The Affect Misattribution Procedure (AMP) Revisited: An Informational Account

Nicolas Pillaud & François Ric

Université de Bordeaux, France

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Abstract

The aim of this research was to test an informational explanation of the effects observed in the Affect Misattribution Procedure (AMP). According to this explanation, participants performing the AMP would simplify the task by asking whether the target is pleasant (yes vs. no), and use the affective information provided by the prime to answer the question (positive = yes; negative = no). In line with this proposition, we observed in three pre-registered experiments that slightly modifying the response options proposed in the task moderates the effect, which can be canceled (Exp. 1) and even reversed (Exp. 2 and 3). These results are consistent with the informational explanation and seem difficult to explain by the operation of misattribution processes.

Research Transparency Statement

General Disclosures

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Experiment One Disclosures

Preregistration: The hypotheses, the methods, the analysis plan and the exclusion criteria were preregistered (Exp. 1 on 2022-11-15: https://doi.org/10.17605/OSF.IO/KWSBN), prior to data collection which began on 2022-11-16. There were no major or minor deviations from the preregistration. **Materials**: All study materials are publicly available (https://doi.org/10.17605/OSF.IO/XQ53J). Details of all the files linked to this experiment, and the procedure for reproducing it, are available at https://doi.org/10.17605/OSF.IO/VJ87U. **Data**: All primary data are publicly available (https://doi.org/10.17605/OSF.IO/XQ53J). **Analysis scripts**: All analysis scripts are publicly available. (https://doi.org/10.17605/OSF.IO/XQ53J). **Computational reproducibility:** The computational reproducibility of the results has been independently confirmed by the journal's STAR team.

Experiment Two Disclosures

Preregistration: The hypotheses, the methods, the analysis plan and the exclusion criteria were preregistered (Exp. 2 on 2022-11-15: https://doi.org/10.17605/OSF.IO/HB9JU), prior to data collection which began on 2022-11-16. There were no major or minor deviations from the preregistration. **Materials**: All study materials are publicly available (https://doi.org/10.17605/OSF.IO/3TKJ7). Details of all the files linked to this experiment, and the procedure for reproducing it, are available at https://doi.org/10.17605/OSF.IO/VJ87U. **Data**: All primary data are publicly available (https://doi.org/10.17605/OSF.IO/3TKJ7). **Analysis scripts**: All analysis scripts are publicly available (https://doi.org/10.17605/OSF.IO/3TKJ7). **Computational reproducibility:** The computational reproducibility of the results has been independently confirmed by the journal's STAR team.

Experiment Three Disclosures

Preregistration: The hypotheses, the methods, the analysis plan and the exclusion criteria were preregistered (Exp. 3 on 2023-02-21: https://doi.org/10.17605/OSF.IO/JB6Y8), prior to data collection which began on 2023-02-22. There were no major or minor deviations from the preregistration. **Materials**: All study materials are publicly available (https://doi.org/10.17605/OSF.IO/PB2SK). Details of all the files linked to this experiment, and the procedure for reproducing it, are available at https://doi.org/10.17605/OSF.IO/VJ87U. **Data**: All primary data are publicly available (https://doi.org/10.17605/OSF.IO/PB2SK). **Analysis scripts**: All analysis scripts are publicly available (https://doi.org/10.17605/OSF.IO/PB2SK). **Computational reproducibility:** The computational reproducibility of the results has been independently confirmed by the journal's STAR team.

Statement of relevance

The present research examines the psychological mechanisms underlying one of the most influential measures of implicit attitudes and proposes an alternative "informational" explanation. The studies provide results consistent with this alternative explanation, leading to a possible reconsideration of some of the effects described in this literature. Furthermore, these results call into question the explanation furnished for the impact of affect on cognitive processes. These effects may not be as direct as often assumed, but reflect the use of affective information to perform the task more effectively.

