Affective Valence Signals Agency within and between Individuals

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Abstract

Affective valence is a core component of all emotional experiences. Building on recent evidence and theory, we reason that valence informs individuals about their agency—the mental capability of doing and intending. Expressed affect may also lead to perceptions of agency by others. Supporting the hypothesis that valence influences self- and other-perception of agency, across five studies, we showed that participants perceived more agency in themselves in positive versus neutral and negative personal (Study 1) and interpersonal (Study 2) events. Participants also perceived more agency in fictional characters showing positive versus negative affect, regardless of how acceptable the characters' behavior was (Studies 3 and 4). Finally, we had participants personify 24 specific emotions across the valence dimension, and found that the more positive and less negative an emotion was, the more agency participants ascribed to the "person" (Study 5). We discuss the results in terms of how valence may help with human self- and social regulation.

Keywords: Valence, Agency, Self-perception, Other-perception, Affect

Introduction

Emotion theorists since Darwin have argued that emotions signal mental states, to the self as well as others (e.g., Chapman, Kim, Susskind, & Anderson, 2009; Darwin, 1872; Keltner & Haidt, 2003; Lindquist, Gendron, Barrett, & Dickerson, 2014; Shariff & Tracy, 2011). Though theoretical accounts vary regarding the specificity of the information conveyed, most affective scientists would agree that all emotions have positive or negative value. That is, they are *valenced* affective states (Russell, 2003). Recently, theorists have proposed that the valence aspect of affect serves as feedback to signal the effectiveness of one's current mental processing style. Specifically, this *Affect-as-Cognitive-Feedback* framework (Huntsinger, Isbell, & Clore, 2014) suggests that positive and negative affect act as "go" and "stop" signals empowering or inhibiting currently accessible thoughts, processing strategies, and inclinations.

Following logically from this framework (Huntsinger et al., 2014), we reasoned that valence also regulates individuals' perceptions of their own *agency*. Agency is a construct that has long been studied across the social sciences (see the reviews of Archer, 2000; Bandura, 1989; Emirbayer & Mische, 1998), and that has recently resurfaced in social psychology (e.g., Fiske, Cuddy, & Glick, 2007; K. Gray & Wegner, 2011). In the current investigation, the concept refers to the *perception of one's capability to do and intend*, following recent research focused on how humans perceive agency in others (K. Gray & Wegner, 2011). Because valence empowers or inhibits actually accessible thoughts, processing strategies, and inclinations in the moment (Huntsinger et al., 2014), our first hypothesis is that valence also empowers or inhibits one's consciously perceived agency, where more experienced *positive* valence is expected to be associated with greater self-perceived agency, while more experienced *negative* valence is expected to be associated with lesser self-perceived agency. Beyond affect as personal cognitive

feedback, we derived our second hypothesis from the long-theorized *social* signal in perceived emotions (Shariff & Tracy, 2011): perceived affect may lead to perceived agency by others.

To examine the hypothesis that valence signals agency within and between individuals, we first test whether valence is indeed associated with consciously reported perceptions of personal agency (Studies 1 and 2). Then, consistent with a long history of theory about the signal value of emotions, we examine the generalization of this pairing, by testing whether valence induces the perception of one's agency in other external perceivers (Studies 3 and 4). Finally, we examine whether the valence-agency association applies to all emotions regardless of context (Study 5).

Why Agency?

It has been long theorized that when momentary affective states arise—especially specific emotional episodes—they *coordinate* mind, body, and behavior (e.g., Keltner, Haidt, & Shiota, 2006). This is true whether the situation at hand is a problem to be solved (signaled by negatively-valenced emotion; see Algoe & Fredrickson, 2011) or an opportunity that has arisen (signaled by positively-valenced emotion; see Algoe & Fredrickson, 2011). As such, a signal that one has the capability to do and intend—that is, perceived agency (K. Gray & Wegner, 2011)—is relevant to the self, in that it may guide the assessment of resources that one has or needs to address the situation at hand. Indeed, some emotion theorists have argued that the outcome of the evaluation of one's resources to handle the situation at hand plays a central role in which emotion will be experienced in a situation (Smith & Kirby, 2009; Smith & Lazarus, 1990). At a broad level, then, our current focus on whether valence *signals* agency is relevant to the way several emotion theorists have conceptualized the value of emotional states. However, the question has never been conceptualized in this way, theoretically or empirically.

Beyond the self, the perception that a social other is agentic—or has the capability of doing and intending—may guide one's interactions with that person (Guthrie, 1993). A signal of other peoples' current agency—for instance, through their expressed valence—may thus help promote social coordination. Clearly, this has relevance in many domains, such as whether we might help a loved one who is sad (helpless/low agency), stay away from a stranger who is angry (out of control/low agency), or seek help from a colleague who is authentically proud (competent/high agency). As another example, researchers have frequently studied perceived agency in the specific domain of moral judgments. They have shown that humans (and other animate and even inanimate beings) that are perceived to have more agency are judged as more responsible for their good or bad actions and, therefore, should get greater rewards or punishments respectively, than their less-apparently-agentic counterparts (K. Gray & Wegner, 2011). In summary, perceived agency carries key social information, with practical social consequences. Investigating how people exchange the information of agency—for instance, through expressed valence—may therefore contribute to the understanding of social coordination.

Valence and Personal Agency

Researchers suggest that any momentary affective state—including specific emotions—varies on at least two fundamental dimensions: valence and arousal (Russell, 2003; Russell, Weiss, & Mendelsohn, 1989). Critically, these two dimensions are orthogonal to one another (Fontaine, Scherer, & Soriano, 2013; Russell et al., 1989). In the current work, we focus on valence, because recent evidence lays an especially strong foundation for the hypothesis that valence and perceived agency may be tightly linked.

The Affect-as-Cognitive-Feedback formulation (Huntsinger et al., 2014) suggests that positively-valenced affect serves as a green light, informing individuals about the reliability and capability of their current cognitive processing styles in solving situational tasks. This personal information in turn leads to individuals' use of the current processing to *act upon the world* (Huntsinger et al., 2014). Interpreting the formulation in our terms, positive affect is therefore the signal through which people perceive their greater agency. In contrast, the Affect-as-Cognitive-Feedback framework proposes that negative affect serves as a red light, signaling a lack of fit between current processing styles and situational demands (Huntsinger et al., 2014). The misfit then induces abandonment of the current processing and transitions to other processing that presumably operates better (Huntsinger et al., 2014). In our words, negative affect arises to signal lesser agency and the need to switch to another cognitive style when the current one is failing.

Supporting the Affect-as-Cognitive-Feedback account, studies have demonstrated that positive affect leads participants to use whatever mental processing style that has been primed and hence made accessible, presumably because positive affect provides feedback that the current mental content is effective for navigating the world (Huntsinger et al., 2014). Negative affect, in contrast, leads participants not to use the primed processing style, presumably because the affective feedback regarding the style may indicate low effectiveness (Huntsinger et al., 2014). In short, affective valence seems to provide critical information that serves as individuals' bases to assess their ability of doing and intending—or, perceived agency—in the moment. Because it is an open question as to whether people consciously perceive personal agency from valence, testing this association is our objective in Studies 1 and 2.

To be clear, the Affect-as-Cognitive-Feedback framework focuses on valence yet also carefully accounts for discrete emotions (Huntsinger et al., 2014). Although we readily acknowledge that any given type of emotion brings with it additional appraisals and contextual factors (Smith & Kirby, 2009; Smith & Lazarus, 1990), which may influence perceived agency, valence underlies all emotions and we hypothesize that it will account for perceived agency, regardless of these additional potential sources of variance.

