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Testing procedural variables of the SPF: Additional analysis of Study 2 from Bar-Anan, Nosek, & Vianello (2008)

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Abstract

This supplement reports additional analyses of Study 2 from Bar-Anan, Nosek & Vianello (2008). We report the following effects: The interaction between gender and race of the stimuli did not affect SPF performance; Correlations between the SPF and self-report were stronger when the response locations condition split the evaluative terms horizontally rather than vertically; There was no meaningful effect of measures-order on the results; The faces grouping of the individuals thermometer questionnaire (by gender or by race) affected the correlation of the SPF with self-reported attitudes; Performance improved in later task blocks, but the validity of the SPF by block was unchanged.

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This data report assumes knowledge of the Bar-Anan, Nosek, & Vianello (2008) report, in particular the methods and results of Study 2. This can be viewed as an extended results section for that study.

Study 2: Results "continued"

The Effect of focal condition on the RaceXGender groups. The associations of valence with the raceXgender groups are presented in Table 3 in the main article. A four-factor ANOVA with race (2) X gender (2) X valence (2) X focal concept (2) revealed the same effects reported in the main article for the raceXvalence, genderXvalence, raceXvalenceXfocus and genderXvalenceXfocus interactions, and did not reveal a raceXgenderXvalence three-way interaction or a raceXgenderXvalenceXfocus four-way interaction, Fs < 1. This suggests that the sub-social groups were evaluated by their gender and race in an additive manner.

The Effects of category pair locations. The responses to the two evaluative terms were sometimes split vertically and sometimes horizontally (e.g., *women-good* and *men-good* at the left corners, and *women-bad* and *men-bad* at the right corners, for a horizontal split). Participant responded faster when the evaluative terms were split vertically (M = 1382, SD = 316), rather than horizontally (M = 1474, SD = 338), $t(1964) = 6.19$, d = 0.28. The error rate was similar in both conditions, $t<1$.

This sorting condition did not affect any of the associations between gender and valence, or between Black people and valence, ps > .50, but it did affect the associations between White people and valence. When the evaluative terms were split horizontally, participants showed more positive evaluation for White people (M = 0.18, SD = 0.31) than when the evaluative terms were split vertically (M = 0.13, SD = 0.28), $t(987) = -2.51$, p = .01, d = .17. This was caused by a .025 increase in the *White-good* association and a .025 decrease in the *White-bad* association.

As described in the article, this sorting condition also affected the correlation between the SPF scores and self-reported attitudes (see Tables 1 and 2 in this supplement). We found that, in general, correlations between the SPF and self-report were stronger when the evaluative terms were split horizontally rather than vertically.

Table 1

Study 2: Correlations between SPF Scores and Self-Reported Attitudes with comparison between two pairs-location conditions.

White-Black people	Self-report white-black	Self-report white-black, by ratings of individuals	Self-report white	Self-report black	Self-report white, by ratings of individuals	Self-report black, by ratings of individuals
SPF black+good	-.16** (-.20**, -.12**)	-.24** (-.32**, -.15**)	-.06* (-.08, -.08)	.11** (.16**, .06)	-.08** (-.10*, -.05)	.16* (.22**, .09*)
SPF black+bad	.05 (.14**, -.03)	.11** (.21**, .01)	-.01 (.03, .00)	-.06* (-17**, .05)	-.03 (-.03, -.03)	-.14* (-.24**, -.04)
SPF white+good	.17** (.14**, .20**)	.18** (.16**, .20**)	.11** (.08, .14**)	-.07* (-.07, -.09*)	.10** (.08, .13**)	-.07* (-.07, -.08)
SPF white+bad	-.05 (-.08, -.02)	-.03 (-.04, -.04)	-.03 (.00, -.05)	.02 (.07, -.02)	.01 (.06, -.02)	.04 (.07, .02)
SPF white	.14** (.14**, .14**)	.13** (.12**, .15**)	.09** (.05, .11**)	-.06* (-.08*, -.04)	.05 (.01, .09*)	-.07* (.09*, -.06)
SPF black	-.13** (-.21**, -.05)	-.22** (-.32**, -.10*)	-.03 (.01, -.05)	.11** (.20**, .01)	-.02 (-.04, -.01)	.18** (.28**, .08*)
SPF white-black	.18** (.25**, .14**)	.24** (.31**, .18**)	.08** (.05, .12**)	-.12** (-.19**, -.04)	.05 (.04, .07)	-.17** (-.24**, -10*)
Women-Men	Self-reported women-men	Self-report Women-Men , by ratings of individuals	Self-report women	Self-report men	Self-report women, by ratings of individuals	Self-report men, by ratings of individuals
SPF women+good	.00 (.00, .00)	.11** (.17**, .03)	.04 (.06, .00)	.04 (.06, .01)	.08* (.16**, .00)	.00 (.02, -.04)
SPF women+bad	.01 (-.05, .09*)	.01 (-.06, .03)	.02 (-.08, .04)	.05 (-.02, -.06)	-.05 (-.09*, .00)	-.04 (-.05, -.02)
SPF men+good	.00 (.01, -.03)	-.16** (-.19**, -.14**)	-.01 (-.01, -.01)	.00 (-.03, .02)	-.09** (-.12**, -.07)	.04 (.03, .05)
SPF men+bad	.00 (.03, -.04)	.07* (.06, .08)	.01 (.04, -.02)	.01 (.00, .02)	.06 (.04, .08)	.00 (.00, .01)
SPF women	-.01 (.03, -.06)	.08** (.14**, .00)	.03 (.09, -.02)	.05 (.05, .04)	.08* (.15**, .00)	.02 (.04, -.01)
SPF men	.00 (.00, .00)	-.14* (.15**, -.14**)	-.01 (-.03, .00)	-.01 (-.02, .00)	.09** (-.09*, -.09*)	.03 (.02, .02)
SPF women-men	.00 (.02, -.03)	,15** (.19**, .10*)	.03 (.08, -.01)	.04 (.05, .03)	.12** (.16**, .06)	.00 (.01, -.02)

