An Old Broom: Behavioral Immune Activity and Preference for the Known and Familiar

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Abstract

One regularity in our environment is that familiar objects tend to be associated with a lower risk of contamination. Building on this pattern, we propose that the degree to which one's behavioral immune system is chronically activated is positively associated with stronger attribution of positive valence to the known and the familiar. In Studies 1 (N = 355) and 2 (N = 271) participants who were disgust-sensitive or who perceived themselves as vulnerable to disease showed stronger preference for familiar Chinese ideographs, based on the mere exposure effect. In Study 3 (N = 261) disgust-sensitive participants exhibited a stronger inherence effect. Study 4 (N = 284) suggests that the latter finding reflects pathogen (above and beyond sexual or moral) disgust. The predicted associations were mostly unaffected by the inclusion of control variables (political orientation, gender, religiosity, illness recency, COVID threat, and personal values). We discuss implications for the association between behavioral immune activity and conservatism, as well as for cognitive changes under pandemic conditions.

Keywords: Behavioral immune activity, Familiarity, Mere exposure effect, Inherence effect

The physiological immune system, which fights infection in the body by way of tools like white blood cells and antibodies, has been studied for more than a hundred years. Over the past two decades, researchers have begun to uncover a complementary system, one based on avoiding contact with sources of infection to begin with (Schaller, 2011, 2016; Tybur et al., 2013). In an intriguing expression of the mind–body interface, this behavioral immune system (BIS) comprises a set of cognitive, emotional, and behavioral processes, whereby things that happen in the mind – perceptions, attitudes, emotions, and motivations – trigger automatic behaviors designed to ensure our bodies stay clear of viruses and other infectious agents. Importantly, there is evidence that the BIS may be operative even when not obviously provoked, working continuously to detect and neutralize infection-related cues in the environment. BIS activity levels may rise temporarily when the system is triggered by the perceived presence of a pathogen threat (Faulkner et al., 2004). However, there is also evidence that people differ in the extent to which their behavioral immune systems function chronically or persistently at higher levels of activity, as opposed to low-level background monitoring (Duncan et al., 2009; Fessler et al., 2005; Makhanova et al., 2015; Navarrete et al., 2007). In the present study we are concerned with these differences in chronic or ongoing levels of BIS activity.

Increased BIS activity results, or is manifested, in specific cognitive, emotional, and behavioral responses. Cognitively, people whose BIS is more active show heightened attention to disease-connoting cues, and are faster to detect them (Miller & Manner, 2011). Once a stimulus is identified as potentially a source of infection, operation of the BIS makes people more inclined to experience disgust – the emotional component of the BIS. Disgust, often expressed externally by features like a wrinkled nose and slightly narrowed brows, is fundamentally an urge to reject sources of potential contamination, designed to prevent infectious stimuli from entering the

body. Behaviorally, increased BIS activity amplifies avoidance tendencies, leading people to increase their physical distance from potentially contaminating stimuli (Miller & Manner, 2011; Mortensen et al., 2010; Sacco et al., 2014; Sawada et al., 2018).

Operation of the behavioral immune system, particularly when the system is chronically set to higher activity levels (Kempthorne & Terrizzi, 2021), is expressed in disgust sensitivity, germ aversion, and perceived infectability to disease (Duncan et al., 2009; Haidt et al., 1994). Importantly, because pathogens themselves may not be directly detectable through the senses, behavioral immune activity is associated with other cognitive processes that serve to minimize contact with potential sources of contamination. For example, people whose BIS is more active are more sensitive to morphological deviance (which may be an indicator of contamination), and are more prone to perceive dissimilarities between stimuli, reflecting their preparedness to process morphological deviance (Nussinson et al., 2018). Likewise, people who score higher in chronic levels of BIS activity perceive unknown others as less psychologically similar to them, and assess their personal preferences as different from the respondent's own preferences (Mentser & Nussinson, 2020). Altogether, it is assumed that because perceived similarity to others elicits approach behaviors and thus increases the risk of infection, under increased levels of BIS activity people become highly tuned to dissimilarities from others.

The present study examines the hypothesis that levels of behavioral immune activity are associated with the attribution of a more positive valence to familiar stimuli, on the grounds that familiarity serves as a crude index for the absence of pathogens. Specifically, we test whether individual differences in BIS activity are correlated with increased preference for the known and familiar over the unfamiliar and novel.

Familiarity and Behavioral Immune System Activity

Ample findings suggest that people, in general, prefer the familiar over the novel, drawing comfort from the "warm glow of familiarity" (Titchener, 1910, 1915). One possible explanation for this pattern is that repeated exposure to a stimulus conditions people to expect an absence of negative consequences (Zajonc, 2001). In fact, familiarity serves as a potent cue as to the safety of a stimulus: if we have been exposed to a stimulus in the past and have survived, it can be deemed safe. The "disgust source effect" – the fact that people treat bodily fluids and waste emitted by family and friends as less aversive than those emitted by a stranger (Curtis et al., 2004; Peng et al., 2013; Stevenson & Rapacholi, 2005) – is in line with this theorizing, suggesting that familiarity serves as a potent source of information regarding infection risks (but see Tybur et al., 2020).

As noted above, pathogens cannot be detected directly through the senses. Hence, the BIS is designed to detect cues indicating a danger of exposure to pathogens, or the absence thereof (Haselton et al., 2015; Schaller, 2011). Because familiarity is a potent cue for stimulus safety and hence for the absence of pathogens, it is reasonable to assume that at times of increased BIS activity, the positive valence attributed to familiarity is amplified. Several prior findings are consistent with our hypothesis.