Beyond additional appraisals associated with various emotions, another common source of variance in affect to be considered is arousal, the other dimension of core affect (Russell et al., 1989). At first blush, an emotion like anger, which is high in arousal and carries with it appraisals of certainty (Tiedens & Linton, 2001) as well as a stereotypical behavior of aggression (Leary, Twenge, & Quinlivan, 2006), would seem high in agency. However, following the Affect-as-Cognitive-Feedback framework and our definition of agency as perceived capabilities of doing and intending in the moment, we still predict negative valence will be associated with a lack of perceived agency; this is perhaps why people sometimes lash out—because anger informs them that they are losing control of the situation in the moment. Moreover, we reiterate that valence and arousal are orthogonal dimensions (Russell et al., 1989), so if perceived agency was tracking with arousal instead of valence, we should not see its hypothesized correlation with valence once we consider arousal. To address this alternative explanation, we explicitly vary specific emotions on arousal in Studies 1 and 5 to provide data regarding this point.

Generalizing the Effect

In addition to signaling one's own sense of agency, we propose that the hypothesized valence-agency association generalizes beyond oneself. Just as emotions signal information to oneself, they also provide information to perceivers (Darwin, 1872; Keltner et al., 2006).

Supporting our other-perception hypothesis that links valence to agency, research has shown that employees who self-report feeling and expressing more positive emotions at work are rated—perceived—by colleagues as more capable and having better performance (Staw, Sutton, & Pelled, 1994). Compared to neutral faces, research has also found individuals with positive and smiling faces to be judged more competent, even after controlling for physical attractiveness (Reis et al., 1990).

As for why the valence-agency association may generalize beyond the self, studies have shown that individuals often project the rules they use to understand themselves (self-perception) onto others (other-perception). For example, research on false consensus has demonstrated that people often believe others share their personal attitudes, behavioral tendencies and, importantly, beliefs of how the world works (i.e., causal attributions; Marks & Miller, 1987). In addition, the *social projection theory* (Cho & Knowles, 2013; Krueger, 2007) suggests that individuals' self-perception is their prototype of other-perception and the lens through which they understand others. That is to say, an individual may infer others' agency based on others' expressed valence—our other-perception hypothesis—exactly because the inference is what the individual uses to understand her own personal agency—our self-perception hypothesis. Consequently, valence may carry information about agency between as well as within individuals. In the current work, we test both possibilities.

Studies Overview

In five studies, we tested the hypothesis that valence signals agency to oneself and perceivers in the moment. First, building on recent elaborations of Affect-as-Cognitive-Feedback framework (Huntsinger, et al, 2014), we propose that the valence dimension of affect provides feedback about the state of agency for the person experiencing the affective state. In Studies 1

and 2, we tested this self-perception of agency by having participants rate—perceive—their own agency after recalling personal experiences that made them feel either positive, neutral, or negative. We then assessed whether this association within individuals is mirrored and generalizes to a similar association between individuals. In Studies 3 and 4, we obtained participants' ratings of the agency of a fictional character expressing either positive or negative affect in the moment of enacting different behaviors. We included multiple behaviors to cover a range of behavioral contexts in which affective valence could convey agency information. Finally, Study 5 included 24 positive and negative emotions to determine the range of different emotions through which affective valence conveys agency information.

Study 1

Participants

We recruited 900 participants on the Amazon Mechanical Turk online forum (see Casler, Bickel, & Hackett, 2013, for evidence that the data from Amazon Mechanical Turk are equally informative and, sometimes, more socio-economically representiative than those of in-lab participants) because the sample size would give us a sample sensitivity $f = .12$ with 80% power. However, we only received completed surveys from 565 participants. Following recommended practices of analyzing data from participants on Amazon Mechanical Turk (Mason & Suri, 2012), we then deleted the data of 20 participants who failed either of two attention checks: failure to move a scroll bar to 20 when being explicitly asked to or failure to choose Earth (among other planets in the solar system) as the planet they were currently on. The resultant sample included 545 participants (55.60% female; age = 34.16, SD = 11.93; sample sensitivity $f = .14$).

Procedure

This study was designed to test whether affective valence signals agency to the self—the one experiencing the affect. All participants reported their evaluations of personal agency prior to the manipulation. To manipulate valence, participants were randomly assigned to one of five writing prompts that comprised the three—positive, neutral, and negative—valence conditions in the current study. Participants were asked to recall and type on the computer for five minutes their thoughts and feelings regarding a personal experience that made them feel either "joyful, glad, and happy" (positive; n = 110), "serene, content, and peaceful" (positive; n = 120), "angry, irritated, and annoyed" (negative; n = 104), "sad, downhearted, and unhappy" (negative; n = 105), or neutral emotions ("about your daily routine"; n = 106). Because both joy and anger are high-arousal emotions, and serenity and sadness are low-arousal emotions, the choices of emotions comprising each valence condition helped de-confound arousal (i.e., intensity of affect, regardless of valence) from valence and increases our ability to make inferences about the extent to which the hypothesized effect is generalizable. After writing, participants evaluated the two dimensions of their affective experiences—valence and arousal—with the valence rating being the theoretical mediator for the proposed effect of the manipulation on perceived agency. Participants then reported their "in-the-experience" perceived personal agency as the dependent measure.

Measures

Pre-writing perceived agency. Using the definition of perceived agency (K. Gray & Wegner, 2011), participants answered the question "How much agency do you think you have, compared to others? Here, agency means one's general capability to do and to intend." They answered the question with a negative-50-to-positive-50 slide bar with −50 labeled extremely less, −20 labeled somewhat less, 20 labeled somewhat more, and 50 labeled extremely more.

Affective arousal and valence. Participants answered "How positive or negative was the emotion you felt in the experience?" as the valence measure and "How emotionally exited or calm were you in the experience you just wrote?" as the arousal measure. Again, a negative-50-to-positive-50 slide bar was used for each measure, this time with labels of negative-positive (valence) or calm-excited (arousal).

Post-writing perceived agency. The post-writing perceived agency measure was different from the pre-writing measure to reduce carry-over effects. Participants reported perceived personal agency in their recalled experiences using the three-item perceived agency subscale of the Mind Perception Questionnaire (K. Gray, Jenkins, Heberlein, & Wegner, 2011), with instructions modified to fit the current task. Participants read: "How capable do you think you were of doing the following in the experience, compared to others?" Participants then rated themselves on exercising self-control, remembering, and acting morally. It might be helpful to note here that the three items were statistically chosen but not theoretically derived by K. Gray et al. (2011) from among many other activities; these three together efficiently reproduce the variation of the underlying factor of perceived agency. Given the empirical basis, we included all items in this and the following studies. Each item was rated using a negative-50-to-positive-50 slide bar; the average of the three items was used as the dependent measure of post-writing perceived agency (Cronbach's $\alpha = .70$).

Results

Manipulation check. As shown in Table 1, the positive writing prompts resulted in the two highest mean valence ratings, and the negative writing prompts resulted in the two lowest valence ratings. This justifies our plan to group them into one positive, one negative, and a neutral category for tests of the hypothesized effect of valence. In addition, the joy and the anger

prompt led to similarly high mean arousal ratings, whereas serenity and sadness led to low mean arousal. In all, the means document the expected blend of valence and arousal due to the manipulation.

