# Supplementary Materials

## Targets for affective priming task

Target words for the affective priming task were selected from the BAWL-R database (Võ et al., 2009) according to their valence and matched for length and frequency (both |*ts*| < 1). Negative targets with bracketed English translations were: MIES (lousy), TRIST (forlorn), BRUTAL (sadistic), WEHRLOS (defenceless), BANKROTT (bankrupt), KRAFTLOS (feeble), MILITANT (militant), TROSTLOS (cheerless), ENTSETZT (horrified), and VERBOTEN (forbidden); positive targets were: TOLL (swell), SUPER (superb), SONNIG (sunny), PFIFFIG (gutsy), TAKTVOLL (tactful), TOLERANT (tolerant), LUKRATIV (lucrative), GRANDIOS (great), SINNLICH (sensual), and REIZVOLL (attractive).

## Outlier elimination rules

In both experiments, participants were excluded from all analyses if their error rate in the AAT task exceeded the third quartile of the experiment’s sample by three interquartiles (far outlier criterion; Tukey, 1977). The criterion for Experiment 1 was 9.5% errors (two eliminated), the criterion for Experiment 2 was 12.5% errors (one eliminated).

Furthermore, in both experiments, participants were eliminated from any analyses including indices derived from the affective priming tasks if their error rate in either the pre- or post-training affective priming exceeded a sample-level far outlier criterion. In Experiment 1, the criterion was 19.6% errors pre-training (one excluded) and 23.9% errors post-training (none excluded). In Experiment 2, the criterion was 27.2% errors pre-training (one excluded) and 22.8% errors post-training (none excluded).

In both experiments, for both the affective priming tasks and the behavioral assessment tasks, trials with an incorrect response were eliminated from analysis. In Experiment 1, this was 4.0% of trials in the behavioral assessment task, 4.7% of trials in the pre-training affective priming and 5.3% of trials in the post-training affective priming. In Experiment 2, it was 5.2% of trials in the behavioral assessment task, 7.4% of trials in the pre-training affective priming and 6.3% of trials in the post-training affective priming.

Finally, in both experiments, for both the affective priming tasks and the behavioral assessment tasks, trials with a RT below 100ms or above an individual simple outlier criterion (exceeding their third quartile by at least 1.5 interquartiles) were eliminated. In Experiment 1, this was 5.4% of remaining trials in the behavioral assessment task, 5.1% of remaining trials in the pre-training affective priming and 4.6% of remaining trials in the post-training affective priming. In Experiment 2, it was 4.7% of remaining trials in the behavioral assessment task, 4.8% of remaining trials in the pre-training affective priming and 4.8% of remaining trials in the post-training affective priming.

## Moderator analyses

The models calculated for the mega-analysis were subjected to moderator analyses by including thirst ratings, mood rating, trait and state reactance ratings as well as all their respective interaction terms with the other predictors in separate models for each moderator. Due to the explorative nature of these analyses and the number of tests calculated, only models containing novel effects with *p* < .01 are reported in order to reduce α errors. Full tables are omitted for brevity; analysis scripts may be found under http://osf.io/t7kmf.

Thirst. Thirst has no significant moderation effect in models predicting consumption or implicit liking, but in those (explicit attitude components and explicit ambivalence) for explicit ratings, the interaction of thirst and AAT achieves significance, *F*(1,122.5) = 7.25, *p* = .008 (explicit attitude components model). Thirst tends to decrease liking for the avoided drink, *B* = -.16, *p* = .197, but increases it for the approached drink, *B* = .27, *p* = .034 (see Figure 1).

*Figure 1*: Model estimates for explicit rating as a function of AAT and thirst, mega-analysis of Experiments 1 and 2.

