait ambivalence and correspondence bias. We predicted that the higher individuals are in trait ambivalence,

the less correspondence bias they show. Study 1A is the first test; Study 1B is a high-powered direct replication. The pre-registration is available here: <http://aspredicted.org/blind.php?x=gd229p>.

## Method

### Participants and design

For Study 1A, two hundred and forty-six participants (121 females, 107 males, 18 unreported,  $M_{age} = 36.33$ ,  $SD = 11.28$ ) and, for Study 1B, six hundred thirty-three (323 females, 310 males,  $M_{age} = 36.81$ ,  $SD = 16.64$ ) were recruited from Amazon Mechanical Turk and paid \$0.40 for completing a four-minute survey. We measured correspondence bias and trait ambivalence in all participants. The sample size for Study 1A was based on research on correlations suggesting that most correlations stabilize around 250 participants. The sample size of Study 1B was based on the effect size of Study 1A. In case the effect size of Study 1A was inflated, we decided to collect 625 participants. Given  $\alpha = .05$ , this would give us .99 power with an effect size of  $r = .19$  (effect size found in Study 1A), but – in case this effect size was inflated, also .98 power to detect  $r = .15$  and .80 power to detect  $r = .10$ .

### Procedure

To measure participants' degree of correspondence bias, they read four scenarios (see procedure used by Genschow, Rigoni, & Brass, 2017, based on Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006). In each scenario, a protagonist engaged in certain behaviour. After reading each scenario, participants indicated their (dis)agreement with four statements. Two statements measured the participants' attribution to external factors (i.e., the situation), and two measured the attribution to internal factors (i.e., the person) on seven-point rating scales (1 = *strongly disagree*; 7 = *strongly agree*). We then averaged the ratings for external and internal attributions and calculated correspondence bias scores by subtracting the attribution to external factors from attribution to internal attributions, higher scores on this index indicate stronger attribution to internal than to external factors.

All participants filled out the Trait Ambivalence Scale. We calculated the overall score by averaging responses to the ten items. Finally, we asked for gender, age, native language and highest educational degree (the latter two variables were not analysed and not reported here).

### Results Study 1A

First, in line with previous work (Kitayama *et al.*, 2006) participants ascribed the protagonists' behaviours more to internal factors ( $M = 5.72$ ,  $SD = .99$ ) than to external factors ( $M = 4.57$ ,  $SD = 1.06$ ),  $t(233) = 13.820$ ,  $d_z = .090$ , 95% CI [.75, 1.05],  $p < .001$ , validating the paradigm. More importantly, in line with our prediction, trait ambivalence ( $\alpha = .90$ ;  $M = 3.9$ ,  $SD = 1.21$ ) was negatively correlated to correspondence bias ( $M = 1.15$ ,  $SD = 1.27$ ),  $r(229) = -0.19$ , 95% CI [-.31, -.06],  $p = .004$ .

### **Exploratory analyses Study 1A**

As an exploratory analysis, we examined the relationship between trait ambivalence and external attribution and internal attribution separately. Trait ambivalence was positively related to external attribution ( $M = 4.57$ ,  $SD = 1.06$ ),  $r(229) = .27$ , 95% CI [.14, .38],  $p < .001$ . This means that the higher participants were in trait ambivalence, the more they attributed behaviour to the situation. However, we did not find a significant relationship between trait ambivalence and internal attribution ( $M = 5.71$ ,  $SD = 0.99$ ),  $r(229) = .04$ , 95% CI [-0.09, .17],  $p = .547$ . Thus, individuals did not differ in the degree to which they attributed the behaviour to the person.

### **Results Study 1B**

As in Study 1A, participants attributed the protagonists' behaviours more to internal factors ( $M = 5.65$ ,  $SD = .93$ ) than to external factors ( $M = 4.57$ ,  $SD = 1.04$ ),  $t(639) = 21.071$ ,  $d_z = .083$ , 95% CI [.74, .92],  $p < .001$ . More importantly, and consistent with our hypothesis and also as in Study 1A, we found a negative correlation between trait ambivalence ( $\alpha = .90$ ,  $M = 4.04$ ,  $SD = 1.2$ ) and correspondence bias ( $M = 1.08$ ,  $SD = 1.29$ ),  $r(632) = -0.23$ , 95% CI [-0.30, -.15],  $p < .001$ , again showing that the higher individual's trait ambivalence, the less bias in judging other person's behaviour.