Note. In parentheses: left: correlation when attitude objects were sorted vertically, right: correlation when attitude objects were sorted horizontally. * $p < .05$, ** $p < .01$.

We have no a priori explanation for these effects. In our investigation of these effects we examined the 8 locations conditions. We suspected that the difference may be related to overall latency in each pair locations conditions because in two of the four conditions in which evaluative terms were split vertically – when *good* was sorted to the top and *bad* to the bottom (Ms = 1286, 1340, SDs = 285, 301, respectively) – participants were much faster than in all other conditions. Even the fastest condition in the other sorting condition (M =1462, SD = 332) was still significantly slower, d = .38. This was the only difference between the two sorting conditions, but the rank order of latencies of the 8 conditions did not match the rank order of the correlations between the SPF measures and self-report measures in each condition. Additionally, a regression analysis found that the interaction term between the latency and the SPF preference scores did not predict the self-reported

preference. For this reason, we do not have a strong account for the validity difference.

The Effect of the order of measures on the association scores. The race associations were not affected by the order of measures, ps > .11. The associations *men-good* and *men-bad* were not affected by the order of measures, ps > .41. The measures order had a significant effect on the association *women-bad*, F(5, 969) = 2.36, p = .04, η_p^2 = .01, and perhaps on the association *women-good*, F(5, 969) = 1.84, p = .10, η_p^2 = .01. These effects were probably spurious because they were caused mainly by a difference between the two conditions in which the SPF was administrated before the other two other conditions – in one condition this association was the strongest of all six orders (*M* = -0.02, *SD* = 0.19), and in the other it was the weakest (*M* = -0.08, *SD* = 0.16).

The effect of the measures order on the relation between the SPF measures and Self-Reported measures. The correlations of the SPF with the self-report measures in the six possible measures orders are presented in Table 3. We compared the relation between the self-report measures and the SPF measures when the SPF was preceded with a self-report questionnaire in comparison to when it appeared first. We found that this order condition had not effect on the relation between the self-report measures and the SPF measures.

Table 2

Study 2: Correlations between SPF Non-Focal Scores and Self-Reported Attitudes with comparison between two pairs-location conditions.