Our results agree with those of Zogmaister and colleagues (2016) in that a relevant deprivation state increases AAT effects, but differ from them in that this occurs only on explicit measures in our studies, but only on implicit measures in theirs. Furthermore, they find the opposite interaction for their explicit measure (a reduction of AAT effects with increasing thirst) in their only experiment concerning soft drinks. However, there are two important differences between our studies that may explain this discrepancy: First, Zogmaister et al.’s soft drink experiment did not contain an AAT, but rather tested approach training against behavioral inhibition. Although inhibition has been linked to avoidance, they address separate neural systems (Amodio, Master, Yee, & Taylor, 2007) and may diverge in training tasks. In Zogmaister et al.’s other experiments, they used avoidance rather than inhibition training and found no opposed interaction. Second, in our experiments, participants had the opportunity to satiate their thirst before the explicit rating. Therefore, participants may have been thirsty during the training phase, but were not during the explicit attitude measurement. As deprivation states have been shown to modulate affective responses to satiation-relevant stimuli (Hoefling et al., 2009), there is reason to assume that participants’ judgments might have been affected by their thirst in Zogmaister and colleagues’ work. For example, participants might have noted a stronger spontaneous emotional response to the approach-trained drinks, but attributed this to their thirst or discounted its relevance in their propositional response (Gawronski & Bodenhausen, 2006), thereby producing reversed or no effects on the explicit measures. Alternatively, their frustration at judging a drink, but not being able to actually drink it while thirsty may have mitigated any explicit training effect. For these important procedural reasons, our study should not be considered a failed replication of Zogmaister and colleagues. Instead, these differences may provide insight into the processes involved in motivational moderation of AAT: Zogmaister and colleagues’ results reflect greater AAT effects on spontaneous evaluations when in a state of deprivation. In contrast, in our experiments, we show that participants’ motivational state duringthe training phase affects explicit judgments even after that motivational state is mitigated, implying an encoding-level effect of motivational states.

Reactance. Although state reactance showed no moderation effects or other interactions in any model by our criteria, trait reactance produced an unexpected three-way interaction effect with ambivalence and AAT in the model predicting explicit ratings, *F*(1,232.2) = 6.64, *p* = .002 (see Figure 2).

*Figure 2*: Model estimates for explicit rating as a function of AAT, ambivalence and trait reactance, mega-analysis of Experiments 1 and 2.

Reactance effects occur when participants believe they have understood the expected effects of experimental manipulations and act against these expectations in order to assert their freedom (Brehm, 1966). Therefore, no reactance effect should be interpreted as evidence for the psychological mechanisms under scrutiny. Instead, reactance effects must be viewed from this perspective of motivated resistance to influence. In our study, greater pre-training ambivalence led to greater AAT effects on explicit attitudes in participants with low trait reactance, but the opposite effect occurred in participants with high trait reactance. This may be an indication that ambivalence plays a role in AAT effects, but that its effect is partially or wholly mediated by conscious processes. For example, approach training might affect ambivalent attitudes by selectively increasing the accessibility of positive attitude components with regard to the target via a general approach orientation (Strack & Deutsch, 2004), with univalent attitudes being less affected due to ceiling effects (Woud, Becker, & Rinck, 2011). For low-reactance individuals, this increase in accessibility leads to more positive contents being integrated into the explicit judgment, but for high-reactance individuals, the activated contents might be dismissed as irrelevant for the judgment due to a perception that they are caused by experimental manipulation, leading to reversed AAT effects (Gawronski & Bodenhausen, 2006). Future research might therefore integrate ambivalence as a predictor of AAT effects, especially in unobtrusive AAT paradigms where reactance is less likely. On a more general level, this pattern of results underlines the importance of considering reactance effects for explicit judgments in AAT paradigms and offers a tentative suggestion as to why AAT studies may sometimes produce effects only on implicit measures (e.g. Woud, Maas, Becker, & Rinck, 2013), one which may be investigated in future studies.

## Tables for mixed-model analyses

The following tables describe the results of all mixed-model analyses completely.

### Experiment 1.

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 137.4 | 10.07 | .002 |
| AAT | 68.1 | .02 | .888 |
| Positive attitude | 68.2 | 3.82 | .055 |
| Negative attitude | 68.2 | .01 | .938 |
| Positive attitude (subject mean) | 137.8 | 3.61 | .059 |
| Negative attitude (subject mean) | 135.2 | .34 | .563 |
| AAT\*Positive attitude | 74.3 | .12 | .730 |
| AAT\*Negative attitude | 76.9 | .00 | .954 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 2

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 77.6 | 132.48 | <.001 |
| AAT | 69.2 | .05 | .823 |
| Implicit positivity | 69.2 | 1.13 | .291 |
| Implicit positivity (subject mean) | 112.6 | .75 | .387 |
| AAT\*Implicit positivity | 87.8 | 3.35 | .070 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 3

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 70.2 | 180.80 | <.001 |
| AAT | 69.2 | .02 | .903 |
| Implicit positivity | 69.3 | 1.78 | .186 |
| Implicit positivity (subject mean) | 111.2 | 2.04 | .156 |
| AAT\*Implicit positivity | 89.7 | .50 | .480 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 4