### **Exploratory analyses Study 1B**

Exploratory analyses showed that trait ambivalence was positively related to external attribution, ( $M = 4.57$ ,  $SD = 1.04$ ),  $r(632) = .25$ , 95% CI [.18, .32],  $p < .001$ . However, we did not find a significant relationship between trait ambivalence and internal attribution ( $M = 5.65$ ,  $SD = 0.93$ ),  $r(632) = -.04$ , 95% CI [-0.04, .12],  $p = .345$ . Thus, while trait ambivalence was related to attributions to the situation, it did not seem related to attribution to the person.

## **STUDY 2A AND 2B: SELF-SERVING BIAS**

In Study 2, we examine the effect of trait ambivalence on attribution bias in the domain of self-judgements by assessing self-serving bias. Self-serving bias is the tendency to attribute one's success more strongly to internal factors and one's own failure more strongly to external factors. Based on the correlation of  $-.19$  found in Study 1A, and given  $\alpha = .05$ , 95 power to detect this effect size would require 262 participants. The study was pre-registered here: <http://aspredicted.org/blind.php?x=r2aq7j>. The power analysis for Study 2B was based on Study 2A, where we found a (non-significant) correlation of  $-.10$ . Given  $\alpha = .05$ , 650 participants would give us .82 power to detect this effect size, but in case the first study showed a depressed effect size, also 99% power if the effect size is  $r = .20$ . Study 2B was pre-registered here: <http://aspredicted.org/blind.php?x=iw6cx4>.

## **Method**

### **Participants and design**

For Study 2A, we recruited three hundred and one participants (127 females, 170 males, 1 other,  $M_{age} = 38.19$ ,  $SD = 12.59$ ) through Amazon Mechanical Turk and paid them \$0.40 for completing a four-minute survey. For Study 2B, we recruited six hundred and fifty-two

participants (294 females, 353 males, 5 unreported,  $M_{age} = 37.90$ ,  $SD = 11.57$ ) from Amazon Mechanical Turk. We paid them \$0.60 for completing a six-minute survey (after Study 2A, we realized that the survey took longer than we thought and increased pay). Self-serving bias was assessed using a 2 (achievement: success vs. failure) by 2 (attribution: internal vs. external) within-subjects design. We measured trait ambivalence for all participants in the same way as in Study 1A and B.

### Procedure

To assess self-serving bias, we adapted a well-established paradigm (Sedikides *et al.*, 1998) in which participants engaged in two achievement tests. In each test, we presented participants with twenty anagrams and asked them to solve as many as possible within 2 minutes. After each test, they received bogus feedback about their performance. Crucially, each participant received positive feedback on one test ('*You have performed better than 93% of the normative sample*') but negative feedback on the other test ('*You have performed worse than 69% of the normative sample*'), regardless of their actual performance (which we did not assess). After each test, participants indicated their agreement with four statements that gave explanations for their test results on a scale ranging from 1 (*not at all*) to 7 (*very much*). Two of the statements related to internal factors (i.e., 'My skills' and 'The effort I put into answering the questions'), and two related to external factors (i.e., 'The selection of anagrams' and '(Bad) luck'). We then computed a score for success attributions by subtracting external attribution ratings of success from internal attribution ratings of success and did the same for failure attributions. Then, we subtracted the failure score from the success score to obtain an overall self-serving bias score, where higher scores indicate more bias.

At the end of the study, we asked participants to indicate which of the two tests they performed better on as an attention check. Data from participants who did not answer this question correctly were excluded from analyses, because it we could not be sure that they had properly read the instruction and test-feedback. At the end of the study, participants indicated their gender, age, religious beliefs, and highest education (the latter two were not analysed). Finally, participants were debriefed and informed that the test was not a measure of intelligence and that the feedback did not reflect their performance.

## Results

### Results Study 2A

We excluded data of nine participants who did not pass the attention check.<sup>1</sup> To test for the presence of the self-serving bias, we ran a 2 (achievement: success vs. failure) by 2 (attribution: internal vs. external) ANOVA. We found an interaction between achievement and attribution,  $F(1, 292) = 250.62$ ,  $p < .001$ ,  $\eta_p^2 = .46$ . Participants attributed their success more to internal ( $M = 5.66$ ,  $SD = 1.11$ ) than to external factors ( $M = 4.14$ ,  $SD = 1.10$ ),  $t(291) = 16.235$ ,  $p < .001$ . However, participants attributed their failure less strongly to internal than ( $M = 4.64$ ,  $SD = 1.53$ ) than external factors ( $M = 5.08$ ,  $SD = 1.78$ ),  $t(291) = -4.285$ ,  $p < .001$ . These findings show self-serving bias was present in this paradigm.