[Insert Table 1 about here]

To formally check the manipulation of valence, we conducted two planned contrasts in an ANOVA that compared writing-prompt differences in valence ratings (F = 250.46, *df* = 4, *p* = .000, η^2_p = .650). In the first contrast, we combined the two positive-emotion groups (each weighted as 1), and compared the combination to the neutral group (weighted as -2). As expected, individuals rated experiences in the "positive" condition to be more positive than experiences in the "emotionally neutral" condition (F = 147.58, *df* = 1, *p* = .000, η^2_p = .22). We then compared the two negative-emotions groups together (each weighted as -1) to the neutral group (weighted as 2). The results show that individuals rated experiences in the "negative" condition to be more negative than experiences in the neutral condition (F = 178.84, *df* = 1, *p* = .000, η^2_p = .25).

Primary analyses. To test the main hypothesis, we conducted the same two planned contrasts in an ANCOVA that compared writing-prompt differences in post-writing perceived agency (F = 4.09, *df* = 4, *p* = .029, η^2_p = .03), while statistically controlling for pre-writing perceived agency (F = 60.55, *df* = 1, *p* = .000, η^2_p = .10). As expected, individuals perceived more post-writing perceived agency in themselves in events that evoked positive emotions than neutral emotions (F = 5.55, *df* = 1, *p* = .019, η^2_p = .10). In the second planned contrast, however, there was not a significant difference in ratings of post-writing perceived agency for those

individuals in the events that evoked negative emotions compared to those in the emotionally neutral condition (F = .54, *df* = 1, *p* = .465, η^2_p = .10).

Although the mean post-writing perceived agency rating for the negative conditions was significantly lower than that of the positive conditions (F = 14.56, *df* = 1, *p* = .000, η^2_p = .03), which is consistent with our hypothesis, it was unexpected that the negative conditions were not significantly lower than the neutral condition. To assess support for the hypothesis in another way, we split the data across the three—positive, negative, and neutral—valence conditions. Here, consistent with the hypothesis, there was a significant positive correlation between ratings of valence and post-writing perceived agency within each condition (positive, *r* = .34, *df* = 228, *p* = .000; negative, *r* = .15, *df* = 207, *p* = .036; neutral, *r* = .43, *df* = 104, *p* = .000). These expected correlations provided justification for testing the hypothesized indirect path from condition to post-writing perceived agency, via valence.

We did this by 5000-sample bias-corrected bootstrapping mediation analysis in an ANCOVA model with the same control and dummy variables used above. Supporting the hypothesis, the results indicated that the positivity contrast significantly induced greater post-writing perceived agency by increasing ratings of valence ($B_{CI95\%}$ = [1.26, 2.74]), and the direct effect of the contrast on post-writing perceived agency was not significant ($B_{CI95\%}$ = [−1.81, 0.76]). Also consistent with our hypothesis, the analysis showed that the negativity contrast caused lower post-writing perceived agency via more negative valence ratings in the negative condition ($B_{CI95\%}$ = [−3.07, −1.36]). Of interest, side-by-side with this predicted valence-mediated effect of condition, in this analysis we found a significant *direct* effect of the negativity-neutral contrast, but in the opposite direction than what was predicted: when statistically removing the effects of valence, participants perceived significantly *higher* post-

writing agency in the negative condition than in the neutral condition ($B_{CI95\%}$ = [0.34, 2.99]). This pair of findings for effects of condition in opposite directions within the same analysis suggests that the null main effect of the negativity contrast observed above was due to a countervailing factor that cancelled out the effect of the valence manipulation. That type of effect is typically referred to as *suppresser*, because it attenuates the main effect of intended manipulations—in the current case, the main effect of the negativity contrast— by its opposite effect, which prevents the main effect from reaching statistical significance (Kenny, Kashy, & Bolger, 1998). [1]

In summary, in this first study, the hypothesized association between valence and perceived agency is supported via three of four planned analyses (i.e., one main effect of condition and two mediated effects) as well as two supplementary analyses (i.e., the main effect of positive vs. negative conditions on post-writing perceived agency and correlations between valence and post-writing perceived agency).

Study 2

Having found initial support for the hypothesis while varying specific emotions as well as arousal in Study 1, we moved to a different method for Study 2. Here, partially motivated by the fact that, in Study 1, writing about one's daily routine as the neutral condition was a different task than writing about a specific emotional episode, we constrained the task to recollection of just one type of experience in all three conditions—social interactions. We also switched to using more generic positive and negative affect than the specific emotions used in the previous study to increase the representation of positivity and negativity. In Study 5, we will return to a wide variety of specific emotions.

[1] All results of hypothesis testing—that is, being significant at $p < .05$ or not—held when statistically controlling for arousal.

Participants

We recruited 150 participants on Amazon Mechanical Turk because the sample size would give us a sample sensitivity $f = .12$ with 80% power and a repeated-measure correlation $r = .30$. We received completed surveys from 102 participants, and then dropped 21 who failed the same attention checks used in Study 1. The resultant sample included 81 participants (53.09% female; sample sensitivity $f = .15$) with a mean age of 34.33 (SD = 11.48)

Procedure and Measures

Participants in the present study recalled personal experiences associated with positive, neutral, and negative affect, and evaluated their agency in the experiences. We specifically asked for memories of social interactions, asking each participant to recall experiences in which she "interacted with a stranger" (emotionally neutral condition; first in order), "interacted with someone and felt positive" and "negative" about herself (positive and negative condition order were counterbalanced). We also shortened the remembering-writing manipulation to one minute per condition, and requested participants only to type "some keywords that could remind you about the person and the event in future." After each recalled experience, participants answered the same measures of affective valence, arousal, and three-item perceived agency "in the experience" (Cronbach's $\alpha = .81$) as they did in Study 1.

Results

Manipulation check. As shown in Table 1, the positive and the negative condition led to positive and negative valence ratings respectively, with the neutral condition in between. All conditions had similar levels of arousal. To formally check the manipulation, we fit the following two-level ANOVA model by the maximal likelihood estimator with robust standard errors (MLE-RES):

$$\text{Valence}_{ij} = \gamma_0 + \gamma_1 * \underline{\textbf{Positivity}}_{ij} + \gamma_2 * \underline{\textbf{Negativity}}_{ij} + u_j + r_{ij}$$ [2]

, where *i* denotes valence conditions at Level 1, and *j* denotes participants at Level 2. Positivity and Negativity are categorical variables on which the positive and the negative condition were the affect conditions and other conditions are reference conditions. With both the variables together in the model, Positivity and Negativity thus indicate the deviations of the positive and the negative condition from the neutral condition, respectively. As predicted, the results showed that Positivity predicted higher valence ratings ($\gamma_{CI95\%} = 15.94 \pm 6.07$, $df = 160.00$, $t = 5.19$, $p = .000$), and Negativity predicted lower valence ratings ($\gamma_{CI95\%} = 48.42 \pm 6.07$, $df = 160.00$, $t = 15.175$, $p = .000$).

Primary hypothesis tests. We then fit the following two-level ANCOVA model by the same estimator to test the effect of valence on perceived agency:

$$\text{Agency}_{ij} = \gamma_0 + \gamma_1 * \underline{\textbf{Positivity}}_{ij} + \gamma_2 * \underline{\textbf{Negativity}}_{ij} + u_j + r_{ij}$$

. As hypothesized, Positivity predicted higher Agency ($\gamma_{CI95\%} = 4.74 \pm 3.68$, $df = 160$, $t = 2.55$, $p = .012$). Also as hypothesized, Negativity predicted lower Agency compared to neutrality ($\gamma_{CI95\%} = -9.22 \pm 3.68$, $df = 160$, $t = -4.95$, $p = .000$).