First, it has been shown that participants show lower levels of openness to experience when under pathogen threat, and a similar pattern was found in participants characterized by high behavioral immune activity (Mortensen et al., 2010). Similarly, higher BIS activity was found to result in more conservative political attitudes and preference for the status quo (Helzer & Pizarro, 2011; Murray & Schaller, 2016; Terrizzi et al., 2013; Tybur et al., 2016), and with ethnocentrism in the face of unknown but not familiar outgroups (Faulkner et al., 2004). Interestingly, such effects emerge at the cultural as well as the personal level: norms of

neophobia are more prevalent in areas of the world which are characterized by relatively higher prevalence of pathogens (Fincher & Thornhill, 2008a, 2008b; Fincher et al., 2008; Thornhill & Fincher, 2014; Thornhill et al., 2009).

Probing more deeply, many findings suggest that the cognitive basis underlying familiarity is processing fluency, or ease of processing. Information about a stimulus to which we have been exposed in the past is easier to process (Jacoby & Dallas, 1981; Whittlesea et al., 1990). The cognitive system relies on this regularity in its interaction with the world, and infers from ease of processing an experience of familiarity (Jacoby & Whitehouse, 1989). Notably, higher BIS activity is linked with an increased preference for symmetrical faces (Young et al., 2011), for attractive leaders (White et al., 2013), and for prototypical stimuli (Nussinson et al., 2018). The common denominator of these stimuli is that they are relatively easier to process, based on research suggesting that the aesthetic pleasure people derive from attractiveness, symmetry, and the like is a function of processing dynamics, and specifically processing fluency (Reber et al., 2004). Thus, findings which suggest that increased BIS activity is associated with a preference for stimuli that are easier to process also point to a preference for the familiar over the novel.

The effects of both familiarity and fluency as cues for safety vary with context (de Vries et al., 2010; Hertwig et al., 2008). In particular, people attribute greater positive valence to familiarity when in an unsafe environment compared with a safe environment (Bornstein, 1989; de Vries et al., 2010). Conservatives also show greater preference for familiar stimuli (Altemeyer, 1988; Blanchar, 2016; Jarudi et al., 2008; Oishi et al., 2012), as do individuals with higher behavioral inhibition system sensitivity (Quilty et al., 2007). Similarly, processing fluency serves as an especially potent cue in situations of uncertainty and low control. For instance, Blair

(2020) found that people who perceive themselves as low in control show greater preference for stimuli that are easy to process compared to those who perceive themselves as having high control. Gillebaart et al. (2012) examined the effect of priming participants with a prevention focus on attitudes toward both familiarity and processing fluency. They found a greater preference for easy-to-process stimuli among participants primed with a prevention focus compared with those primed with a promotion focus; and a prevention focus accentuated the positive affect participants derived from familiarity.

In short, the present research suggests that behavioral immune activity is correlated with a preference for familiar stimuli because familiarity is a crude index of the absence of pathogens, which constitute a potential threat. We test this proposition using several different measures for both variables (preference for the familiar and behavioral immune activity). The findings contribute to the literature on the behavioral immune system by demonstrating an association between chronic tendencies toward increased BIS activity and a concrete behavioral preference for neutral stimuli, which are assumed to be free from contamination. They may also suggest a cognitive basis for previous findings, such as the association between BIS activity and xenophobia towards unknown outgroups but not towards known ones (Faulkner et al., 2014).

The Present Research

The current research comprises four studies examining the correlation between measures that reflect individual differences in levels of behavioral immune activity, and preference for the cognitive experience of familiarity. Individual differences in behavioral immune system activity were tapped using three classic measures of the BIS: the Disgust Scale – Revised (DS-R, Olatunji et al., 2007; see Shook et al., 2017; Terrizzi et al., 2013; Tybur et al., 2010); the pathogen disgust subscale in the Three Domains of Disgust Scale (TDDS, Tybur et al., 2009; see

Hlay et al., 2024; Kempthorne & Terrizzi, 2021; Pond et al., 2012; Shook et al., 2017; Tybur et al., 2010); and the Perceived Vulnerability to Disease scale (PVD, Duncan et al., 2009; see Hlay et al., 2024, Hodson & Costello, 2007; Kempthorne & Terrizzi, 2021; Miller & Maner, 2012). Note that these measures are not equivalent. Recent findings point to their distinct measurement properties, suggesting, for example, that disgust sensitivity remains consistent in the face of environmental factors (such as the recent COVID pandemic), whereas perceived vulnerability to disease changes as a function of external factors (Car et al., 2022; Milkowska et al., 2021; Schwambergová et al., 2021; Stefanczyk et al., 2024). Importantly, however, they all capture aspects of BIS activity as a chronic characteristic of individuals. We predict these individual differences in BIS activity as captured by the three measures to be correlated with a preference for the known and the familiar.

Studies 1 and 2 directly examine the hypothesis that higher behavioral immune activity is associated with a preference for familiar stimuli, based on the mere exposure effect – i.e., inducing familiarity simply through exposure to a stimulus. Specifically, we had participants choose between “old” ideographs (which they had seen in a previous phase of the study) and “new” ideographs, and then measured their behavioral immune activity, operationalized by chronic disgust sensitivity (Olatunji et al., 2007) in Study 1 and perceived vulnerability to disease (Duncan et al., 2009) in Study 2. In Studies 3 and 4 we examined whether participants characterized by higher behavioral immune activity exhibit a stronger inherence effect – a feeling that things in the world as we know them are the way they ought to be, which is yet another manifestation of attributing positive valence to the known and the familiar. Both these studies used the same measure for the inherence effect (the Inherence Heuristic Scale, or IHS; Salomon & Cimpian, 2014), while again operationalizing behavioral immune activity first

through disgust sensitivity (Study 3) and then through specific aversion to pathogens or disease (Study 4). In the latter case, rather than perceived vulnerability to disease, we employed the pathogen disgust measure from the Three Domains of Disgust Scale (Tybur et al., 2009) to explore whether pathogen disgust predicts the inherence effect over and above the other two domains of disgust (sexual and moral disgust).