The Affect Misattribution Procedure Revisited: An Informational Account

The last decades have seen an increasing interest in indirect measures of attitudes, with a number of proposals, like, for instance, the Implicit Association Test (IAT; Greenwald, et al., 1998), the Evaluative Priming Task (EPT; Fazio et al., 1995), the Approach/Avoidance task (Rinck & Becker, 2007; Rougier et al., 2018; 2020), or the Extrinsic Affective Simon Task (EAST; De Houwer, 2003). Among these measures, the Affect Misattribution Procedure (AMP; Payne et al., 2005) has attracted much interest from researchers (see, for review, Payne & Lundberg, 2014). The dominant explanation of the AMP lies in misattribution processes, according to which affect evoked by the attitude stimulus would be misattributed to another ambiguous object (Gawronski & Ye, 2014; Payne et al., 2005). We proposed another mechanism through which AMP effects could occur, namely participants' use of the affective information to answer the question they have in mind while doing the task.

The Affect Misattribution Procedure

The AMP borrows from the affective priming task developed by Murphy and Zajonc (1993). In each trial, participants are first briefly exposed to a prime stimulus (e.g., 100 ms) that refers to the attitude object (e.g., a kitten). This prime is followed by an ambiguous target (e.g., a Chinese ideograph for a non-Chinese reader), also presented briefly and followed by a visual mask preventing participants from inspecting the target in detail. Participants then have to make a judgment about the target, indicating whether it is pleasant or unpleasant. The proportion of "pleasant" evaluations for targets preceded by a given attitude object is assumed to measure attitude about it. This procedure has been used in many studies, producing large effects (e.g., Payne et al., 2005), with good reliability (Payne &

Lundberg, 2014), and relatively good predictive values for behavior (r = .35; Cameron et al., 2012; Znanewitz et al., 2018). As a result, the AMP has been used to study many issues, like prejudice (e.g., Cooley et al., 2014; Steele et al. 2018), alcohol consumption (e.g., Payne et al., 2008), eating behavior (e.g., Hofmann et al., 2010), or still health-related issues (e.g., Hood et al., 2021; Seligman et al., 2023).

Does the AMP Reflect Affect Misattribution Processes?

Based on previous studies suggesting the operation of misattribution processes (e.g., Murphy & Zajonc, 1993; Schwarz & Clore, 1983), Payne and colleagues proposed that participants use their affect triggered by the prime as a basis of their evaluation of the ideograph's pleasantness. In other words, they will misattribute their affect elicited by the prime to the to-be-evaluated target. Consistent with this view, Oikawa et al. (2011) found that asking participants to evaluate the prime, thus making misattribution less likely, decreased its impact on the evaluation of the target. However, even though this explanation appears consistent with most of the results observed in the literature, there is still no definite evidence of the role of misattribution processes in the occurrence of these effects. On the basis of recent studies showing how affective information can be used in cognitive tasks, another account of the AMP effects can be proposed.

An Informational Account of the AMP

Informational models of affect (Martin et al., 1993; Schwarz & Clore, 2007; Ray & Huntsinger, 2017) propose that affect can be used as a signal to prepare a response adapted to the current context. According to these positions, basic affective reactions that are triggered by appraisals of the situation (e.g., Russell, 2003) "convey information about the value of cognitively accessible mental content, including accessible thoughts and processing inclination" (Huntsinger et al., 2014, p. 603). The experience of a positive affect is interpreted as a validation of the content of one's thoughts. In contrast, a negative affect is interpreted as a signal that invalidates this content. Among these theories, the mood-as-input model (Martin et al., 1993; see also Hirt et al., 1996; Hirt et al., 1997) proposes that individuals interpret their affect as a "yes" (if positive) or as a "no" (if negative) answer to the question they have in mind while doing the task. For instance, if participants ask themselves whether they enjoy the task, they should persist longer on that task if a positive affect has been induced, compared to a negative affect. In contrast, if they ask themselves whether they have done enough, a positive affect would lead participants to stop sooner than a negative affect.