Finally, we added valence ratings in the model to test the hypothesized full indirect path from condition to perceived agency via valence. To make single-level mediation bootstrapping appropriate for our multi-level model, we estimated and removed the participant-level random

[2]To enhance interpretation of the statistical models, we underline the effects we were targeting. We also use the reduced form of the models to save space. Finally, we assumed normal distributions of random effects. These decisions apply throughout the current paper.

effect u_j from the model. Because Positivity and Negativity were within-participant manipulations with no random slopes in the model and thus had no participant-level variance, this pre-processing of data removed within-participant interdependence (as the fixed-effect approach; see Hayes, 2013, p. 434) and made them purely single-level. We could then ran 5000-sample bias-corrected bootstrapping mediation tests on the hypothesized mediation by valence ratings.

Consistent with the hypothesis and the results of Study 1, valence positively predicted perceived agency ($\gamma_{CI95\%} = 0.14 \pm 0.09$, $df = 205.58$, $t = 3.08$, $p = .002$) and significantly mediated the effects of Positivity (indirect effect $_{CI95\%} = [0.11, 3.16]$) and Negativity (indirect effect $_{CI95\%} = [-8.80, -0.11]$) on perceived agency. More than Study 1, the direct effects of Positivity ($\gamma_{CI95\%} = 2.58 \pm 3.91$, $df = 163.83$, $t = 1.30$, $p = .194$, direct effect $_{CI95\%} = [-0.19, 6.71]$) and Negativity ($\gamma_{CI95\%} = -2.66 \pm 5.56$, $df = 185.34$, $t = -0.94$, $p = .347$, direct effect $_{CI95\%} = [-0.19, 0.38]$) on perceived agency were no longer significant in these models. These results provide additional support the hypothesis that affective valence—whether on the positive or negative end of the continuum—signals agency. [3]

Study 3

Studies 1 and 2 provide the first direct evidence in the literature that affective valence signals agency to the self: when valence is positive, people perceive greater personal agency, and when negative, people perceive lower personal agency. Yet, we also hypothesize that one's valenced state signals agency to others. Therefore, in Studies 3 and 4, we had participants judge the agency of other persons who were displaying either positive or negative affect while enacting a behavior.

[3] As in Study 1, all results of hypothesis testing—that is, being significant at $p < .05$ or not—held when statistically controlling for arousal.

The specific behaviors were varied systematically on how moral/beneficial versus immoral/harmful they were, for three reasons. First, prior work has documented that the morality of actions systematically influences how agentic the actors are perceived (K. Gray & Wegner, 2011). Therefore, analogous to systematically varying levels of arousal with different emotions in Study 1, we tested whether affective valence would signal agency *regardless* of these other possible contributors to perceived agency. We continue to expect a main effect of valence above and beyond the potential influence of the morality of the actor's behavior.

Moreover, using moral behaviors created a natural context for us to ask about participants' *moral judgments* of the actors, which we alluded to in the Introduction as one potential meaningful real-life consequence of our proposed valence-agency association. Taking the hypothesis that valence induces perceived agency, coupled with past evidence that perceived agency *intensifies* moral judgments (K. Gray & Wegner, 2011), we expect a person's conveyed affective valence to not only increase others' perceptions of the person' agency but also amplify others' moral judgments of the person. That is, moral behavior in an actor would be rated *more* moral with positive valence, but immoral behavior would be rated *less* moral with positive valence. Finally, such valence-intensified moral judgments would offer a "reversed-item" counterpoint to the perceived agency measure in that, for example, when valence causes *increases* in perceived agency, moral judgments of immoral behavior would *decrease*. That is, if positive (/negative) valence does not simply cause *all* measured outcomes to be rated in a more desirable (/undesirable) way, such data would provide useful discriminant evidence regarding the proposed valence-agency link.

Participants

We recruited 650 participants on Amazon Mechanical Turk because the sample size would give us a sample sensitivity f = .08 with power = .80 and a repeated-measure r = .03. However, we only received completed surveys from 497 participants. We then deleted the data of 10 who failed the attention checks used in Studies 1 and 2. The resultant sample consisted of 487 participants (39.43% female; age = 31.77, SD = 10.15; sample sensitivity f = .09).

Procedure

Participants read about a fictional character showing either positive (n = 249) or negative affect (n = 238; between-participants Valence factor), while taking four different actions that varied in moral content (within-participants); specifically, the actions were either moral or immoral (Morality factor) and were either serious or mild (Severity factor). For instance, participants in the negative-affect, mildly immoral condition evaluated a character who was "dumping trash in an innocent neighbor's backyard while feeling unhappy about doing it" (referred to as "trashing", below). We used "taking out trash in an innocent neighbor's backyard" (cleaning) as the mildly moral behavior, "shooting an innocent neighbor" (killing) as the seriously immoral behavior, and "saving an innocent neighbor from being shot" (saving) as the seriously moral behavior. The manipulation of behavioral contexts was so designed to cover a wide range of behavior, and we changed the affective tag of "unhappy" to "happy" to manipulate affective valence. The participant read four actions (Morality x Severity) presented one at a time, in counterbalanced order. The valence manipulation was administered as a between-participants variable to limit participants' ability to guess the primary hypothesis regarding valence. After each behavior, the participant reported on *both* perceived agency and moral judgment of the fictional character.

Measures

After reading about each moral action, participants rated the character on the single-item perceived general agency measure used in Study 1, with instructions for the new context reading: "How much agency would the person have, compared to others? Here, agency means one's general capability to do and to intend." We then asked participants "How willing or unwilling would the person feel to do this behavior?" We devised this question of perceived *intentionality* based on the review of Waytz, Gray, Epley, and Wegner (2010) in order to tap into the *intending* component of perceived agency, without the "doing"; because we were manipulating the character's *behavior*, all actors were "doing," which is the other component of perceived agency. This *perceived intentionality* measure of agency is thus not tethered to the manipulation, and provides a useful independent assessment of perceived agency. Finally, participants responded to "How morally right or wrong is this behavior?" as the moral judgment measure. Similar to the scale of the perceived general agency item, the doing and the judgment items were slide bars with −50, −20, 20, and 50 labeled extremely unwilling/wrong, somewhat unwilling/wrong, somewhat willing/right, and extremely willing/right, respectively.

Results

We examined whether the valence manipulation increased general perceived agency by the following two-level linear model fitted by MLE-RES:

$$\text{Agency}_{ij} = \gamma_{00} + \gamma_{01} * \underline{\textbf{Valence}}_{j} + \gamma_{10} * \text{Morality}_{ij} + \gamma_{20} * \text{Severity}_{ij} + \gamma_{11} * \text{Valence}_{j} * \text{Morality}_{ij} + \gamma_{30} * \text{Morality}_{ij} * \text{Severity}_{ij} + \gamma_{21} * \text{Valence}_{j} * \text{Severity}_{ij} + \gamma_{31} * \text{Valence}_{j} * \text{Morality}_{ij} * \text{Severity}_{ij} + u_{j} + r_{ij}$$

, where *i* denotes behavioral conditions at Level 1, and *j* denotes participants at Level 2. In the

model, Agency is the rating of perceived general agency; Valence, Morality, and Severity are dummy codes mentioned above where moral, serious, and positive-affect conditions are 1, and other conditions are −1. We coded the model this way so the main effect of Valence was equal to the total effect of Valence on Agency when both Morality and Severity are 0, the summary point of the effect in all four behaviors we included. Consequently, the coefficient of Valence in the model was readily interpretable as the general test of our hypothesized valence-agency link, and we focused on this piece of the model also for simplicity. Finally, to form the models of willingness and morality judgment, we changed the dependent variable Agency to the ratings of willingness (Intentionality) and moral judgment (Judgment), respectively. Readers can find all detailed results of the models in Table 2.