Behavioral immune activity is assumed to be higher in women compared to men (Curtis et al., 2004; Duncan et al., 2009; Haidt et al., 1994; Rozin et al., 1999), and in people who were vs. were not recently ill (Miller & Maner, 2011). We therefore controlled for these variables in our studies. Similarly, we controlled for religiosity, which is associated with disgust sensitivity (Berger & Anaki, 2014; Haidt et al., 1994; Inozu et al., 2014; Olatunji et al., 2005). In light of findings that conservatives (vs. liberals) show greater preference for familiar stimuli (Altemeyer, 1988; Blanchar, 2016; Jarudi et al., 2008; Oishi et al., 2012), we assessed and controlled for political orientation in all of our studies. In Study 1 we also controlled for personal values, which are associated with people's general attitudes toward novelty and change (Schwartz, 1992). Finally, because our data was collected during the COVID-19 pandemic, we also measured and controlled for the degree to which perceived COVID-19 threat increased participants' behavioral immune system activity (Makhanova & Shepherd, 2020; Shook et al., 2020).

All studies were preregistered and were introduced to participants as dealing with "intuitive information processing." The Ethics Committee of the Department of Education and Psychology at the Open University of Israel approved all the studies (Approval no. 3378). No variables other than those described here (except for demographics) were measured or manipulated in any of the studies. Full data for all four studies are available at [https://osf.io/k37x4/?view_only=ddc2e0de74ff466ea1d37f782322ce8a].

Study 1

A tendency to experience disgust is assumed to reflect a more active behavioral immune system (Oaten et al., 2009). Both factors of Duncan et al.'s (2009) Perceived Vulnerability to Disease scale (PVD) – namely Perceived Infectability (e.g., "In general I am very susceptible to colds, flu and other infectious disease") and Germ Aversion (e.g., "I prefer to wash my hands pretty soon after shaking someone's hands") – correlate positively with the DS-R (Disgust Scale–Revised, Olatunji et al., 2007). The inclination to experience disgust, like BIS activity levels generally, can vary both between individuals, as a personal attribute, and within individuals, based on natural shifts. For example, periods characterized by suppression of the biological immune system (e.g., the first trimester of pregnancy, the luteal phase of the menstrual cycle) are also characterized by increased sensitivity to disgust (Conway et al., 2007; Fessler et al., 2005; Fessler & Navarrete, 2003; Fleischman, 2014; Fleischman & Fessler, 2011).

In Study 1, we examined the hypothesis that behavioral immune activity, operationalized by sensitivity to disgust, is associated with a preference for familiar stimuli. Specifically, we tested whether participants who are chronically prone to experience disgust exhibit a stronger mere exposure effect. Towards this end, we had participants indicate their preference between pairs of ideographs, where one in each pair had been presented in a previous phase of the study ("old") and the other was unfamiliar ("new"), and then measured their disgust sensitivity. We expected a positive association between participants' scores on the DS-R and the proportion of familiar ("old") ideographs they preferred.

Method

Participants and Procedure

A G*Power analysis (one-tailed) suggested that to detect a small-to-medium effect ($|\rho|$ = 0.15) with power of 80%, we should recruit 270 participants. Because the study was conducted online, we expected "noisy" running conditions and therefore recruited a larger sample of 360 participants (245 females, *M*age = 28.16, *SD* = 4.96, age range: 18–66). All were Israeli students whose first language is Hebrew, with no learning disabilities and who have completed the study on a computer (the same applies to all studies in the present article). The study took place over two sessions, two weeks apart. Five participants who took an excessively long time to complete the survey in the first session were excluded (see preregistration protocol at https://aspredicted.org/BGM_PXD), leaving a sample of 355. Of these, 227 agreed to participate in the second session, which was presented as an unrelated study.

Data were collected in July–August 2020. In the first session, to measure the mere exposure effect, participants completed two tasks presented as pertaining to intuitive processing of figurative information and intuitive processing of visual information, respectively (see below). They then completed the Disgust Sensitivity Scale–Revised (DS-R; Haidt et al., 1994, modified by Olatunji et al., 2007), which was presented as a task involving intuitive processing of everyday information. Finally, participants reported on auxiliary variables (how recently they had had a cold, their perceived sense of threat from the COVID-19 pandemic, their religiosity, and demographics). We then realized it would be beneficial to also control for participants' personal values as well as their political orientation. Thus, in a second session, two weeks later, participants completed a measure of personal values – the Schwartz Value Survey (SVS, Schwartz, 1992) – and indicated their political orientation.

Measures

Mere Exposure Effect. In the first of two tasks, participants were presented with 24 ideographs and were asked to rate their complexity on a scale from 1 (*very simple*) to 5 (*very complex*). Note that the number of people reading Chinese in Israel is negligible and hence the ideographs served as unknown figures. In the second task participants were presented with 24 pairs of ideographs, and were asked to quickly and intuitively indicate which of the two they preferred. Unbeknownst to participants, one of the ideographs in each pair ("old") had been previously presented to participants in the complexity ratings task, while the other ("new") had not. "Old" ideographs were positioned in half the pairs to the right of the "new" ones, and in half to the left. A preference for the "old" ideograph over the "new" one that is greater than 0.5 (i.e., chance level) indicates a preference for familiar stimuli – a mere exposure effect. The higher the proportion, the higher the preference for familiar stimuli.