<sup>1</sup> Because the number of excluded participants was small, we did not replace them with new participants (as stated in the pre-registration).

More important for our hypothesis, we found that trait ambivalence ( $\alpha = .92$ ,  $M = 3.89$ ,  $SD = 1.30$ ) was negatively correlated to the strength of self-serving-bias ( $M = 1.97$ ,  $SD = 2.12$ ),  $r(292) = -.10$ , 95% CI  $[-.21, .02]$ ,  $p = .092$ , albeit not statistically significant.

### **Exploratory analyses Study 2A**

We performed the same exploratory analyses as in Study 1A and 1B and found that trait ambivalence was positively related to external attribution ( $M = 4.62$ ,  $SD = 1.18$ ),  $r(292) = .18$ , 95% CI  $[.07, .29]$ ,  $p = .002$ . This means that the higher participant's trait ambivalence, the more they attribute their outcomes to the situation (over both success and failure). However, we did not find a significant relationship between trait ambivalence and internal attribution ( $M = 5.15$ ,  $SD = 1.04$ ),  $r(292) = .06$ , 95% CI  $[-.06, .17]$ ,  $p = .321$ . Thus, individuals did not differ in the degree to which they ascribed outcomes to themselves. This pattern is in line with the findings of the exploratory analyses of studies 1A and 1B.

### **Results Study 2B**

Thirty-three participants failed the attention check, and their data were excluded from analyses. In line with previous work, and Study 2A, there was an interaction between achievement and attribution,  $F(1, 618) = 403.38$ ,  $p < .001$ ,  $\eta_p^2 = 0.40$ . In line with previous work, this interaction showed that participants attributed their success more to internal ( $M = 5.37$ ,  $SD = 1.33$ ) than to external factors ( $M = 3.83$ ,  $SD = 1.13$ ),  $t(618) = 22.963$ ,  $p < .001$ . However, participants attributed their failure more strongly to external factors ( $M = 4.80$ ,  $SD = 1.78$ ) than to internal factors ( $M = 4.49$ ,  $SD = 1.54$ ),  $t(618) = -3.943$ ,  $p < .001$ , demonstrating again self-serving bias.

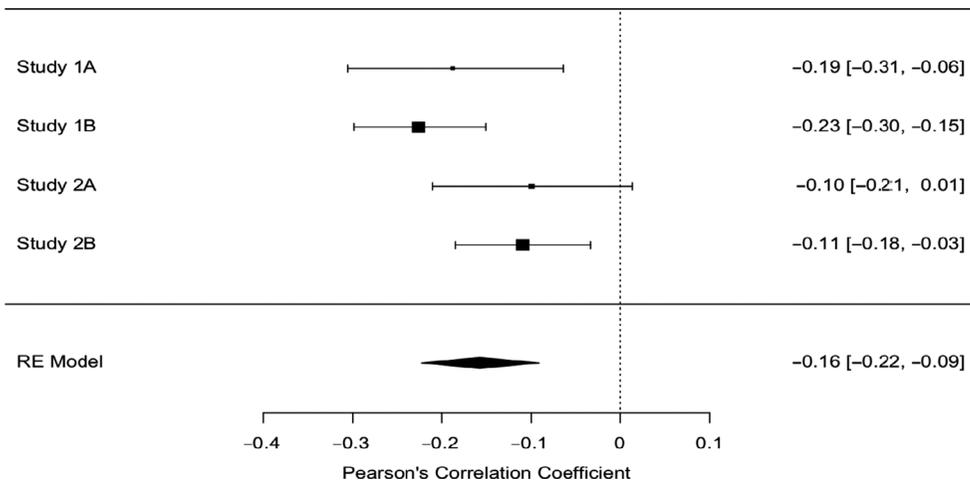
Crucial for our hypothesis, trait ambivalence ( $\alpha = .91$ ,  $M = 3.92$ ,  $SD = 1.27$ ) was negatively correlated to self-serving-bias ( $M = 1.84$ ,  $SD = 2.28$ ),  $r(619) = -0.11$ , 95% CI  $[-.19, -.03]$ ,  $p = .007$ . Thus, in line with our hypothesis, the higher individuals are in trait ambivalence, the less self-serving bias they show.