White-Black people	Self-report white-black	Self-report white-black, by ratings of individuals	Self-report white	Self-report black	Self-report white, by ratings of individuals	Self-report black, by ratings of individuals
SPF white+good	.13** (.17**, .09*)	.09** (.11**, .08)	.07* (.09*, .05)	-.07* (-.08, -.06)	.04 (.06, .03)	-.04 (-.04, -.05)
SPF white+bad	-.05 (-.11*, .00)	.00 (-.02, .00)	-.02 (-.03, .00)	.04 (.09*, .01)	-.04 (-.03, -.02)	-.03 (-.02, -.03)
SPF black+good	-.09** (-.02, -.15**)	-.14** (-.06, -.21**)	-.03 (.02, .08)	.08* (.04, .10*)	-.05 (.03, -.13**)	.08** (.08, .08)
SPF black+bad	.01 (-.02, .05)	.05 (-.03, .13*)	-.02 (-.09*, .04)	-.04 (-.06, -.01)	.04 (-.05, .14**)	.00 (-.01, .00)
SPF white	.11** (.17**, .06)	.06* (.08, .05)	.06 (.07, .03)	-.06* (-.10*, -.03)	.05 (.06, .03)	-.01 (-.01, -.01)
SPF black	-.06 (.00, -.12**)	-.11** (.00, -.21**)	.00 (.07, -.07)	.06* (.06, .07)	-.05 (.05, -.16**)	.05 (.06, .05)
SPF white-black	.12** (.12*, .13**)	.13** (.06, .19**)	.04 (.00, .08)	-.09** (-.11*, -.07)	.06* (.00, .14**)	-.05 (-.04, -.05)
Women-Men	Self-reported women-men	Self-report Women-Men , by ratings of individuals	Self-report women	Self-report men	Self-report women, by ratings of individuals	Self-report men, by ratings of individuals
SPF women+good	.04 (.00, .08)	.11** (.07, .14**)	.03 (.01, .04)	-.02 (.01*, -.05)	.09** (.10*, .08)	.00 (.04, -.05)
SPF women+bad	-.06* (-.04, -.09*)	.02 (.05, -.01)	-.05 (-.02, -.08)	.02 (.02, .03)	-.02 (-.02, -.03)	-.05 (-.07, -.03)
SPF men+good	.00 (-.04, -.04)	-.12** (-.11*, -.12**)	.03 (.03, .03)	.04 (-.01, .08)	-.03 (-.04, -.02)	.07* (.05, .10*)
SPF men+bad	.03 (.00, .06)	.00 (-.02, .00)	.00 (.-02, .01)	-.04 (-.02, -.05)	-.02 (-.03, .07)	-.02 (-.02, -.01)
SPF women	.06* (.02, .10*)	.05 (.01, .09*)	.05 (.02, .07)	-.02 (.00, -.05)	.07* (.07, .07)	.03 (.07, -.01)
SPF men	-.02 (.02, -.06)	-.06* (-.06, -.07)	.02 (.03, .00)	.05 (.00, .07)	.00 (-.01, .00)	.06 (.04, .07)
SPF	.06* (.00, .12**)	.09** (.05, .12**)	.02 (.00, .04)	-.05 (.00, -.09*)	.06 (.06, .05)	-.02 (.02, -.06)

Note. In parentheses: left: correlation when attitude objects were sorted vertically, right: correlation when attitude objects were sorted horizontally. * p < .05, ** p < .01.

In a regression with the SPF White-Black preference as the outcome and the predictors self-reported White-Black preference, the implicit-explicit order condition and the interaction term between these two predictors, only the self-reported preference predicted the SPF, β = .18, $t(802) = 4.18$, $p < .0001$. The interaction and order were not significant predictors, $ts < 1$. When the self-reported measure was the by-individual preference, it was a significant predictor, β = .30, $t(806) = 6.75$, $p < .0001$, but the interaction term and the order condition were not significant predictors, $ps > .20$.

In a regression with the SPF women-men preference as the outcome and the predictors self-reported women-men preference, the implicit-explicit order condition and the interaction term between these two predictors, none of the factors predicted the outcome significantly, $ps > .40$. When the self-reported measure was the by-individual preference, it was a significant predictor, β = .17, $t(961) = 4.17$, $p < .0001$, but the interaction term and the order condition were not significant predictors, $ps > .39$.

The Effect of the Presentation of the Stimuli on the Individuals Thermometer Self-Report. Another factor that affected the relation between the measures pertains to the thermometer self-report toward individuals. This questionnaire was displayed in two separate pages, one after the other. The stimuli were divided to two groups of ten, either by gender or race. The correlation between the SPF preference score and the by-individuals race-attitude was larger when the individuals were separated by gender $r(546) = .31$, than when they were separated from race, $r(486) = .19$, Fisher $z = 2.07$, $p = .04$.