How can this be applied to the AMP? We propose that participants asked whether the target is pleasant or unpleasant simplify the task so that the question would be: Is the target pleasant (yes vs. no)? Participants would select this question because it reflects the way people assess things in most situations. For instance, when examining an object, people probably ask themselves whether it is pleasant (yes vs. no) rather than whether it is unpleasant. Then, if a positive prime activates a "yes" answer while a negative prime activates a "no" answer, participants would favor a pleasant answer following a positive prime over a negative prime, which is typically observed in the AMP. This explanation of the AMP is compatible with previous results supporting the misattribution processes. It could be argued that, because it requires the implementation of another process (i.e., task simplification), the informational account is less parsimonious than the misattribution explanation, which is true. However, the informational account may have important implications for the interpretation of the AMP results and leads to new predictions. If the informational explanation is true, the AMP would not directly reflect participants' attitudes toward the primes, but how their attitude influences the answer to the question they have in mind. So, the results could dramatically change as a function of how the question is framed. For instance, if participants were asked whether the Chinese ideograph is unpleasant (vs. not), it would more likely be evaluated unpleasant following a positive than a negative prime. Thus, in a political AMP testing Trump against Biden, strong positive attitudes toward Biden could paradoxically lead to more unpleasant responses after primes of Biden if participants recode the task this way (i.e., Is it unpleasant?). The experiments reported aimed to test this possibility.

In these experiments, we compared the results obtained with typical AMP instructions ("control") to conditions in which the instructions were slightly modified. In the "pleasant" condition, participants were asked to indicate whether the ideograph was visually pleasant (vs. not pleasant). In this condition, we thus emphasized what is thought to be the default response option. In the third condition ("unpleasant"), participants were asked to indicate whether the ideograph was visually unpleasant (or not). According to the misattribution explanations of the AMP, the effect should remain relatively similar in the three conditions (i.e., more positive judgments after a positive than a negative prime) since affect is used to evaluate the pleasantness of the ideograph, regardless of how the question is framed. The informational account also predicts that the ideograph should be evaluated more positively after a positive prime in the control condition and in the "pleasant" condition, since a positive stimulus would suggest a positive answer to this question, while a negative stimulus would activate a negative answer. However, the effects should be reversed when participants are asked to evaluate whether the ideograph is unpleasant (or not), with a positive prime suggesting a "yes" answer to this question.

Experiment 1

Method and Protocol

Participants and Design

Sample size was estimated on the basis of an unreported pilot study (N = 17) with the same material (prime words and ideographs) in which we observed an AMP effect size of d_z = 1.15. Expecting this effect to be moderated by the instructions, we halved the effect size (see Perugini et al., 2018). For *d* = 0.575 and power = .80, we estimated the required sample size (MorePower, 6.0.4, Campbell & Thompson, 2012) to include at least 120 participants to observe the hypothesized moderation. As we conducted this study online (on the Crowdpanel platform), we decided to include at least 150 participants. Through the recruitment procedure, we ended up with 152 participants (M_{Age} = 44.35, *SD* = 12.91, 79 women, 73 men) who received 1.70 euros in exchange for their participation. All the participants were French native speakers or had sufficient proficiency in French. None of the participants had any knowledge in Chinese language. Participants were randomly assigned to the conditions of a 2 (Stimulus valence: positive vs. negative) X 3 (instructions: pleasant vs. unpleasant vs. control) mixed design, the last variable being manipulated between participants.

Procedure

The experiment was programmed using PsyToolKit (Stoet, 2010; 2017). Participants read a consent form and agreed to its terms before starting the experiment. Then the AMP was presented. The participants were informed that their task would be to evaluate Chinese ideographs presented one at the time. However, the instructions differed according to the conditions. In the control condition, participants were instructed that they had to indicate whether they found the ideograph visually pleasant by pressing the "T" key or visually unpleasant by pressing the "B" key on an AZERTY keyboard. In the "pleasant" condition, participants were instructed to indicate whether they found the ideograph visually pleasant ("T" key) or not ("B" key). Finally, in the "unpleasant" condition, participants were instructed to indicate whether they found the ideograph visually unpleasant ("T" key) or not ("B" key). For each trial, the sequence was similar. First, a fixation cross was presented at the center of the screen for 1000 to 2000 ms, immediately followed by a positive or negative word, presented for 75 ms. The 30 positive and 30 negative words were the same as the one used by Pillaud and Ric (2020) on a French population. After the word, the participants were presented a Chinese ideograph (100 ms) immediately followed by a gray screen. At this moment, participants had to indicate their answer by pressing either the "T" or the "B" key. For this task, we selected 60 Chinese ideographs that were randomly assigned for each participant to a positive or to a negative word. As a result, half of the ideographs were preceded by a positive word and half were preceded by a negative word. When the task was over, participants were asked to report their age, gender, their level in French and Chinese languages. Finally, they were debriefed and thanked for their participation.