### **Exploratory analyses Study 2B**

Like in the previous studies, we examined the relationships between trait ambivalence and internal and external attributions separately. Trait ambivalence was positively related to external attribution ( $M = 4.32$ ,  $SD = 1.22$ ),  $r(619) = .15$ , 95% CI  $[.07, .22]$ ,  $p < .001$ . This means that the higher people are in trait ambivalence, the more they attribute their outcomes to the situation. In addition, unlike in the previous studies, we also found significant relationship between trait ambivalence and internal attribution ( $M = 4.92$ ,  $SD = 1.19$ ),  $r(619) = .19$ , 95% CI  $[.11, .26]$ ,  $p < .001$ .

### **Within-paper meta-analytic results**

We performed a meta-analysis on the four studies to obtain a more precise estimate of our effect size using the *metafor* package (Viechtbauer, 2010) in the statistical software R (R Core Team, 2013). We used a random effects model with restricted maximum likelihood estimation. The meta-analysis was performed on Fisher-z-transformed correlations, but we report the correlations transformed back to  $r$  to aid interpretation. In line with our



**Figure 1.** The relation between trait ambivalence and bias score. The squares represent the effect sizes of the individual studies with their respective 95% confidence intervals. The size of the square indicates the weight with which the effect size enters the overall effect size. The diamond represents the overall effect size across all studies using a random effects model. The width of the diamond represents the 95% confidence interval.

findings in the individual studies, we found a negative correlation between trait ambivalence and bias,  $r = -.16$ ,  $z = -4.62$ ,  $p < .001$ , 95% CI  $[-.23, -.09]$  (see Figure 1). Thus, the higher individuals' trait ambivalence, the smaller their bias.

The Q-test for heterogeneity (Hedges & Olkin, 1985) revealed no significant differences between the individual correlation coefficients,  $Q(df = 3) = 6.0004$ ,  $p = 0.11$ . However, descriptively, the effect sizes for the individual studies suggest that the effect is smaller for self-serving bias (Study 2A and Study 2B) than for correspondence bias (Study 1A and Study 1B). We explored this possibility by conducting a moderator analysis to see whether there was a systematic difference between the two types of bias (correspondence vs. self-serving). We dummy coded the bias type factor (0 = correspondence bias, 1 = self-serving bias) and performed a meta-regression from the *metafor* package (Viechtbauer, 2010). We found that for correspondence bias, the correlation coefficient,  $r = -.22$ , 95% CI  $[-.28, -.15]$  was significantly larger than for self-serving bias,  $r = -.11$ , 95% CI  $[-.17, -.04]$ ,  $\beta = 0.11$ ,  $z = 2.39$ ,  $p = .017$ . However, given the small number of studies, these results should be interpreted with great caution.

## GENERAL DISCUSSION

### Main findings

In this work, we aimed to extend the growing body of research examining the positive effects of ambivalence on judgement and decision-making processes. Specifically, we explored the role of trait ambivalence in social perception and judgement by examining the relationship with two pervasive biases: correspondence bias and self-serving bias. First, for correspondence bias, the tendency to attribute other people's behaviour to their disposition more than the situation, we found a negative relationship with trait ambivalence. That is, the higher people were in trait ambivalence, the smaller the difference between internal and external attribution, and the smaller their bias.

We also examined the relationship between trait ambivalence and self-serving bias. Self-serving bias refers to the tendency to attribute success more strongly to internal factors ('I am smart') than to the situations ('The test was easy'), with the reverse patterns for the attributions of success. We found that higher trait ambivalence was related to less bias in self-attributions. The findings for self-serving bias were smaller than those found for correspondence bias. Although these findings are in line with the findings for correspondence bias, they also suggest that self-serving bias is not moderated as much by trait ambivalence as correspondence bias.

### **Exploratory findings**

Notably, our exploratory analyses show that in three out of four studies trait ambivalence was positively related to external attribution, but unrelated to internal attributions. These findings suggest that the most ambivalent individuals had relatively strong internal *and* internal attributions – leading to less bias, while the least ambivalent individuals had relatively strong internal attributions but relatively weak external attributions – leading to more bias. In other words, individuals high in trait ambivalence make strong attributions either way, while individuals low in ambivalence make strong internal attributions, but weaker external attributions. Thus, it seems that internal attributions are more stable than external attributions, suggesting they are perhaps a default response when judging other people.