Table 3

Study 2: Mean SPF Preference Scores and Correlation with Self-Report Measures as a Function of Measures Order

Measures order			
White-Black (n)	SPF Preference mean (SD)	Correlation with direct self-report	Correlation with by-exemplar self-report
P-E-S (191)	0.24** (0.42)	.39**	.24**
P-S-E (157)	0.23** (0.41)	.25**	.23**
E-P-S (167)	0.23** (0.43)	.11	.23**
E-S-P (188)	0.23** (0.45)	.10	.19**
S-P-E (148)	0.21** (0.49)	.05	.30**
S-E-P (152)	0.21** (0.51)	.26**	.33**
Women-Men	SPF Preference mean (SD)	Correlation with Self-report (direct)	Correlation with by-exemplar self-report
P-E-S (175)	0.13** (0.46)	-.11	.28**
P-S-E (179)	0.14** (0.41)	.10	.20**
E-P-S (180)	0.17** (0.41)	-.03	-.04
E-S-P (150)	0.24** (0.48)	.09	.17*
S-P-E (143)	0.22** (0.45)	-.12	.06
S-E-P (148)	0.11** (0.47)	.18*	.35**

Note. P is thermometer ratings of 20 stimuli in the study. S is SPF, E is thermometer ratings of social-groups. Positive means values indicate stronger preference for white over black people. * $p < .05$, ** $p < .01$.

Surprisingly, the faces grouping condition also affected the correlation of the SPF with the direct self-report of social groups. The correlation between the SPF white-black preference score and the direct self-report white-black preference score mounted from $r(484) = .13$ to $r(543) = .26$, Fisher $z = 2.2$, $p = .03$. These effects can be explained as a context effect: when the individuals on the same page differed by race, the race attitude became more influential. Race stayed salient and therefore affected the more general self-report as well. Supporting this claim is the fact that when the target individuals were grouped by race, the two self-report race-preference measures showed lower correlation, $r(1036) = .35$, than when the individuals were grouped by gender, $r(1080) = .42$, Fisher $z = 1.98$, $p = .04$. This factor has no effect on gender attitudes.

Effect of Time on SPF Performance. Changes in performance across blocks reflect the effect of time. Latency and standard deviation reduced as a function of block, Fs (2, 3956) = 93.08, 95.70, ps < .0001, η_p^2 s

= .05, .05, respectively (see Table 4). Error-rates were not systemically improved or worsen as a function of block (see Table 4). Overall, this suggests an increase in performance, probably due to learning.

Table 5 presents the correlations between each of the eight SPF scores (focal conditions only) for each block and the self-report measures. Only the race associations with positive valence were related to self-reported attitudes. We found no consistent increase or decrease of the SPF/self-report relationship as a function of block. This may suggest that learning has no influence on the validity of the SPF measures.

References

Bar-Anan, Y., Nosek, B. A., & Vianello, M. (2008). The Sorting Paired Features task: A measure of association strengths. Unpublished manuscript.

Table 4
Study 2: Mean Latency, Error-Rate and Standard Deviation as a Function of Block Number

	Mean Latency (SD)	Mean Error-rate (SD)	Mean Standard Deviation (SD)
Block 1	1450 (341)	.0873 (.0776)	706 (211)
Block 2	1419 (336)	.0921 (.0817)	672 (215)
Block 3	1411 (341)	.0913 (.0829)	652 (216)
Effect Size between Blocks 1 and 2	.09**	.06**	.16**
Effect Size between Blocks 2 and 3	.02*	0	.09**
Effect Size between Blocks 1 and 3	.11**	.06*	.16**

Note. Effect sizes are Cohen's *d*. * p < .05, ** p < .001.

Table 5
Study 2: Correlations of Per-Block SPF Scores and Self-Report Attitudes

	SPF white-good	SPF black-good	SPF white-bad	SPF black-bad
Block 1	.11**, .09**	-.08**, -.15**	-.06, -.04	0.0, .06
Block 2	.11**, .12**	-.08**, -.14**	-.04, 0.0	.05, .05
Block 3	.07*, .14**	-.16**, -.15**	.05, -.05	.06, .08*
	SPF women-good	SPF men-good	SPF women-bad	SPF men-bad
Block 1	0.0, .11**	-.01, -.15**	0.0, -.01	0.0, .02
Block 2	.04, .05	-.02, -.09**	-.03, -.02	-.02, .06
Block 3	.03, .14**	-.02, -.13**	0.0, -.03	0.0, 0.0

Note. Only focal attitude scores. The two correlations in each cell are: with self-reported group attitudes, with self-reported by ratings of individuals. N for race attitudes: 1029, 1031. N for gender attitudes: 993, 999. * p < .05, ** p < .001.