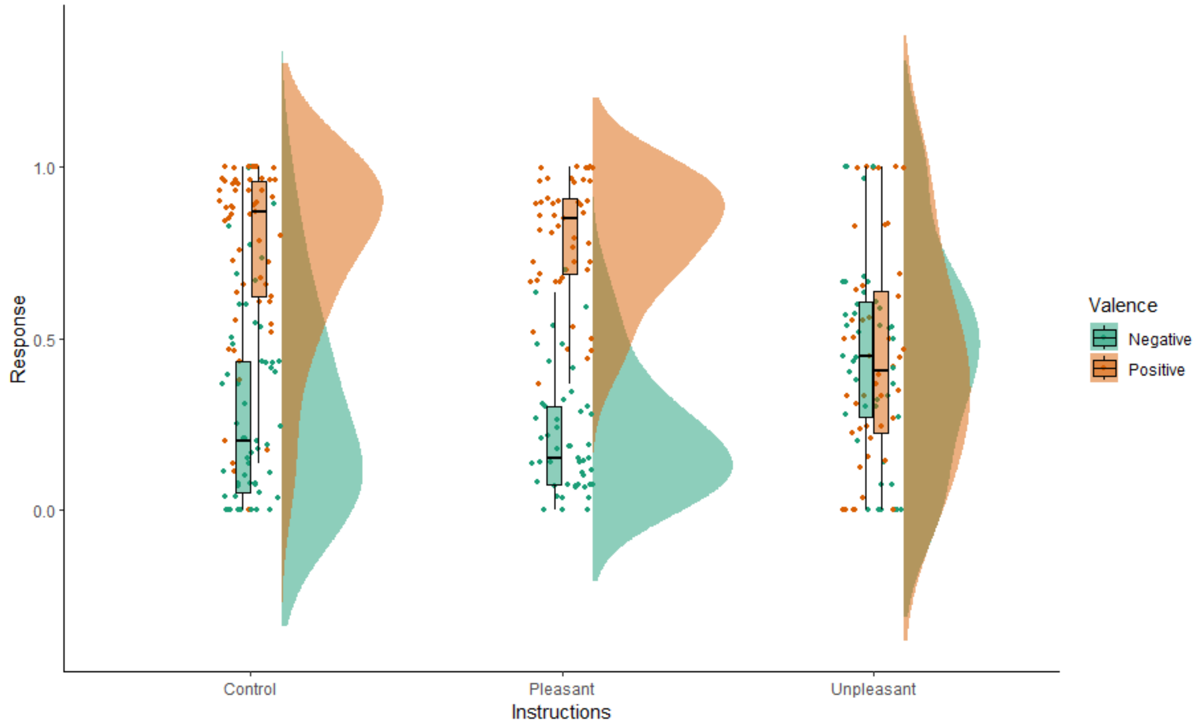
Results

The main measure was the proportion of "pleasant" (or "not unpleasant" for the unpleasant condition) answers. As this study was conducted online, we applied a [300-3000] cut-off on the response times to limit the influence of extremely fast/slow answers (10.38%). The effect of instructions was evaluated with two contrasts. The first contrast (C1) opposed the control and "pleasant" conditions (each coded "-0.5") to the "unpleasant" condition (coded “1”). The second contrast (C2) opposed the control (-0.5) and “pleasant” (0.5) conditions. All the reported CIs are 95% for the effect size d/d_z. As preregistered, we checked for outliers (i.e., |SDR| > 4). No outliers were identified.