[Insert Table 2 about here]

Results support the valence-agency hypothesis: As seen in the fifth row (Valence) of Table 2, the valence manipulation caused participants to perceive more agency (measured by Agency and Intentionality) in actors feeling happy compared to unhappy. As secondary evidence, valence had no such main effect on moral judgments. Instead, it interacted with the actors' behaviors to extremify moral judgments on the actors: valence raised the judgments of moral behavior, but lowered the judgments of immoral behavior.

We also note here some significant statistical interactions between Valence and other factors. In brief, first, Valence interacted with Morality to influence each dependent measure. Simple effects tests, presented in the lower portion of Table 2, revealed that Valence increased perceived agency for the *moral* behaviors (i.e., saving and cleaning) regardless of the perceived

agency measures being used (i.e., for both Agency and Intentionality), but it only increased perceived agency for the *immoral* behaviors (i.e., trashing and killing) when the measure was Intentionality. That is, six of the eight within-behavior simple effects of valence on perceived agency were significant. Finally, simple effects provide some evidence that Valence amplified moral judgments, such that moral behaviors done happily were perceived as more *right*, whereas the immoral behavior of killing done happily was perceived as more *wrong* than when the same behavior was done unhappily.

Study 4

Consistent with the hypothesis that valence signals agency between persons, the results of Study 3 showed that actors' affective valence influenced perceptions of their agency. Stemming from the valence-agency association, we also provide initial evidence that the association has implications for moral judgments. However, though the main effect of valence on perceived agency was significant, only six out of eight within-behavior simple effects of valence on perceived agency were significant. In Study 4, we changed the design to sharpen the valence contrast, and tested for conceptual replication using all the same behaviors from Study 3. We did so using two independent samples.

Participants

For each study, we aimed to enroll 150 participants, because the sample size would give us a sample sensitivity $w = .23$ with 80% power.

Sample a. We recruited 150 participants on Amazon Mechanical Turk, however, only 102 participants (sample sensitivity $w = .28$) among the 150 completed our study survey. We then deleted the data of those failing the attention check (described below) in any of the four

behavioral conditions and/or indicating they were not on Earth. The resultant sample consisted of 83 participants (42.17% females) with a mean age of 37.83 (SD = 12.29).

Sample b. The study was advertised to all 300 undergraduate students enrolling in a course of behavioral marketing; 199 of them completed the survey. We then cleaned the data following the same criteria as in Sample a. The resultant sample consisted of 162 participants (58.64% females; age = 20.17, SD = 0.81; sample sensitivity w = .20).

Procedure

We asked participants from two independent samples (Samples a and b) to *compare* two fictional characters experiencing different affect (positive and negative) while doing each of the same four moral actions introduced in Study 3 (within-participants). For instance, we told participants in the mildly immoral condition that Person A is dumping trash in an innocent neighbor's backyard while feeling "unhappy" about doing it, whereas Person B is doing the same thing while feeling "happy" about doing it. Different from Study 3, participants' task this time was to decide whether A or B (letter labels counterbalanced) had stronger agency, as well as who was more morally unacceptable. As in Study 3, we again included these moral judgments as a practical consequence and to document a different pattern of effects from the main outcome of agency.

Measures

We adopted the measures of perceived general agency and perceived intentionality (this second measure was only in Sample b [4]) from Study 3, and revised them as "Who has stronger agency? Here, agency means one's general capability to do and to intend." and "Who is more unwilling to take the action?" respectively, with forced-choice options of Person A and Person B.

[4] The measure was not in Sample a because the study and its first sample were originally intended to assess only the nonsignificant simple effects on general perceived agency from Study 3. However, we included both measures of perceived agency in Sample b for full conceptual replication of Study 3.

We also asked a question of moral judgments: “Who is more morally unacceptable?” Following the same rationale as in Study 3, we hypothesized that participants would pick the happy character as being more agentic and less unwilling in all conditions. We also expected to replicate the results of Study 3 in which the happy character was picked as less unacceptable in moral conditions but more unacceptable in immoral conditions. Finally, as an attention check, participants were asked to choose whether Person A or B was happier.

Results

[Insert Table 3 about here]

We used chi-square tests to analyze both Samples a and b. The results shown in Table 3 indicated that, as predicted, acting happily made a person more likely to be perceived as relatively agentic in all four behavioral conditions (all choices of the happy actor > 50%). On the other side of the coin, acting unhappily made one seem to lack willingness relative to acting happily, in all conditions, as predicted (all choices of the happy actor < 50%). In addition, participants were more likely to pick the happy character as relatively moral compared to the unhappy one, when the both persons were committing moral actions (all choices of the happy actor within moral behaviors < 50%). When the actions were immoral, participants however indicated the happy person as relatively more immoral than the unhappy person (all choices of the happy actor within immoral behaviors > 50%). Together, the results offered evidence that valence signals agency—both general agency and the ability of intending—across a wide range of behavior. These valence-induced perceptions of agency may also drive real-life social and moral judgments.

Study 5

Results from Studies 1 through 4 demonstrate that valence signals agency to the self as well as to others. Our evidence—using multiple methods—suggests this is true regardless of affective arousal and the context in which the feeling is experienced or expressed. In this last study, we aimed to test the generalizability of the finding by using a wide array of discrete emotions. This approach allows us to test whether a core feature underlying any given emotion—valence—continues to predict agency, despite the variance in any given emotional state. In addition, inspired by the research on perceiving agency in animate and inanimate beings (see Waytz et al., 2010), we had participants judge the agency of emotions per se, as opposed to that of people experiencing (Studies 1 and 2) or expressing (Studies 3 and 4) them. Further, by presenting emotions but not context to participants, the current study further addresses whether the valence-agency link transcends specific personal experiences (Study 1), or specific social (Study 2) or behavioral contexts (Studies 3 and 4).

Participants

We recruited 1000 participants on Amazon Mechanical Turk so on average each of the 24 emotions used in the current study (see Procedure) would have more than 40 participants. We received completed surveys from 866 participants (sample sensitivity $f = .16$; 47.81% female; age = 34.01, SD = 11.14). It is worth noting that the large sample size included participants aged 17 to 73 and from 47 countries around the globe.

Procedure

Valence was varied by employing 24 different positive and negative discrete emotions that had been previously identified by an international research collaborative—with 4947 participants from 34 countries—as shared across cultures and covering the overall emotional

space worldwide (Fontaine et al., 2013). The emotions were: anger, anxiety, being hurt, compassion, contempt, contentment, despair, disappointment, disgust, fear, guilt, happiness, hate, interest, irritation, jealousy, joy, love, pleasure, pride, sadness, shame, stress, and surprise. We randomly assigned one emotion to each participant and told her "Imagine that [emotion inserted here; underscored] is a living person. How would the person be capable of doing the following, compared to ordinary people?" This last question was then followed by the three-item/activity perceived agency scale (Cronbach's α= .70) used in Study 2, and the items/activities were rated on a negative-100-to-positive-100 (labeled extremely less capable and extremely more capable respectively) slide bar.