Disgust Sensitivity Scale–Revised (DS-R). The scale consists of 25 items assessing sensitivity to a range of disgust elicitors, including core, animal-reminder, and contamination disgust. Scale items are divided into two sets. In the first set, participants are asked to indicate their agreement with 13 statements (e.g., "If I see someone vomit, it makes me sick to my stomach") on a 5-point Likert scale from 0 (*strongly disagree*) to 4 (*strongly agree*). In the second set, respondents are confronted with 12 experiences (e.g., "While you are walking through a tunnel under a railroad track, you smell urine"), and are asked to rate how disgusting they find each on a similar scale, again from 0 (*not disgusting at all*) to 4 (*extremely disgusting*). We used the Hebrew version of the scale translated by Berger and Anaki (2014). The scale's construct and external validity were confirmed in a heterogeneous Israeli sample. Like the translators, we omitted two items due to religious considerations. Disgust sensitivity scores were computed by averaging the ratings for all items ($\alpha = 0.88$).

Perceived COVID-19 threat, illness recency, and religiosity. Perceived threat from the COVID-19 pandemic was assessed based on three questions: how concerned participants were by the spread of the new coronavirus (SARS-CoV-2); how much they feared the spread of the new coronavirus; and how dangerous they considered the new coronavirus. All items were answered on 6-point scales from 1 (*not at all*) to 6 (*extremely/very much*). An index for perceived COVID-19 threat was computed by averaging the ratings for these three items (α = 0.86). Next, following Miller and Maner (2011), participants indicated the last time they had suffered from a cold by selecting from among the following response options: 1–*today*, 2–*a couple days ago*, 3–*a week ago*, 4–*a couple weeks ago*, 5–*a month ago*, 6–*a few months ago*, and 7–*a year or more ago*. Finally, participants further indicated how religious they were on a scale from 0 (*not at all religious*) to 7 (*very religious*).

Personal values and political orientation. Participants completed the short (46-item) value inventory, which includes only those items from the Schwartz Value Survey (SVS, Schwartz, 1992) that have been validated for cross-cultural use (Gandal et al., 2005). The value items were sampled to cover the ten different values described in Schwartz's theory. Each item was followed by a short explanatory phrase in parentheses (e.g., SOCIAL POWER [controlling others, dominance]). Participants rated the importance of each item on a 9-point scale from -1 (*opposed to my values*) through 0 (*not important*) to 7 (*of supreme importance*). In this study, we were interested in two of the four higher-order values identified by Schwartz: conservation and openness-to-change. To measure the priority given to each of the ten values and two higher-order values, we used the indexes recommended by Schwartz (1992). Thus, the score for conservation was the average importance of 14 items: *humble, accepting my portion in life, devout, respect for tradition, moderate, politeness, obedient, self-discipline, honoring parents and elders, family*

security, *national security*, *social order*, *clean*, and *reciprocation of favors* (α = 0.86). The score for openness-to-change was the average importance of 8 items: *creativity*, *freedom*, *independent*, *curious*, *choosing own goals*, *daring*, *a varied life*, and *an exciting life* (α = 0.84). A final rating was calculated by subtracting the total openness value from the conservation value, such that higher numbers indicated greater endorsement of conservation values. Finally, to capture political orientation we asked participants to indicate to what extent they usually identify with left-wing political attitudes and, separately, right-wing attitudes, both on scales from 1 (*not at all*) to 7 (*very much*). A final rating was calculated by subtracting the left-wing from the right-wing rating, such that lower numbers indicated a more left-wing orientation.

Results and Discussion

Descriptive statistics and correlations between continuous variables are reported in Table 1.

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Regressing preference for familiar ideographs onto participants' disgust sensitivity yielded a small non-significant effect, such that the more sensitive to disgust participants were, the higher their preference for "old" over "new" ideographs, $\beta = 0.093$, $t(353) = 1.75$, $p = 0.081$, 95% *CI* [-0.01; 0.20]. This association grew stronger, however, when the model was broadened to include perceived COVID-19 threat, gender, religiosity, and illness recency $\beta = 0.167$, $t(349) = 2.71$, $p = 0.007$, 95% *CI* [0.05; 0.29]. The effect of disgust sensitivity was again significant when we added the difference between conservation and openness-to-change values, and the

difference between right and left political orientation, β = 0.213, $t(219) = 2.72$, $p = 0.007$, 95% *CI* [0.06, 0.37] (see Table SM1 in the Supplemental Materials for full results).[1]

Study 2

Study 1 showed that a preference for familiar stimuli (based on mere exposure) is associated with higher levels of behavioral immune activity, operationalized by chronic disgust sensitivity. In Study 2 we further tested the robustness of these findings while operationalizing behavioral immune activity through perceived vulnerability to disease.

Method

Participants and Procedure

A power analysis conducted as in Study 1 suggested that we should recruit 270 participants to achieve 80% power in detecting a small-to-medium effect ($|\rho| = 0.15$). Two hundred and seventy-eight Israeli students (177 females, *M*age = 32.36, *SD* = 6.19, age range: 20–45) were recruited to participate online. Following our preregistration (https://aspredicted.org/KT6_YS8), we excluded six participants who took an excessively long time to complete the study, and one participant who had zero variance in ratings on the PVD scale, leaving 271 participants in the final sample.

Data collection took place in October 2020. The procedure was similar to the first part of Study 1. The tasks designed to estimate the mere exposure effect were presented first and framed as measuring intuitive information processing. Next, participants completed the Perceived Vulnerability to Disease scale (Duncan et al., 2009), which was presented as measuring processing of everyday information. Finally, auxiliary variables were measured: perceived COVID-19 threat, illness recency, mood, religiosity, political orientation, and demographics.

Measures

Mere Exposure Effect. Same as in Study 1.