The analysis revealed a main effect of stimulus valence, $t(149) = 13.282$, $p < .001$, d_z = 1.08, CI [0.90; 1.26] as well as the expected Instructions (C1) X Stimulus valence interaction, $t(149) = 9.303$, $p < .001$, $d = 1.64$, CI[1.25; 2.03]. The difference between the control and the “pleasant” condition did not reach significance, $t(149) = 1.866$, $p = 0.064$, $d = 0.36$, CI[-0.022; 0.75] (see Figure 1). Simple effects analyses indicate an effect of stimulus valence in the control, $t(150) = 8.865$, $p < .001$, $d_z = 0.72$, CI[0.55; 0.88], and “pleasant” conditions, $t(150)$ = 10.89, $p < .001$, $d_z = 0.88$, CI[0.71; 1.06], that disappeared in the “unpleasant” condition, $t(150) = 0.096$, $p = .92$, $d_z = 0.008$, CI[-0.15; 0.17].

Figure 1.

Raincloud plot (Allen et al., 2019) of participants’ responses (0 = unpleasant and 1 = pleasant) according to valence (positive vs. negative) and instructions (control vs. pleasant vs. unpleasant) for Experiment 1



As indicated in the pre-registration, we also realized the analyses with no exclusion based on reaction times. Of importance, the expected Instructions (C1) X Stimulus valence interaction remained unchanged, $t(149) = 9.195$, $p < .001$, $d = 1.62$, CI [1.23; 2.01].

Discussion

The results of this experiment indicate that the effect of stimulus valence can be moderated by the way the instructions to complete the AMP are framed. A classical AMP effect was observed in the control and the "pleasant" conditions. However, in contrast with the informational explanation, the effect was canceled but not reversed in the unpleasant condition. This absence of reversal could be due to the translation of "unpleasant" ("déplaisant") that was used in French. This could have made the question a bit weird, especially when participants had to say that it was not unpleasant. To test this, we conducted a second experiment in English.

Experiment 2

Method and Protocol

Participants and Design

The determination of the sample size was based on the same reasoning as for Exp. 1. We recruited 150 participants on Prolific Academic who received 2£ as a compensation for their participation. Two participants were excluded because they reported not having sufficient skills in English (score < 5 on a 6-point scale: 1 = *very good skills*; 6 = *very bad skills*) and one because of good skills in Chinese language. The remaining 147 participants (M_{Age} = 39.15, *SD* = 12.94, 104 women, 42 men, 1 person who did not want to answer) were randomly assigned to one of the three instructions conditions: “control”, “pleasant”, “unpleasant.”