The study that identified these 24 emotions also conducted a sophisticated analysis of ratings of the emotions to estimate the valence and the arousal level of each emotion (Fontaine, Scherer, Roesch, & Ellsworth, 2007). Consequently, our assignment of the emotions to participants was equivalent to giving them a priori "doses" of valence while controlling for arousal. We were therefore able to enter the estimated values of the dosages of valence in the analysis, without asking participants' appraisals of it. As a result, the present study was an experiment and supported causal inference about the extent to which valence—which varies across types of emotions—induces perceived agency. Lastly, in previous studies, we either asked participants to self-generate the contexts of valence (Studies 1 & 2) or offered participants specific contexts (Studies 3 & 4). In contrast, the current personification design contained no explicit information of social or behavioral contexts. As a result, findings in this study might depend only on participants' understanding of emotions and the emotions' affective valence.

Results

To test the effect of valence dosage on perceived agency across the 24 emotions, we fitted the following two-level model by MLE-RES by three stages:

$$\text{Agency}_{ij} = \gamma_0 + \gamma_1 * \underline{\textbf{Valence}}_j + u_{0j} + r_{ij}$$

where *i* denotes participants at Level 1, and *j* denotes emotions at Level 2. In the model, Agency is ratings of perceived agency, and Valence is the weight of affective valence assigned a priori to emotions. In the stage-1 baseline model, we estimated the effect of emotions with the coefficient of Valence fixed at 0, in order to document the full variance of Agency at the emotion level. That is, the variance of Agency produced by the variety of emotions we included, with all their different nuances (analogous to between-group variance in ANOVA). We then estimated the coefficient of Valence at stage 2. Comparing the results at this stage to those at the previous stage, we could then see the variance of Agency created by emotions that was uniquely explained by Valence. That is, the extent to which the valence–agency association generalized across different emotions.

The result showed that, at stage 1, the variance of the emotion-level random intercept was significantly larger than 0 (τ = 618.33, SE = 193.86. Z = 3.19, p = .001), indicating different emotions induce different levels of perceived agency, as might be expected. With Valence added as a predictor at stage 2 ($\gamma_{\text{CI95\%}}$ = 20.97 ± 6.42, df = 21.75, t = 6.78, p = .000), it was found that the same unexplained random-intercept variance in perceived agency decreased by 70.27% (to τ = 183.81, SE = 66.98. Z = 2.74, p = .006), with significant yet merely 29.73% variance left unexplained. In other words, despite additional contributions to variance in perceived agency

from unique features of the individual emotions, valence was the absolutely dominant source of perceived agency underlying the 24 emotions. [5]

[Insert Figure 1 about here]

To investigate further whether there was an emotion that did not fit the hypothesized valence-agency association, we sampled three representative data points—the 25th, 50th, and 75th percentile—of perceived agency of each emotion, and plotted the data against their valence (Figure 1 upper) or arousal (Figure 1 lower). To facilitate interpretation, we also drew the ordinary-least-squares regression lines of the 50th percentile samples. As can be seen in the upper graph of Figure 1, these samples of median perceived agency of each emotion—seen as circles on the graph—scattered closely to the valence-agency regression lines without systematic or individually excessive deviations. That is, these 24 emotions generally followed the proposed positive valence-agency relation. Turning to the lower part of Figure 1, we also provide the graph in which one can also see a negative association between *arousal* and perceived agency, which would be consistent with the negative effect of arousal on perceived agency ($\gamma_{CI95\%} = -8.11 \pm 6.04$, $df = 21.83$, $t = -2.79$, $p = .011$) if it was added in the model. However, because valence and arousal are theoretically orthogonal (Fontaine et al., 2013; Russell et al., 1989) and were estimated as orthogonal in the research on the specific emotions tested here (Fontaine et al.,

[5] As in Studies 1 and 2, all results of hypothesis testing—that is, being significant at $p < .05$ or not—held when controlling for arousal, and the control decreased unexplained variance by another 8.36%. For readers familiar with the two-dimensional mind perception theory (K. Gray & Wegner, 2011), we note that, in addition to perceived agency, we measured the other dimension of mind perception—perceived experience—as well, in all studies, for completeness. Conceptually, it is not relevant to our methods because it asks about *capability* of sensing and feeling (i.e., feeling hunger, fear, sadness) just as we have participants directly focus on experiences (i.e., making it seem a moot point). Nonetheless, for curious readers, we note that all results of the current study and, Studies 1 through 4 held too, while controlling for perceived experience. This result of invariance rules out the alternative explanation that valence signals a mind strong on all aspects as opposed to specifically on agency.

2007), we note that adding arousal dosages in the model did not influence the effect of valence (see Footnote 7).

General Discussion

The current studies provide evidence that affective valence signals agency to the self and others. Specifically, the more positive or the less negative a person's affect is, the more agency the person will see in herself (Studies 1 and 2), and the more agency others will attribute to her (Studies 3 and 4). In addition, the valence-agency relationship remained robust when variation in valence was achieved by having participants consider emotions representing the entire emotion space (Study 5). The valences of specific emotions were directly related to the degree of perceived agency. Across studies, the hypothesized valence-agency relationship held regardless of arousal level (Studies 1, 2, and 5), behavioral context (Studies 2, 3, and 4), and whether perceptions were of self (Studies 1 and 2) or others (Studies 3, 4, and 5).

We further show that the proposed valence-agency association may be more than simple patterned responses, or linking positive valence with "good" and negative valence with "bad" (Studies 3 and 4). As we found, valence made moral judgments more extreme for the valence holders in both morally positive and negative directions. For example, people performing immoral actions happily were perceived as *more bad*, whereas people performing moral actions unhappily were perceived as *less good*. This predicted effect was in line with the literature showing that individuals heighten moral judgments to those who are seen as more agentic (K. Gray & Wegner, 2011), as well as our hypothesis that valence influences perceived agency. Lastly, as noted in footnotes, arousal is not a compelling alternative explanation for the influence of valence on perceived agency. Consistent with the theoretical orthogonality of valence and arousal, we find the effect of arousal to be either non-significant (Studies 1 and 2) or actually

negative (Study 5) on perceived agency. Specifically regarding high-arousal negative emotions that seem behaviorally or physiologically active, we demonstrate that anger is perceived as the *least* agentic among joy (high-arousal positive), serenity (low-arousal positive), sadness (low-arousal negative), and neutral affect in self-perception (Study 1, Table 1). In the tests of other-perception, we also show that anger and fear comply to the proposed valence-agency association well, if not the best of the 24 emotions studied (see Figure 1 of Study 5).

Implications

Valence detection is one of the most basic and automatic mental processes that humans have (Wentura & Rothermund, 2003). The current studies elaborate on this position by demonstrating that people will translate information about affective valence into judgments of agency. As such, perhaps the tendency for positive and negative affect to regulate mental processes as indicated in the Affect-as-Cognitive-Feedback framework (Huntsinger et al., 2014) is only part of the picture: in addition to automatically influencing use of cognitive processing styles, valence appears to influence *conscious perceptions* of one's own momentary agency and, importantly, convey that information to others. This has implications for theoretical claims about the adaptive value of positively valenced and negatively valenced affective states, consideration of the social functions of emotion and affect, and practical implications for social coordination (e.g., moral judgment).

Adaptive value of valenced states. Many theorists argue that, when an emotion—a momentary affective state—arises, it does two things: draws attention to a situation at hand, and coordinates a response to that situation (e.g., Keltner et al., 2006). Others have explicitly considered positively-valenced and negatively-valenced states as drawing attention to two different kinds of situations—opportunities to be taken advantage of, and problems to be solved

(see Algoe & Fredrickson, 2011; Fredrickson, 1998), respectively. The current data are consistent with those perspectives, in that positive valence appears to signal to the self that one has the capabilities to do and intend in the moment—a green light to take advantage of the opportunity that has arisen—whereas negative valence appears to signal to the self that one does not have the capabilities to do and intend (perhaps as they expected to do) in the moment, which is a signal that a prior strategy needs to be changed (i.e., a problem needs to be solved).