The difference in the relationship between trait ambivalence internal and external attributions also illustrates that our findings are not driven by general uncertainty or indifference. One could, for instance, argue that individuals high in trait ambivalence are just more uncertain than those low in trait ambivalence, regardless of judgement. This argumentation would be in line with research showing that state ambivalence is related to uncertainty in decision-making (van Harreveld, Rutjens, *et al.*, 2009; van Harreveld *et al.*, 2015). However, if this were the case, one would expect high trait ambivalence to be related to moderate response across the board. If so, we should find a negative relationship between trait ambivalence and internal and external attributions, respectively. This was not the case. Instead, our data showed an asymmetrical pattern. Trait ambivalence was positively related to external attributions, but not related to internal attributions, in all but one study. This shows that, like individuals low in trait ambivalence, those higher in trait ambivalence made strong internal attributions. However, in contrast to low ambivalence individuals, high trait ambivalence individual *also* made strong external attributions. Thus, their attributions were more balanced, which is in line with our idea that trait ambivalence is related to the incorporation of multiple perspectives of an issue.

### **Ambivalence and bias**

Our work is in line with work showing that ambivalence leads to broader processing and incorporation of diverse perspectives (Rothman *et al.*, 2017) and more balanced judgements (Rees *et al.*, 2013; Rothman *et al.*, 2017). Yet, at first glance, it seems at odds with work that has found that ambivalence is related to *more biased* information processing (Clark *et al.*, 2008; Sawicki *et al.*, 2011). However, in most of the work showing biasing effects of ambivalence, the ambivalence participants experienced was directly related to the judgement topic. For instance, work on attitudes towards junk food has found that people who were ambivalent towards junk food, also were more one-sided and biased in subsequent information selection about junk food (Sawicki *et al.*, 2013).

However, looking at studies showing that ambivalence is related to less bias, it becomes clear that in those studies, the ambivalence people experienced was not related to the judgement or decision task. For example, in one experiment, people were asked to recall an instance in which they felt ambivalent. After this, they started a new and *unrelated* task: judging job candidates by selecting information about this candidate. Participants who recalled a time when they were ambivalent were more likely to seek out *both* confirming and disconfirming information about a job candidate than those who had remembered a non-ambivalent experience (Rees *et al.*, 2013), showing less bias in information search. Likely, such ‘incidental’ ambivalence promotes a broader cognitive scope (Plambeck & Weber, 2009; Rothman & Melwani, 2017; Rothman *et al.*, 2017).

Why should it matter whether ambivalence is or is not related to the judgement at hand? One possible reason might be that in related ambivalence people want to resolve their ambivalence, whereas in incidental ambivalence, this is not possible or necessary. According to the Model of Ambivalence-Induced Discomfort (van Harreveld, van der Pligt, *et al.*, 2009), conflict is aversive (van Harreveld, Rutjens, *et al.*, 2009; van Harreveld, van der Pligt, *et al.*, 2009) because it interferes with efficient action (Harmon-Jones *et al.*, 2015), motivating people to resolve the conflict (van Harreveld, van der Pligt, *et al.*, 2009). The negative affect associated with this aversiveness narrows cognitive flexibility (Rothman *et al.*, 2017). Thus, a person who is ambivalent about junk food might try and solve their ambivalence (resolving conflict) by attending to information that is biased and one-sided (cognitive inflexibility).

On the other hand, in situations when ambivalence is more or less incidental, there is no need to ‘resolve’ the ambivalence. For instance, in studies on emotional ambivalence, the experience of happiness and sadness at the same time does not directly threaten action or decision-making processes. Here, the presence of opposing emotions opens up a broader cognitive scope (Fong, 2006) and increases perspective-taking (Rees *et al.*, 2013; Rothman *et al.*, 2017), leading to cognitive flexibility (Rothman *et al.*, 2017). The results of our studies suggest that the influence of trait ambivalence works in a similar way. Indeed, the items reflect a general tendency to see the world not as just good or bad, but more as mixed and full of evaluative opposition. Although future research should further elucidate the exact mechanisms, our findings suggest that such an outlook on the world makes for a broader perspective and less biased attendance to information.

### **Future research**

Future work should first consolidate our findings by replicating these results in other correspondence and self-serving bias paradigms. Because individuals high in trait ambivalence are more balanced in their judgements, it seems likely that they will show smaller bias across paradigms. Additionally, it would be interesting to see whether trait ambivalence relates to individual differences in correspondence bias. Work examining this dispositional difference has shown that over different correspondence paradigms, there are differences in the degree to which people neglect external demands in the attribution of behaviour, and this difference can be quantified by the Neglect of External Demands scale (NED, Scopelliti *et al.*, 2018). That is, some people neglect external factors more than others. However, our exploratory findings suggest that higher trait ambivalence is associated with more external attributions. As such, it is likely that NED is negatively related to trait ambivalence.