Procedure

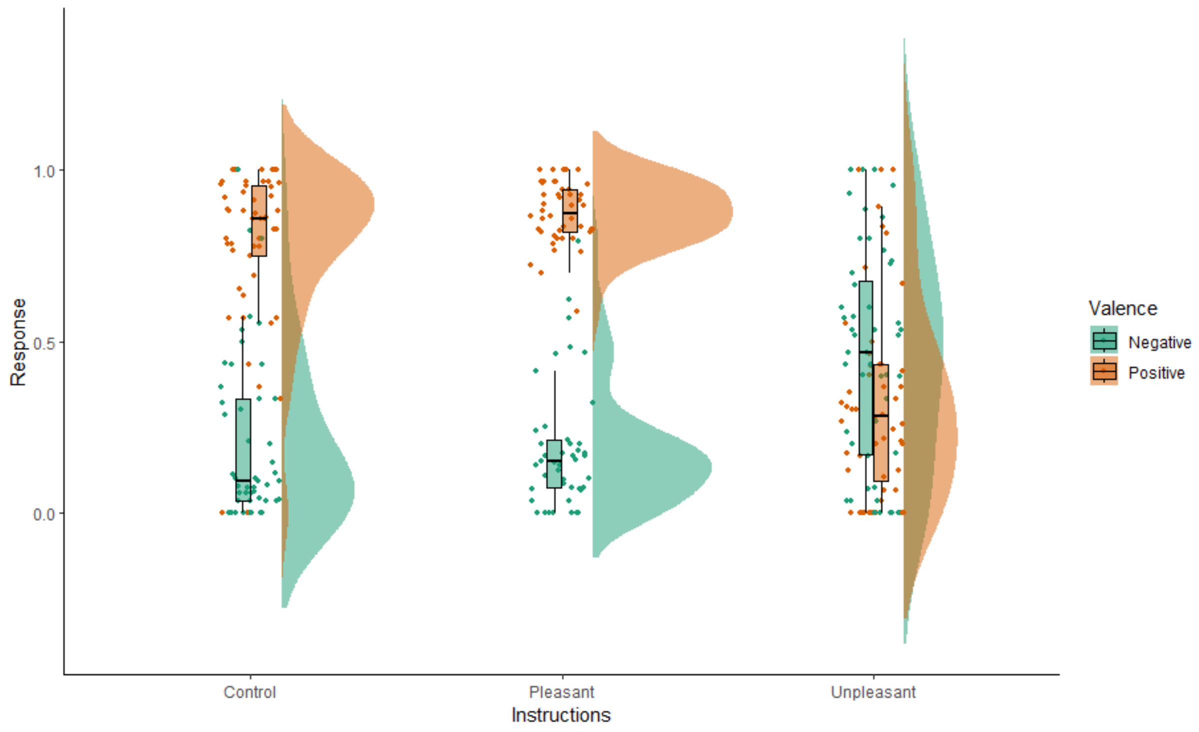
The procedure was similar to the one used in Exp. 1, except for the prime words taken from the database by Warriner et al. (2013). The positive and negative words were matched on the number of letters, arousal, and frequency (data obtained via SUBLEX-us, Brysbaert & New, 2009; Brysbaert et al., 2012).

Results

Responses < 300 ms or > 3000 ms were excluded (13.36%). The same analysis was conducted as for Exp. 1. No outliers were identified (i.e., |SDR| > 4). The analysis revealed a main effect of stimulus valence, $t(144) = 15.316$, $p < .001$, $d_z = 1.26$, CI[1.07; 1.45]. As expected, this effect was moderated by the instructions. The Instructions (C1) X Stimulus valence interaction was significant, $t(144) = 14.593$, $p < .001$, $d = 2.52$, CI[2.07; 2.96], and the interaction between instructions (C2) and stimulus valence was not, $t(144) = 1.707$, $p = .09$, $d = 0.35$, CI[-0.06; 0.76] (see Figure 2). Simple effects indicate that positive primes lead to more positive evaluations of the ideographs than negative primes both in the control condition, $t(145) = 9.074$, $p <.001$, $d_z = 0.75$, CI[0.58; 0.92], and in the pleasant condition, $t(145) = 11.08$, $p <.001$, $d_z = 0.91$, CI[0.74; 1.09]. As predicted, this effect was significantly reversed in the unpleasant condition, $t(145) = 2.964$, $p < .004$, $d_z = 0.24$, CI[0.08; 0.41]. Again, the Instructions (C1) X Stimulus valence interaction remains unchanged when computed on the data with no exclusion based on reaction times, $t(145) = 14.075$, $p <.001$, $d = 2.43$, CI [1.99; 2.86].

Figure 2.

Raincloud plot (Allen et al., 2019) of participants' responses (0 = unpleasant and 1 = pleasant) according to valence (positive vs. negative) and instructions (control vs. pleasant vs. unpleasant) for Experiment 2