Perceived Vulnerability to Disease. The PVD is a 15-item inventory composed of two subscales. The Perceived Infectability subscale measures beliefs about one's susceptibility to contracting infectious diseases (e.g., "If an illness is 'going around', I will get it," $\alpha = 0.87$). Participants indicated their responses on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The Germ Aversion subscale measures the tendency to experience emotional discomfort in situations associated with a high probability of germ transmission (e.g., "I prefer to wash my hands pretty soon after shaking someone's hand," $\alpha = 0.77$). We introduced a minor change to the last item ("I avoid using public telephones because of the risk that I may catch something from the previous user"), replacing "telephones" with "restrooms" in keeping with the rarity of public phone use today. The average rating for all items constituted our focal predictive variable. Cronbach's alpha for the entire scale was 0.84.

Mood. Participants were presented with a horizontal line reading "very good" on one pole and "very bad" on the other. They were asked to move a button from the middle of the line to the point that reflected their current mood.

Perceived COVID-19 threat, illness recency, religiosity, political orientation. Same as in Study 1. Cronbach's alpha for the perceived COVID-19 threat index was 0.85.

Results and Discussion

Descriptive statistics and correlations between continuous variables are reported in Table 2.

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As we predicted, regressing the mere exposure index onto the PVD scores yielded a significant effect, such that the higher participants' scores in the PVD, the greater their preference for "old" over "new" ideographs, β = .127, *t*(269) = 2.097, *p* = 0.037, *CI* [0.008, 0.246]. This effect was weakened when controlling for participants' mood, β = 0.118, *t*(268) = 1.900, *p* = 0.059, *CI* [-0.004, 0.241], and again when we controlled for gender, religiosity, political orientation, perceived COVID threat, and illness recency, β = 0.117, *t*(264) = 1.717, *p* = 0.087, *CI* [-0.017, 0.252]). Table SM2 presents the regression coefficients for all variables. Tables SM3 and SM4 show the results of regressions using each of the PVD subscales separately.

Note that in our study, both the DS-R and PVD are intended to capture chronic differences in behavioral immune system activity. When we use the DS-R (in Study 1), we find that introducing the control variables strengthens the predicted effect, while when we use the PVD (in Study 2), similar control variables cause the effect to weaken. Looking at Tables 1 and 2, which report the associations between the variables measured in each study, we can identify minor differences that may explain such disparities. For example, illness recency was unrelated to preference for the familiar in Study 1, but was negatively correlated with it in Study 2. Moreover, only in Study 2 did we measure and control for participants' mood, which is negatively associated with the PVD. Finally, the sample in Study 2 appears to be more liberal than the sample in Study 1 (see the means for political orientation in Tables 1 and 2). Given the finding that BIS activity tends to be both lower and less varied in liberals than conservatives, this

difference in sample composition might have led to reduced statistical power in Study 2 compared to Study 1 (see Stefanczyk et al, 2024 for a similar explanation).

Study 3

The inherence heuristic is a basic cognitive process that supplies quick, effortless responses to questions as to why existing patterns in the world are the way they are (e.g., "Why do people usually have orange juice for breakfast?"; "Why do engagement rings typically have diamonds?"). These responses often appeal to inherent features of the entities under consideration (Cimpian & Salomon, 2014a, 2014b), defined as easily retrieved information about these entities' stable, constitutive properties – e.g., the fact that orange juice is refreshing and that diamonds are durable (Hussak & Cimpian, 2018; McRae et al., 2005). The inherence heuristic, much like the illusory truth effect (wherein people judge familiar propositions as more true than unfamiliar ones; Begg et al., 1985), thus reflects a feeling that what is known and familiar is also right and to be preferred. The standard questionnaire used to measure reliance on the inherence heuristic (the Inherence Heuristic Scale, Salomon & Cimpian, 2014) captures this feeling that existing patterns reflect how things ought to be using a set of five stems (e.g., "It seems right to…."; "It seems natural to…"; see below). Endorsement of the inherence heuristic is positively correlated with belief in a just world (Rubin & Peplau, 1975) and right-wing authoritarianism (Altemeyer, 2006).

In Study 3, we examined the hypothesis that reliance on the inherence heuristic is associated with level of behavioral immune system activity. We thus tested whether participants who are chronically prone to experience disgust are also more inclined to endorse the inherence heuristic. Towards this end, participants completed the Inherence Heuristic Scale (IHS) and the

DS-R measure of disgust sensitivity. We expected a positive association between participants' scores on the DS-R and the IHS.

Method

Participants and Procedure

A G*Power analysis (one-tailed) suggested that 270 participants would be needed to detect a small-to-medium effect with power of 80% ($|\rho| = 0.15$). Because the study was conducted online, we expected "noisy" running conditions and therefore recruited a larger sample of 285 Israeli students (*M*age = 27.35, *SD* = 4.23, age range: 18–35; gender data was accidently not recorded). In line with our preregistration, we excluded four participants who took an excessively long time to complete the study, one participant with zero variance in responses to the IHS, one participant with zero variance in responses to the DS-R, and an additional 18 participants who failed to follow instructions (see preregistration https://aspredicted.org/ZFQ_QW1). Thus, the final sample included 261 students.

Data collection took place in November – December 2020. Participants first completed the IHS (Salomon & Cimpian, 2014), then the DS-R (Haidt et al., 1994, modified by Olatunji et al., 2007). Both tasks were presented as involving intuitive processing of everyday information. Finally, participants reported the auxiliary variables: illness recency, perceived COVID-19 threat, religiosity, political orientation, and demographics.