Another exciting avenue for future research is the relationship between trait ambivalence and cognitive biases in decision-making. For example, confirmation bias,

the tendency to seek information that confirms what one believes already, has detrimental effects in real-life settings, such as medicine (Pines, 2006), and finance and business (Wheeler & Arunachalam, 2008). Based on the work presented here and work on state ambivalence in decision-making (Guarana & Hernandez, 2016; Rees *et al.*, 2013), we expect that trait ambivalence will also be related to less bias in confirmation bias paradigms. Preliminary work from our laboratory suggests that this is the case: High trait ambivalence is associated with less confirmation bias in different decision-making tasks and confirmatory hypothesis testing (Hohnsbehn & Schneider, n.d.).

It would also be interesting to examine the role of trait ambivalence in dichotomous choice situations, mainly when choice options are similar, and choosing is hard. Presumably, individuals high in trait ambivalence are more likely to give each choice option a 'fair shake'. This balanced consideration of alternatives should result in longer decision-making times, and less spreading of alternatives after the choice. In turn, this could lead to less satisfaction and possibly more regret. Paradoxically, in such situations, making a balanced decision might not lead to the highest choice satisfaction, even if the decision-making process is of higher quality.

More broadly, even though trait ambivalence is related to more balanced judgements in cognitive bias paradigms, an open question is whether these balanced judgements come at the expense of the well-being of the individual. Research on ambivalence has emphasized the negative affective consequences of being ambivalent. Often when people experience ambivalence, they also report tension, distress, and overall negative affect (Haddock *et al.*, 2017; van Harreveld, Rutjens, *et al.*, 2009; Has *et al.*, 1992; Herr *et al.*, 2019; van Harreveld *et al.*, 2015). Thus, while those high in trait ambivalence make better choices and have a more balanced way of thinking, they might also suffer lower well-being.

Finally, we demonstrated the effect of trait ambivalence over four studies. However, all our studies used a similar sample, namely Amazon Mechanical Turk workers. Research on these samples has shown that MTurk samples can provide good quality data (Buhrmester *et al.*, 2016; Clifford & Jerit, 2014; Crump *et al.*, 2013) and are more representative of the general population than in-person convenience samples (at least in the United States) (Berinsky *et al.*, 2012; Buhrmester *et al.*, 2016; Chandler *et al.*, 2019). However, there are also reports of bots and low data quality (Chmielewski & Kucker, 2020). Furthermore, MTurk workers may not be naïve to the study material (Chandler *et al.*, 2014).

Despite these challenges, in our studies, we were able to replicate the main bias effects for correspondence bias and self-saving bias in line with earlier work (Kitayama *et al.*, 2006; Sedikides *et al.*, 1998), which may indicate that our data are of good quality. Additionally, we were able to replicate our own findings as well, suggesting that our effect is robust. Regarding the problem of non-naïveté, our trait ambivalence scale was newly developed, thus, unfamiliar to the participants. Furthermore, we screened participants for each subsequent study using the TurkPrime platform (Litman *et al.*, 2017) to reduce familiarity with our materials. However, it might still be possible that participants were familiar with the attribution bias paradigms we used. Thus, future work must replicate our findings in different samples and samples that are naïve to the materials. Finally, many MTurk workers rely on Amazon Mechanical Turk for at least part of their income (Brawley & Pury, 2016). Payment should reflect this reality, and future work – our own and others – should aim to provide MTurk workers with fair pay (see Gleibs, 2017).

## Conclusions

In this work, we show that trait ambivalence is related to less bias in person perception. Specifically, we found that trait ambivalence was related to less correspondence bias and less self-serving bias. Individuals high in trait ambivalence were more balanced in their attributions of behaviour. Together, our studies add to a growing body of work, showing that the ambivalent mind can be wise and balanced.

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## Author contributions

Iris Karoline Schneider, Ph.D: Conceptualization; Formal analysis; Methodology; Visualization; Writing – original draft. Sheida Novin: Conceptualization; Formal analysis; Writing – review & editing. Frenk van Harreveld: Writing – review & editing. Oliver Genschow: Conceptualization; Formal analysis; Writing – review & editing.

## Conflict of interest

All authors declare no conflict of interest.

## Data availability statement

The data that support the findings of this study are openly available in the Open Science Framework at <https://osf.io/4vp3c/> (currently only for peer review, but will be made open after publication).

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