Discussion

The results of this experiment replicate the Instructions X Stimulus valence interaction observed in Exp. 1. Moreover, as expected, the pattern of data was reversed in the unpleasant condition. These results are consistent with the informational explanation of the AMP effect, and support the proposed explanation for absence of a reversal in Exp. 1, which would be due to the translation of the instructions in French. To confirm this analysis, we conducted a third experiment with French participants, in which we tried to disambiguate the instructions by asking the participants whether the ideograph was beautiful (vs. not) or ugly (vs. not). One could argue that this produces a shift in the evaluation process (evaluation vs. aesthetic judgment) and that aesthetic judgments are more complex than simple evaluation (e.g., Chenier & Winkielman, 2018). However, the AMP basic instructions (used in Exp. 1 and 2) ask participants to evaluate whether the ideograph is *visually* pleasing or unpleasing, which seems semantically very close to the question of whether the ideograph is beautiful or ugly. Moreover, affective priming has been observed on dimensions other than pleasantness. Murphy and Zajonc (1993; Exp. 2) described similar effects when participants were asked to rate whether the ideograph represented good or bad objects. Finally, Flexas et al. (2013) observed AMP effects on aesthetic appreciation. Thus, we hypothesized that participants would judge the ideograph more beautiful (or ugly, depending on the condition) following a positive than a negative prime.

Experiment 3

Method and Protocol

Participants and Design

The sample size was determined based on the two preceding experiments. We selected the lowest effect size obtained for the Instructions X Stimulus valence interaction, that is d = 1.49 (Exp. 1, analysis with no exclusion). With such an effect size and power = .80, the required sample size was N = 18. As the experiment was conducted online, we decided to include at least 80 participants. We recruit 80 participants on Crowdpanel who received 1.12€ as a compensation for their participation. One participant was excluded as he/she was not French native speaker and did not have the expected level of skills in French. The final sample comprised 79 participants (M_{Age} = 43.81, SD = 13.22, 39 women, 40 men) who were randomly assigned to the instructions conditions in a 2 (Instructions: beautiful vs. ugly) X 2 (Stimulus valence: Positive vs. negative) mixed design.

Procedure

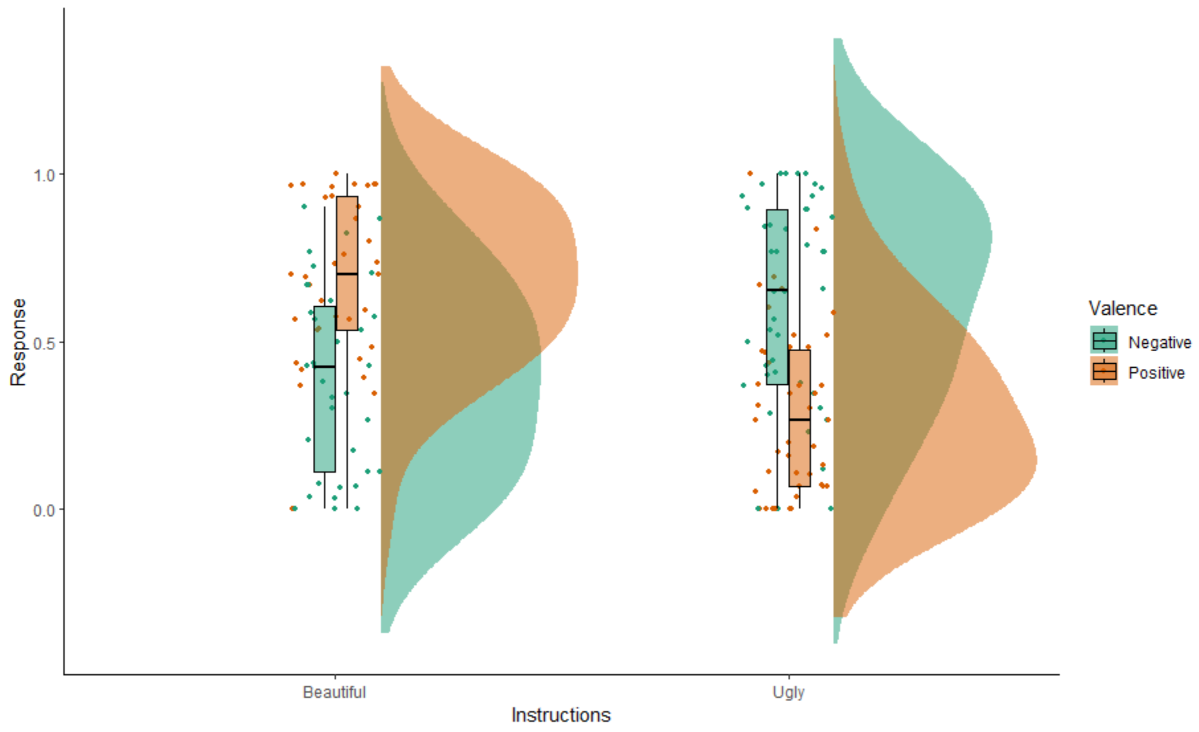
The procedure was similar to the one used in Exp. 1 and 2, except for the response labels (i.e., ugly vs. beautiful). In addition, we did not include a control condition since we observed no significant difference between the control and the "pleasant" conditions in the two first experiments.