Measures

Inherence Heuristic Scale (IHS). The scale consists of 15 items assessing the feeling that existing patterns in the world are as they ought to be, based on five stems: "It seems natural...," "It seems right…," "It seems ideal…," "There are good reasons why…," and "If intelligent organisms were found on another planet, they would probably…." Sample items

include "***It seems right*** *to use white for wedding dresses,*" "***It seems ideal*** *that there are 7 days in a week*," "***It seems natural*** *to use red in a traffic light to mean 'stop,''' and "If intelligent organisms were discovered on another planet,* ***they would probably have*** *two arms and two legs."* Participants were asked to indicate their agreement with the items on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). We used the Hebrew version of the scale translated by Lin et al. (2019). Like the translators, we modified the item "There are good reasons why dollar bills are green" to "There are good reasons why currency bills are in different colors." In addition, we omitted the four "catch" items used in the original scale and instead used one item where participants were asked to choose 1 (*strongly disagree*) to indicate that they were paying attention. The average ratings for all items (other than the attention item) served as our inherence heuristic index. Cronbach's alpha in our sample was 0.81.

Disgust Sensitivity Scale–Revised (DS-R). Same as in Study 1 ($\alpha = 0.86$).

Perceived COVID-19 threat, illness recency, religiosity, political orientation. Same as in Study 1. Cronbach's alpha for the COVID-19 threat index was 0.89.

Results and Discussion

Descriptive statistics and correlations between continuous variables are reported in Table 3.

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As predicted, regressing inherence heuristic scores onto participants' disgust sensitivity yielded a significant positive effect, such that the more sensitive to disgust participants were, the

stronger their tendency to experience existing patterns in the world as correct and preferred, β = .241, $t(259) = 3.995$, $p < 0.001$, CI [0.122, 0.360]. This association was not affected by broadening the model to include perceived COVID-19 threat, illness recency, religiosity, and (right-wing) political orientation, $\beta = 0.200$, $t(255) = 3.260$, $p = 0.001$, CI [0.079, 0.321] (see Table SM5 for full results).

Study 4

Method

Participants and Procedure

As in our previous studies, we aimed to recruit at least 270 participants in order to have sufficient power to detect a small-to-medium effect ($\rho| = .15$). Three hundred and two Israeli students (*M*age = 29.67, *SD* = 4.83, age range: 19–60; gender data was accidently not recorded) took part in the study online in return for a small monetary reward. Following our preregistered protocol, we excluded two participants who took an excessively long time to complete the survey, three participants who had zero variance on the disgust scale, one participant who had zero variance on the inherence scale, and twelve additional participants who failed a simple reading check (see preregistration https://aspredicted.org/14J_X4C). This resulted in a final sample of 284 participants.

The participants completed the Three Domains of Disgust Scale (TDDS; Tybur et al., 2009), followed by the IHS. They then reported the main auxiliary variables as in the previous studies. The data were collected in December 2020.

Measures

Three Domains of Disgust Scale (TDDS). Participants were asked to rate 21 items describing potentially disgusting acts or experiences on a scale from 0 (*not at all disgusting*) to 6

(*extremely disgusting*). Each item was designed to primarily reflect one of the three domains: pathogen disgust (e.g., “Accidentally touching a person’s bloody cut”; 7 items, α = 0.73), sexual disgust (e.g., “Hearing two strangers having sex”; 7 items, α = 0.85), and moral disgust (e.g., “Deceiving a friend”; 7 items, α = 0.88). The instrument was translated from English into Hebrew by two native Hebrew speakers highly proficient in English. Their translation was then refined by a professional language editor. We computed disgust scores in each domain by averaging the items of each subscale. The intercorrelations between the factors were of medium size (range: 0.34–0.42).

IHS. Same as in Study 3 (α = 0.84).

Perceived COVID-19 threat, illness recency, religiosity, political orientation. Same as in Study 1. Cronbach’s alpha for the perceived COVID-19 threat index was 0.87.

Results and Discussion

Descriptive statistics and correlations between continuous variables are reported in Table 4.

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We regressed the inherence scores onto the three domains of disgust (pathogen, sexual, and moral). Supporting our prediction, pathogen disgust positively predicted reliance on the inherence heuristic, $\beta = 0.313$, $t(280) = 5.181$, $p < 0.001$, CI [0.194, 0.432], beyond the other subscales. Moral disgust was also significantly associated with reliance on the inherence heuristic, $\beta = 0.205$, $t(280) = 3.521$, $p < 0.001$, CI [0.090, 0.320], but not sexual disgust, β =

0.079, $t(280) = 1.338$, $p = 0.182$, CI [-0.037, 0.196]. Further broadening the model to include perceived COVID threat, illness recency, religiosity, and political orientation left the effect of pathogen disgust virtually unchanged, $\beta = 0.287$, $t(276) = 4.806$, $p < 0.001$, CI [0.170, 0.405] (see Table SM6 for full results).

General Discussion

The BIS serves as a fascinating intersection of mind and body, in which the mind is tuned to protect the body from contamination. Indeed, behavioral immune activity is associated with specific cognitive modulations aimed to minimize contact with potential disease carriers (Makhanova et al., 2015; Mentser & Nussinson, 2020; Miller & Maner, 2012; Nussinson et al., 2018). The present research suggests a novel cognitive marker among people whose behavioral immune system is chronically more active – namely, the increased attribution of positive valence to the known and the familiar as compared to the unknown and the unfamiliar, even for completely neutral, benign stimuli.