One useful feature of the present data is that they are consistent with the literature suggesting valence is a "core" feature of affective experience (Barrett, 2012; Barrett & Bliss-Moreau, 2009), but do not limit implications about how this signal of agency plays out for any given discrete emotion or situation. For example, it would be possible to test the hypothesis that increased self-perceived agency helps account for improved relationships from felt gratitude (Algoe, 2012), improved achievement from authentic pride (Tracy, Weidman, Cheng, & Martens, 2014), or that decreased self-perceived agency helps account for withdrawing to gather resources in sadness (Bonanno, Goorin, & Coifman, 2008) and feeling a sudden urge to remove obstacles in anger (Lemerise & Dodge, 2008). We do not see our research as an alternative explanation to the previously proposed evolutionary value of any of these given emotional states, but a fundamental component that may help shape their consequences: It is simply a different research question, at a different level of analysis.

Social functions of valenced states. In addition to conveying information to the self, many theorists have argued that emotions systematically convey useful information to social interaction partners (e.g., Chapman et al., 2009; Darwin, 1872; Ekman, 1993; Keltner & Haidt, 2003; Shariff & Tracy, 2011). The current research demonstrates a piece of information—agency—that emotions convey among individuals (Studies 3 and 4). In addition, studies have

reported that individuals often track the emotions and, thus incidentally, the underlying valence of other people in everyday interactions through various channels of expressions including muscle movements (e.g., Lindquist et al., 2014), gestures and postures (e.g., Coulson, 2004), tone of voice (e.g., Scherer, 2003), and bodily touches (e.g., Hertenstein, Keltner, App, Bulleit, & Jaskolka, 2006). Our data raise the possibility that this tracking of valence may also prepare people for seeing the degree of agency in interaction partners.

We suspect people may track agency of others by valence because human beings need information about agency for survival, and they need the information so much that agency detection may have become their second nature (Atran & Henrich, 2010; Guthrie, 1993). Consequently, mental processes as automatic as valenced affective reactions may have been co-opted to support the need for seeing agency in the world. For example, consistent with a social functional perspective on emotions (Keltner & Haidt, 1999), Bonanno et al. (2008) argues that sadness not only changes the behavior of sad individuals, but also prompts their fellow perceivers to provide assistance to those who are sad. The assistance consequently helps restore the lack of resources of the sad individual in the group and, therefore, strengthens the group the perceivers belong to.

As another potential manifestation of perceived agency guiding interpersonal coordination, our studies show that affective valence intensifies moral judgments, presumably by inducing perceived agency. For example, based on results of Studies 3 and 4, individuals might blame a happy bully (e.g., killer with no regret) harsher and increase moral judgments for her (e.g., longer time in prison) relative to an unhappy one (e.g., killer with regret), so the individuals and their fellow group members can *avoid* (e.g., keep the killer in prison and away from the society) the happy bully and the potential exploitations she would cause to others. On the flip

side, regardless of how beneficial an action is, taking the good action (e.g., saving neighbors or cleaning their yards) with negative affect could make the actor seem non-agentic and ineffective, relative to those doing the same with positive affect. It might thus seem less useful to *approach* (e.g., to be a friend and a potential recipient of kindness of) the unhappy benefactor than the happy one for future social bonding. We believe these results contribute to the current literature on agency perception and its role in morality as well as general social decision-making (e.g., H. M. Gray, Gray, & Wegner, 2007; K. Gray & Wegner, 2011; Knobe, 2003; Morewedge, 2009).

Finally, whereas prior studies suggest implicit embodiment of personal agency (e.g., K. Gray, 2010; Huntsinger, 2014), we report that one can explicitly judge people as having different levels of agency according to their affective valence. The pairing is so general that it may not only transcend whether the self or another is having the affective experience, but also the distinct experiential content of different emotions, as suggested by the results of Study 5. Though the literature on distinctions among emotions is robust (e.g., DeSteno, 2009; Keltner & Haidt, 2003; Watkins, Scheer, Ovnicek, & Kolts, 2006), we believe the current findings will be of extra interest to those researchers focused on similarities across emotional experiences.

Limitations and Future Directions

Because we only used explicit measures of perceived agency, we do not know to what extent the valence-agency association relies on automatic processes and/or learned, controlled associations among concepts. The research from which we derive our hypotheses about the valence-induced self-perception of agency hints that the pairing is quick and could be automatic (Huntsinger, 2014), and we look forward to future work to dig into the formation of both self- and other-perceived agency. Related to this consideration, we do not know what else may have come to mind for participants in our studies, particularly those in Studies 3 and 4, when they

were evaluating an *actor*'s agency. For example, beyond knowledge we provided about valence, participants may have spontaneously generated attributions for the person's action that also contributed to the effects we see. Participants also may have spontaneously translated the word "un/happiness" into "un/willingness"; though we see this potential colloquial translation from affect to agency as consistent with our predictions, we believe future studies could manipulate displayed affect in other ways (e.g., show pictures of the actor with different emotional expressions) to test for conceptual replication without linguistic interference.

Further, although we employed many emotions identified as cross-culturally shared across the studies, we have not yet considered the cultural aspect of agency (discussed by Markus & Kitayama, 2003). Future research may examine whether the valence-agency link holds even for culturally special emotions and ways to show agency. Related to this, although we successfully generalized the valence-agency association across the emotion space, it does not mean affective valence is the sole determinant here. Indeed, in Study 5, we found significant variability in the perception of agency that was induced by discrete emotions and not explained by their valence (or arousal). The finding therefore calls for future investigation into the effects of different emotions on perceived agency, above and beyond affect. Finally, prior studies on perceived agency suggests its social significance (e.g., K. Gray & Wegner, 2011; Knobe, 2003; Morewedge, 2009; Waytz et al., 2010). We thus believe the present data provide further justification to explore the mediating effect of perceived agency on valence-driven personal and social coordination such as those mentioned in Implications. We look forward to future research on these topics and we believe, by so doing, the field may together advance the research program on the communication functions of emotions that dates back to Darwin (1872).

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Table 1. Descriptive Statistics of Studies 1 and 2

Emotion condition	N	Valence		Arousal		Perceived Agency	
		M	SD	M	SD	M	SD
Study 1 (Between-participant)							
Joyful, glad, and happy (Positive)	110	36.56	17.42	14.45	26.93	20.29	16.25
Serene, content, and peaceful (Positive)	120	36.78	16.72	−12.70	30.48	19.44	15.03
Daily routines (Neutral)	106	7.23	26.70	−5.60	28.60	16.79	15.70
Angry, irritated, and annoyed (Negative)	104	−27.96	16.62	12.85	22.37	13.40	15.29
Sad, downhearted, and unhappy (Negative)	105	−23.42	24.11	−2.65	27.36	15.95	17.67
Study 2 (Within-participant)	81						
Positive		34.40	16.19	5.94	28.87	20.70	15.94
Stranger (Neutral)		18.46	25.53	−9.73	29.90	15.95	16.35
Negative		−29.96	16.71	9.42	24.15	6.73	15.77