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 71.4 | 180.27 | <.001 |
| AAT | 70.4 | .01 | .919 |
| Ambivalence | 132.1 | .01 | .910 |
| AAT\*Ambivalence | 82.8 | .13 | .716 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 5

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 83.3 | .21 | .651 |
| AAT | 68.1 | 6.26 | .015 |
| Implicit positivity | 68.1 | 2.66 | .107 |
| Implicit positivity (subject mean) | 133.7 | 11.68 | .001 |
| AAT\*Implicit positivity | 102.9 | 4.07 | .046 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 6

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 70.6 | 2.82 | .098 |
| AAT | 69.4 | .05 | .818 |
| Implicit positivity | 69.5 | .31 | .581 |
| Implicit positivity (subject mean) | 138.5 | 1.36 | .246 |
| AAT\*Implicit positivity | 126.3 | .12 | .732 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 7

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 71.4 | 6.51 | .013 |
| AAT | 70.8 | 4.78 | .032 |
| Ambivalence | 141.8 | .00 | .960 |
| AAT\*Ambivalence | 93.9 | 1.09 | .299 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 8

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 71.3 | 1.45 | .233 |
| AAT | 70.9 | .06 | .803 |
| Ambivalence | 137.2 | .02 | .898 |
| AAT\*Ambivalence | 101.3 | 1.40 | .240 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 9

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 138 | 1.33 | .250 |
| AAT | 138 | .43 | .515 |
| Positive attitude | 138 | 4.55 | .035 |
| Negative attitude | 138 | .08 | .772 |
| Positive attitude (subject mean) | 138 | .00 | .996 |
| Negative attitude (subject mean) | 138 | 1.02 | .314 |
| AAT\*Positive attitude | 138 | .36 | .552 |
| AAT\*Negative attitude | 138 | .58 | .449 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 10

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 71.4 | 49.41 | <.001 |
| AAT | 71.2 | .47 | .495 |
| Ambivalence | 130.5 | .30 | .585 |
| AAT\*Ambivalence | 108.5 | .11 | .746 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

### Experiment 2.

Table 11

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 105.5 | 12.23 | .001 |
| AAT | 53.1 | .06 | .811 |
| Positive attitude | 53.2 | .65 | .422 |
| Negative attitude | 53.1 | .05 | .821 |
| Positive attitude (subject mean) | 107.9 | .15 | .697 |
| Negative attitude (subject mean) | 107.7 | .69 | .408 |
| AAT\*Positive attitude | 56.0 | 3.59 | .063 |
| AAT\*Negative attitude | 56.1 | 1.52 | .223 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 12

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 58.1 | 96.19 | <.001 |
| AAT | 54.1 | .12 | .727 |
| Implicit positivity | 54.2 | .93 | .340 |
| Implicit positivity (subject mean) | 77.1 | .15 | .697 |
| AAT\*Implicit positivity | 65.3 | .17 | .681 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 13

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 55.6 | 105.30 | .000 |
| AAT | 54.1 | .00 | .993 |
| Implicit positivity | 54.1 | .10 | .757 |
| Implicit positivity (subject mean) | 76.8 | .22 | .643 |
| AAT\*Implicit positivity | 65.4 | 2.23 | .140 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 14

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 57.2 | 114.11 | <.001 |
| AAT | 57.7 | .01 | .922 |
| Ambivalence | 101.8 | .14 | .708 |
| AAT\*Ambivalence | 60.5 | .18 | .676 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 15

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 70.1 | 4.15 | .046 |
| AAT | 55.6 | 7.32 | .009 |
| Implicit positivity | 55.7 | 2.53 | .117 |
| Implicit positivity (subject mean) | 110.9 | 3.61 | .060 |
| AAT\*Implicit positivity | 99.8 | 2.49 | .118 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 16

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 58.1 | 2.83 | .098 |
| AAT | 54.6 | 1.71 | .196 |
| Implicit positivity | 54.8 | .33 | .570 |
| Implicit positivity (subject mean) | 109.5 | 2.76 | .100 |
| AAT\*Implicit positivity | 104.7 | 0.59 | .446 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 17

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 58.3 | 7.00 | .010 |
| AAT | 58.8 | 3.82 | .055 |
| Ambivalence | 112.5 | .94 | .333 |
| AAT\*Ambivalence | 82.7 | .00 | .957 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 18

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 59.6 | 3.92 | .052 |
| AAT | 59.7 | .66 | .419 |
| Ambivalence | 104.6 | 1.36 | .246 |
| AAT\*Ambivalence | 93.8 | .94 | .334 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 19