Results

Responses faster than 300 ms and slower than 3000 ms were excluded (9.45%). No outliers were identified (i.e., |SDR| > 4). The analysis revealed no direct effect of prime valence, $t(77) = 0.234$, $p = .82$, $d_z = 0.026$, CI[-0.19; 0.25]. However, the predicted Instructions X Stimulus valence interaction reached significance, $t(77) = 7.101$, $p < .001$, $d = 1.61$, CI[1.09; 2.12] (see Figure 3). Analysis of simple effects indicated that the AMP effect was significant in the "beautiful" condition, $t(77) = 4.601$, $p < .001$, $d_z = 0.52$, CI[0.30; 0.74], and significantly reversed in the "ugly" condition, $t(77) = 5.510$, $p < .001$, $d_z = 0.62$, CI[0.39; 0.85]. Analysis on data with no exclusion based on reaction times yielded similar results for the Instructions X Stimulus valence interaction, $t(77) = 7.056$, $p < .001$, $d = 1.59$, CI [1.08; 2.10].

Figure 3.

Raincloud plot (Allen et al., 2019) of participants' responses (0 = unpleasant and 1 = pleasant) according to valence (positive vs. negative) and instructions (control vs. pleasant vs. unpleasant) for Experiment 3



Discussion

The results replicated the moderating effects of the instructions on the AMP effect, with again a reversal of the AMP effect. These results again fit the predictions of the informational explanation of the AMP and appear difficult to account in terms of affect misattribution.

General Discussion

This research was aimed to test an informational account of the AMP effect based on informational theories of affect, and more precisely the mood-as-input model, and their application to cognitive tasks. Consistent with these proposals, we observed in three experiments that the impact of the valence of the prime was moderated (and reversed in two experiments) by how the instructions were framed. These results are consistent with the informational account of the AMP and difficult to explain by misattribution processes. If the affect elicited by the prime were misattributed to the ideograph, the participants should evaluate the ideograph as less unpleasant or ugly when preceded by a positive than a negative prime, regardless of how the question is framed. This is clearly not the case, as illustrated in Exp. 2 and 3.

We may concede that these experiments do not provide undisputable evidence that participants tend to simplify the AMP by asking themselves whether the ideograph is pleasant (“yes” vs. “no”), which we posit is the default option. However, the lack of significant difference between the “pleasant” and control conditions in Exp. 1 and 2 provides indirect evidence for this assumption, suggesting that participants in the control condition might act similarly to those in the “pleasant” condition.

Therefore, these results are consistent with the informational account. However, they do not totally dismiss the possible operation of misattribution processes. Results consistent with misattribution processes have been observed in a wide range of task, relying on valence (e.g., Payne et al., 2005), emotional expressions (e.g., Heerdink et al., 2015), or semantic concepts (e.g., Deutsch & Gawronski, 2009). Therefore, it is still possible that both misattribution and informational processes participate in the production of the response in the AMP and that the effects of each take the priority depending on the constraints imposed by the task.

In addition, the reversal of the AMP effects was clearer when the judgmental domain was aesthetic (Exp. 3) than when it was more evaluative (Exp. 2). We argued that the judgmental options were semantically close in both experiments. However, it is also possible that it reveals the operation of different processes in the two areas of judgment. We hope that the present results will stimulate further research on these issues to better understand the interplay between affect and cognition in the expression of judgments.

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