Table 2. Multilevel Modeling Results of Study 3

	Perceived Agency				Perceived Intentionality				Moral Judgment			
Predictors	γ CI95%	*df*	*t*	*p*	γ CI95%	*df*	*t*	*p*	γ CI95%	*df*	*t*	*p*
Intercept	15.71 ± 1.55	485	19.97	.000	4.55 ± 1.78	485	5.01	.000	−6.58 ± 0.84	1940	−15.44	.000
Morality (M)	4.85 ± 0.86	1455	11.10	.000	8.33 ± 1.03	1455	15.93	.000	31.21 ± 0.84	1940	73.29	.000
Severity (S)	2.84 ± 0.86	1455	6.50	.000	1.13 ± 1.03	1455	2.17	.030	3.78 ± 0.84	1940	8.88	.000
M × S	1.93 ± 0.86	1455	4.42	.000	4.08 ± 1.03	1455	7.81	.000	10.10 ± 0.84	1940	23.71	.000
Valence (V)	1.66 ± 1.55	485	2.11	.035	6.12 ± 1.78	485	6.73	.000	0.54 ± 0.84	1940	1.26	.206
V × M	2.38 ± 0.86	1455	5.45	.000	2.57 ± 1.03	1455	4.92	.000	2.09 ± 0.84	1940	4.92	.000
V × S	0.74 ± 0.86	1455	1.69	.091	−0.39 ± 1.03	1455	−0.75	.452	−0.11 ± 0.84	1940	−0.26	.797
V × M × S	0.44 ± 0.86	1455	1.01	.314	−1.06 ± 1.03	1455	−2.02	.043	0.34 ± 0.84	1940	0.79	.429
Simple effects of valence within each behavior												
V | Saving	10.44 ± 4.28	1399	4.78	.000	14.48 ± 5.03	1450	5.64	.000	5.72 ± 3.34	1940	3.36	.001
V | Cleaning	5.72 ± 4.28	1399	2.62	.009	20.28 ± 5.03	1450	7.91	.000	4.81 ± 3.34	1940	2.82	.005
V | Trashing	−2.04 ± 4.28	1399	−0.93	.350	5.75 ± 5.03	1450	2.24	.025	−2.22 ± 3.34	1940	−1.30	.193
V | Killing	−0.84 ± 4.28	1399	−0.39	.699	8.41 ± 5.03	1450	3.28	.001	−4.00 ± 3.34	1940	−2.35	.019

Table 3. Results of Choosing the Happy Character in Samples a and b in Study 4

	Perceived Agency			Lack of Perceived Intentionality			Moral Judgment		
Behavior	Happy %	χ^2	*p*	Happy %	χ^2	*p*	Happy %	χ^2	*p*
Moral behavior									
Saving [a]	78.40%	26.61	.000				18.07%	33.84	.000
Saving [b]	83.47%	52.25	.000	3.09%	142.62	.000	6.79%	120.99	.000
Cleaning [a]	80.86%	36.45	.000				37.35%	5.31	.021
Cleaning [b]	78.40%	61.73	.000	3.70%	138.89	.000	17.90%	66.77	.000
Immoral behavior									
Trashing [a]	67.47%	10.13	.001				81.93%	33.84	.000
Trashing [b]	76.54%	45.65	.000	1.85%	150.22	.000	85.19%	80.22	.000
Killing [a]	67.47%	10.13	.001				85.54%	41.94	.000
Killing [b]	75.31%	41.51	.000	2.47%	146.4	.000	87.04%	88.89	.000

Note: All choices are tested against 50%, i.e., no difference from choosing the unhappy character; [a] and [b] stand for Samples a and b, whose N's are 102 and 162, respectively.

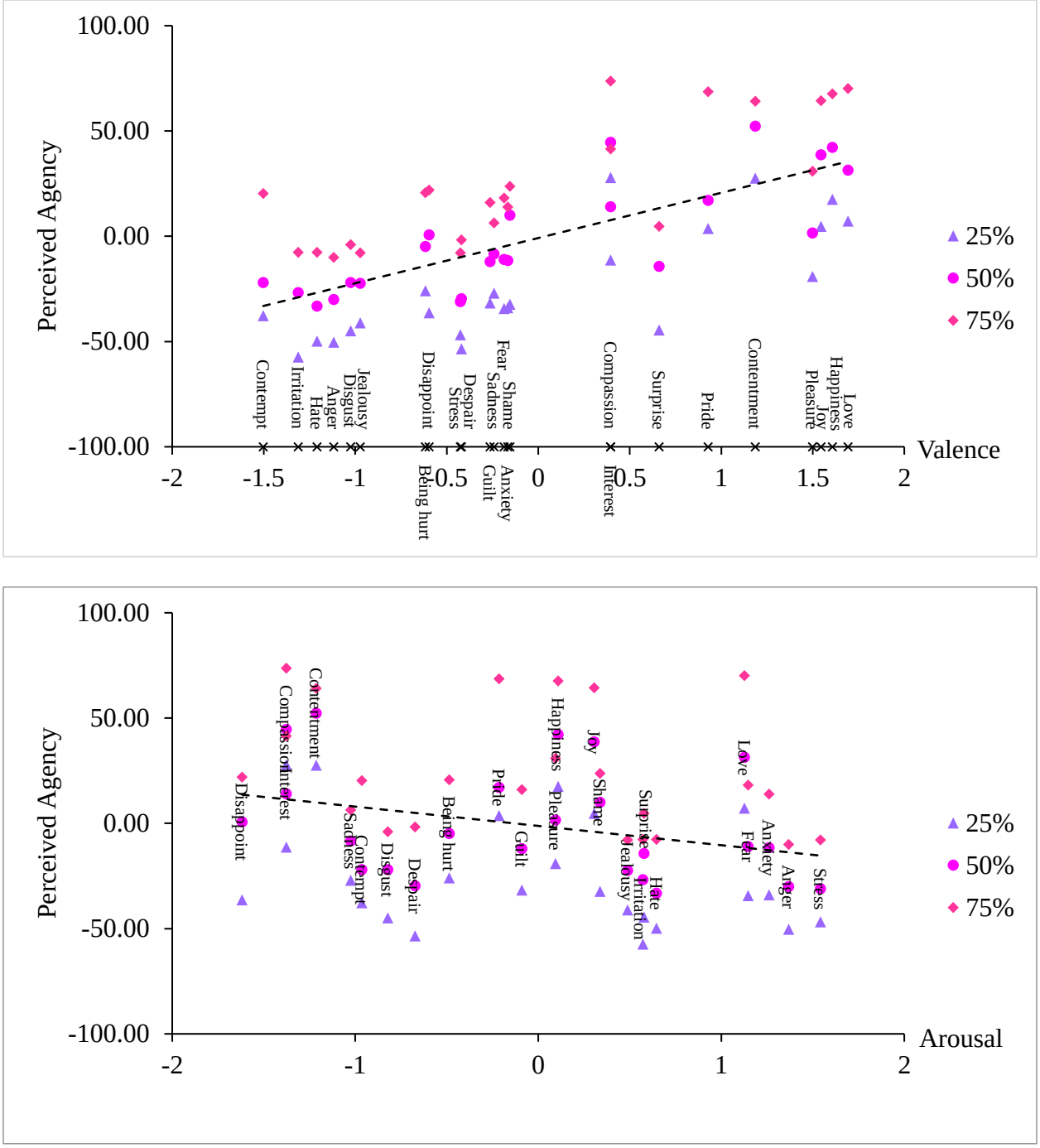

Figure 1. The relationship between emotions' valence (upper) and arousal (lower) with perceived agency. *Note:* In the lower graph, positive emotions are generally above and negative emotions are generally below the arousal-agency regression lines, indicating that the valence of emotions accounts for unique variance of perceived agency while holding arousal constant.