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 96.8 | 1.15 | .287 |
| AAT | 53.7 | .36 | .551 |
| Positive attitude | 54.6 | 1.50 | .226 |
| Negative attitude | 53.7 | 7.67 | .008 |
| Positive attitude (subject mean) | 94.2 | 2.09 | .151 |
| Negative attitude (subject mean) | 83.6 | .94 | .334 |
| AAT\*Positive attitude | 66.1 | .07 | .786 |
| AAT\*Negative attitude | 63.5 | .01 | .926 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 20

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 58.2 | 16.71 | <.001 |
| AAT | 58.6 | .03 | .857 |
| Ambivalence | 103.5 | .02 | .890 |
| AAT\*Ambivalence | 67.7 | .15 | .697 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

### Mega-analysis.

Table 21

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 127.9 | 275.60 | <.001 |
| AAT | 126.0 | .03 | .863 |
| Positive attitude | 126.1 | 4.16 | .043 |
| Negative attitude | 126.0 | .04 | .836 |
| Positive attitude (subject mean) | 253.3 | 1.14 | .287 |
| Negative attitude (subject mean) | 246.7 | 1.08 | .300 |
| AAT\*Positive attitude | 134.4 | 2.16 | .144 |
| AAT\*Negative attitude | 136.6 | .75 | .387 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 22

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 135.9 | 220.89 | <.001 |
| AAT | 126.1 | .03 | .853 |
| Implicit positivity | 126.1 | .01 | .924 |
| Implicit positivity (subject mean) | 187.3 | .02 | .875 |
| AAT\*Implicit positivity | 155.2 | .82 | .365 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 23

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 127.7 | 265.34 | <.001 |
| AAT | 126.2 | .04 | .840 |
| Implicit positivity | 126.2 | .41 | .521 |
| Implicit positivity (subject mean) | 185.6 | .15 | .695 |
| AAT\*Implicit positivity | 156.0 | 2.51 | .115 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 24

|  |  |  |  |
| --- | --- | --- | --- |
| *Consumption, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 129.9 | 273.06 | <.001 |
| AAT | 128.7 | .01 | .935 |
| Ambivalence | 231.7 | .08 | .772 |
| AAT\*Ambivalence | 144.3 | .01 | .926 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 25

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), implicit positivity RT model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 155.0 | 2.62 | .107 |
| AAT | 126.4 | 10.95 | .001 |
| Implicit positivity | 126.5 | .04 | .852 |
| Implicit positivity (subject mean) | 251.8 | 14.89 | <.001 |
| AAT\*Implicit positivity | 208.6 | 5.89 | .016 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 26

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), implicit positivity error model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 130.3 | 6.09 | .015 |
| AAT | 126.6 | .54 | .464 |
| Implicit positivity | 126.8 | .85 | .357 |
| Implicit positivity (subject mean) | 253.2 | 3.73 | .054 |
| AAT\*Implicit positivity | 237.3 | .14 | .706 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 27

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (RT), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 129.4 | 13.59 | <.001 |
| AAT | 128.8 | 9.70 | .002 |
| Ambivalence | 258.6 | .37 | .546 |
| AAT\*Ambivalence | 178.5 | .60 | .439 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 28

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training implicit positivity (error), ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 129.9 | 5.28 | .023 |
| AAT | 129.6 | .32 | .575 |
| Ambivalence | 245.6 | .73 | .394 |
| AAT\*Ambivalence | 197.3 | 2.35 | .127 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 29

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, explicit attitude components model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 128.7 | 104.75 | <.001 |
| AAT | 127.3 | .49 | .486 |
| Positive attitude | 128.1 | 5.75 | .018 |
| Negative attitude | 127.3 | 1.11 | .295 |
| Positive attitude (subject mean) | 197.4 | .55 | .457 |
| Negative attitude (subject mean) | 199.4 | 3.40 | .067 |
| AAT\*Positive attitude | 167.8 | .18 | .674 |
| AAT\*Negative attitude | 170.7 | 1.00 | .318 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

Table 30

|  |  |  |  |
| --- | --- | --- | --- |
| *Post-training explicit rating, ambivalence model* | | | |
| Parameter | Denominator *df* | *F* | *p* |
| Intercept | 129.9 | 61.29 | <.001 |
| AAT | 129.2 | .47 | .496 |
| Ambivalence | 259.4 | .40 | .527 |
| AAT\*Ambivalence | 176.5 | .17 | .679 |
| *Note.* Numerator df was 1 for all tests. |  |  |  |

## References for Supplementary Materials

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