As expected, in Studies 1 and 2 behavioral immune activity positively predicted the magnitude of the mere exposure effect, in which familiar neutral stimuli are preferred over unfamiliar ones. This held true regardless of whether behavioral immune activity was measured by the DS-R (Study 1) or the PVD (Study 2). Furthermore, as expected, in Studies 3 and 4 behavioral immune activity positively predicted the magnitude of the inherence effect, in which things as we know them are perceived to be the way they ought to be. Again, this held true for two measures of behavioral immune activity: the DS-R (Study 3) and the pathogen disgust subscale of the TDDS (Study 4). With the exception of Study 2, the predicted associations were not affected by the inclusion of control variables such as political orientation, religiosity, illness recency, perceived COVID threat, and personal values (the latter were only measured in Study

1). That we were able to demonstrate preference for the old and the familiar while using all three classic measures of chronic behavioral immune system activity strengthens our confidence in our findings and in their interpretation.

Our findings chime with previous research on the BIS and various attitudes and preferences. For example, as noted earlier, a more active BIS has been associated with more conservative political attitudes (Helzer & Pizarro, 2011; Murray & Schaller, 2016; Terrizzi et al., 2013; Tybur et al., 2016). The increased preference for familiarity associated with higher BIS activity found in our study may serve, at least in part, as a cognitive basis for this link between increased BIS activity and a conservative orientation. Likewise, the documented effect may also underlie at least in part the ethnocentrism found by Faulkner and colleagues (2004) towards unfamiliar compared to familiar outgroups. Finally, as noted above, norms of neophobia are more prevalent in areas of the world characterized by a relatively higher prevalence of pathogens (Fincher & Thornhill, 2008a, 2008b; Fincher et al., 2008; Thornhill & Fincher, 2014; Thornhill et al., 2009). Our findings suggest that individuals with relatively heightened BIS activity exhibit less favorable responses to novel stimuli, even when they cannot easily identify those stimuli as novel. In Studies 1 and 2, we observed a stronger mere exposure effect among participants with higher scores on the DSR and PVD, respectively, despite the fact that the experimental design made it difficult to explicitly distinguish between familiar and unfamiliar stimuli. These results suggest that BIS activity may shape affective responses to novelty at a relatively automatic and implicit level, offering insights into the underlying mechanism of neophobia.

Our findings may have even more far-reaching implications. The experience of subjective familiarity (as well as its cognitive underpinning, processing fluency, Jacoby & Dallas, 1981) is known to serve as the basis of many kinds of judgments and behaviors, including judgments of

truth (Begg et al., 1992; Begg et al., 1985; Hasher et al., 1977; Silva et al., 2016), famousness (Jacoby, Kelley, Brown et al., 1989; Jacoby, Kelley, & Dywan, 1989), beauty (Christensen et al., 2020; Reber et al., 2004), and credibility (Newman et al., 2014; Zürn & Topolinski, 2017). Specifically, people judge familiar propositions as more true than unfamiliar ones (the illusory truth effect, Begg et al., 1985), and familiar stimuli as more beautiful than unfamiliar ones (Reber at al., 2004). They perceive familiar names as more likely to be of famous people (Jacoby, Kelley, Brown et al., 1989), and they are more inclined to purchase a product with a familiar brand name than an unfamiliar one (Janiszewski & Meyvis, 2001; Karremans et al., 2006). Our findings suggest that all of these effects may be modulated by behavioral immune activity, such that people with more active behavioral immune systems should exhibit these effects to a greater extent. As such, our findings may have ramifications in domains such as persuasion (Hawkins & Hoch, 1992; Weisbuch & Mackie, 2009), purchase intentions (Cho & Schwarz, 2010; Labroo et al., 2008; Silva et al., 2017), fake news (Skurnik et al., 2005), propaganda (Arkes et al., 1989), and more (for a review see Schwarz et al., 2020). For example, individuals characterized by higher behavioral immune activity might be more susceptible to the effect of fake news and of propaganda (by way of the augmented illusory truth effect) (see Arkes et al., 1989; Schwarz & Jalbert, 2020).

In addition, in line with previous research (Bacon & Corr, 2020; Makhanova & Shepherd, 2020; Shook et al., 2020), in all four studies behavioral immune activity was found to be positively correlated with perceived threat from the COVID-19 pandemic. Our findings linking increased BIS activity with preference for the familiar may thus shed light on previous findings linking pandemic concerns to increased social conservatism (Karwowski et al., 2020) and xenophobia (Esses, & Hamilton, 2021; White, 2020; but see Fan et al., 2021 for contradictory

findings). In this sense our findings are also in line with evidence pointing to increased behavioral immune system activity (as reflected by increased disgust sensitivity and germ aversion) throughout the pandemic (Stevenson et al., 2021; but see Car et al., 2022; Milkowska et al., 2021; Schwambergová et al., 2021; Stefanczyk et al., 2024; Sun et al., 2025). Similarly, our findings align with indications that reading information about the pandemic, at least during its initial period, heightened BIS activity (Bacon & Corr, 2020).

Finally, our findings go hand in hand with previous research suggesting that increased behavioral immune activity renders people more sensitive to the cue of processing fluency. Specifically, we have previously shown that higher BIS activity results in increased sensitivity to morphological deviance (Nussinson et al., 2018), which may be assumed to involve more effortful processing (Trujillo et al., 2014). Furthermore, it has been found that under higher levels of BIS activity people show increased preference for attractive others (whose faces are easier to process), from leaders (White et al., 2013) to partners (Lee & Zietsch, 2011), and a greater desire to improve one's own appearance (Ackerman et al., 2018). In a complementary manner, under increased levels of BIS activity people are tuned to ugliness and tend to perceive stimuli with disease-connoting cues as ugly (Klebl et al. 2021). If, as indirectly suggested by our and others' findings, behavioral immune activity is associated with increased tuning to processing fluency, then the various effects of processing fluency should be modulated by BIS activity. For example, it is well documented that people are more likely to trust and purchase from sellers with easier-to-process names compared with names that are more difficult to process (Silva et al., 2017; and see Newman et al., 2014; Zurn & Topolinski, 2017). Similarly, brands that are conceptually and/or perceptually easier to process are evaluated more favorably (Labroo et al., 2008; Lee & Labroo, 2004). Both these effects of processing fluency (and possibly also of

familiarity) on trust and on liking should be particularly strong in people with high levels of behavioral immune activity.

One obvious limitation of our studies is that all four focus on the association between *chronic* behavioral immune system activity and a preference for the known and familiar. Our theorizing would suggest that even a temporary increase in BIS activity should augment the positive affect attributed to known stimuli. But in none of our studies did we manipulate BIS activity and measure its effects on the mere exposure effect or the inherence effect. Another limitation is that all our participants were Israelis. Future research may want to examine our predictions while manipulating BIS activity, and with participants from other cultures.

To conclude, in a series of four studies we provide initial evidence that increased behavioral immune system activity elicits attribution of more positive valence to the known and the familiar. We hope that our basic findings may help shed light on previously studied and on yet to be studied cognitive, social and behavioral effects.

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All data and codes associated with this manuscript are available at the OSF and can be accessed at [https://osf.io/k37x4/?view_only=ddc2e0de74ff466ea1d37f782322ce8a].

Footnotes

[1]Note that the broadest model could only be calculated based on that subset of the participants who completed the SVS and political orientation scales two weeks later.

Open Data

Nussinon, R. (2024). OSF.

[https://osf.io/pbqa9?view_only=ddc2e0de74ff466ea1d37f782322ce8a]

ESM 1. Code of Study 1 (Study1_code.R)

This file contains the analysis code of Study 1.

ESM2. Dataset of Study 1 (Study1_data.csv)

This file contains the raw data for each participant who started Study 1.

ESM3. Dataset of Study 1 with values (Study1_data_with_values.csv)

This file contains the raw data for each participant who started the values part of the study as well.

ESM 4. Code of Study 2 (Study2_code.R)

This file contains the analysis code of Study 2.

ESM5. Dataset of Study 2 (Study2_data.csv)

This file contains the raw data for each participant who started Study 2.

ESM 6. Code of Study 3 (Study3_code.R)

This file contains the analysis code of Study 2.

ESM7. Dataset of Study 3 (Study3_data.csv)

This file contains the raw data for each participant who started Study 3.

ESM 8. Code of Study 4 (Study4_code.R)

This file contains the analysis code of Study 4.

ESM9. Dataset of Study 4 (Study4_data.csv)

This file contains the raw data for each participant who started Study 4.

Table 1. Descriptive data and correlations between variables measured in Study 1.

Measure	*M*	*SD*	2	3	4	5	6	7
1. DS-R	2.79	0.62	0.09	0.45**	0.19**	0.07	0.29**	0.20*
2. Preference for familiar	0.56	0.12		-0.06	0.02	0.03	0.07	0.13
3. COVID threat	4.26	1.07			0.14*	-0.07	0.20*	0.09
4. Religiosity	2.77	2.29				0.01	0.58**	0.54**
5. Illness recency	5.60	1.52					0.07	0.12
6. Conservation values	-0.27	1.36						0.21*
7. Political orientation	1.89	3.43						

Note. *$p < .05$; **$p < .01$; DS-R – Disgust Scale-Revised; COVID – Coronavirus Disease.

Table 2. Descriptive data and correlations between variables measured in Study 2.

Measure	*M*	*SD*	2	3	4	5	6	7
1. PVD	3.80	0.95	0.13*	0.43**	0.02	-0.19*	-0.07	-0.24**
2. Preference for familiar	0.57	0.12		0.05	0.06	-0.12*	-0.06	-0.06
3. COVID threat	4.26	1.06			0.07	-0.14*	-0.08	-0.06
4. Religiosity	2.18	2.13				-0.11	-0.59**	0.11
5. Illness recency	5.79	1.52					0.05	-0.03
6. Political orientation	-0.37	3.52						-0.12*
7. Mood	6.93	2.21						

Note. *$p < .05$; **$p < .01$; PVD – Perceived Vulnerability to Disease; COVID – Coronavirus Disease.

Table 3. Descriptive data and correlations between variables measured in Study 3.

Measure	*M*	*SD*	2	3	4	5	6
1. DS-R	2.73	0.58	.24**	.34**	22**	-.08	.18**
2. IHS	4.93	0.75		.02	.27**	-.09	.39**
3. COVID threat	4.05	1.05			.07	.07	.11
4. Religiosity	2.74	2.29				-.04	.62**
5. Illness recency	5.08	1.98					-.08
6. Political orientation	1.33	3.46					

Note. *$p < .05$; **$p < .01$; DS-R – Disgust Scale-Revised; IHS – Inherence Heuristic Scale; COVID – Coronavirus Disease.

Table 4. Descriptive data and correlations between variables measured in Study 4.

Measure	*M*	*SD*	2	3	4	5	6	7	8
1. Pathogen disgust	4.01	0.93	.42**	.39**	.43**	.30**	.08	-.00	.14*
2. Sexual disgust	3.01	1.39		.34**	.28**	.26**	.38**	-.00	.20**
3. Moral disgust	4.53	1.15			.35**	.17**	.03	.01	.08
4. IHS	4.79	0.84				.23**	.22**	.06	.32**
5. COVID threat	4.03	1.15					.15*	-.01	.10
6. Religiosity	2.25	2.03						.02	.51**
7. Illness recency	4.81	1.98							.04

8.	Political orientation	0.82	3.46

Note. *$p < .05$; **$p < .01$; IHS – Inherence Heuristic Scale; COVID – Coronavirus Disease.