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On Sending Artifact in Search of Artifact: Reply to McDonald, Harris, and Maher

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Two studies are reported that show the McDonald, Harris, and Maher critique of our earlier experiment to be mistaken. In the first study, arousal-induced attention to self was demonstrated in a field setting devoid of any of the artifactual covariates of arousal induction suggested by these researchers. In the second study, a replication of the McDonald et al. experiment was conducted in which a crucial manipulation check that they failed to make was included. This check on the unusualness and embarrassment-producing properties of the manipulations revealed that their study was burdened by the very artifact they claimed might exist in ours. Although their slow-running manipulation was superficially similar to our fast-running manipulation, slow running created self-focus through unusualness and embarrassment, whereas fast running led to self-focus via arousal.

Does arousal cause self-focused attention? McDonald, Harris, and Maher (1983) appear to be convinced that it does not. But the data that they have assembled are not up to the task of supporting this claim, for as they must admit, their findings "do not preclude the possibility that arousal may cause self awareness" (p. 288). The question, then, is still very much open, and our aim in this article is to provide a less equivocal answer. As will become evident, arousal does cause self-attention, and this fact was not apparent to McDonald and his colleagues because they incorporated in their experiment the very artifact that they believed was present in our original investigation (Wegner & Giuliano, 1980).

The concern raised by McDonald et al. is a simple one. They have qualms about our manipulation of arousal and argue that having subjects run in place as a means of increasing their arousal might also increase their embarrassment and concern about engaging in an unusual activity. By their analysis, these concerns—and not arousal—were responsible for inducing self-focused attention in our study. This explanation fails to encompass any of the other findings we reported and leaves unclear why conceptually related findings might exist (e.g., Fenigstein & Carver, 1978), but it does provide an alternative that seems reasonable when the running-in-place manipulation is considered in isolation. With this in mind, we decided it might be appropriate to test for the effect once again—this time, in a setting devoid of any possible embarrassment or unusual activity.

Study 1

People get aroused when they walk up hills, and there is just such a hill on the Trinity University campus. Students traveling from the dormitories to the classroom buildings must climb a set of 40 steps on the way. In the campus vernacular, this incline is commonly referred to as "heart-attack hill." Participation in this climb is of course both voluntary and familiar, and it is clear that any self-focus produced by arousal in this context could not reasonably be traced to embarrassment over performing an unusual laboratory activity. It was in this setting, therefore, that we arranged for a test of the hypothesis. Six pairs of undergraduate and graduate student experimenters, operating at different times over the course of a week, administered self-focus assessment questionnaires to passing students. The questionnaires were composed of the same five items used in our original study and called for the respondent to fill in sentence blanks with one

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of three possible pronouns. Because the selection of first-person singular pronouns is a fairly reliable and valid measure of self-focus (cf. Wegner & Giuliano, 1980), the total number selected by the respondent was used as a summary index of self-focused attention. Each pair of experimenters was instructed to approach only students who were walking alone, to avoid acquaintances, and to gather responses from different students at the bottom and at the top of the steps. The experimenters introduced themselves as psychology students studying language, obtained the respondent's signed consent, and engaged each other in conversation unrelated to the experiment as the respondent filled out the brief form.

In this way, 20 students were tested before climbing the steps, as they approached the bottom landing; and 37 students were tested after climbing the steps, as they approached a walkway some 20 m beyond the top landing. The self-focus index mean for those at the bottom was 2.20, whereas for those at the top it was 3.08, $t(55) = 4.08$, $p < .001$. This significant difference is entirely consistent with our hypothesis that arousal causes self-focus, but it is hard to understand, given only the alternative hypotheses advanced by McDonald and his colleagues. After all, there is nothing particularly embarrassing or unusual about finishing steps as opposed to starting them. What differs between bottom and top is arousal, and this finding lends substantial credence to our original contention.

How then are we to understand the McDonald et al. findings? If arousal indeed causes self-focused attention, how were these investigators able to conduct an experiment aimed directly at this target and miss it? This was the concern of our second investigation.

Study 2

The claim that our initial findings were artifactual rests on an experimental condition that McDonald et al. appended to our experimental design. The original design used a control condition in which the subject sat in a chair and an arousal condition in which the subject ran in place for 2 minutes; measurements made following these activities showed greater self-focus in the arousal condition, and we interpreted this effect as an instance of arousal-induced self-attention. McDonald and his colleagues inserted a slow-running condition in this design. They held that subjects in this condition would remain unaroused but would experience the same level of embarrassment and unusualness ostensibly experienced by subjects in the running-in-place condition. By their reasoning, the relatively high level of self-focus that they observed in this slow-running group showed that the unusualness and embarrassment associated with running had been responsible for our earlier finding of high self-focus in the fast-running condition.

There is a serious flaw in this argument. Quite simply, McDonald et al. failed to check their most critical manipulation. Although they incorporated a heart-rate check on the arousal-inducing properties of the manipulations, they did not obtain any independent measure of the alleged embarrassment-inducing properties of the same manipulations. All that is offered is an assurance that a preexperimental survey showed slow running to be unusual. Given that their claim to the discovery of an artifact rests on this second possible impact of the running manipulations, the absence of a simple check struck us as more than a bit curious. We were concerned about the obvious contradiction between our hill-climbing results and their findings, and so we decided to replicate their study with the proper check included in hopes that this would shed some light on the issue.

Our procedure followed the one described by McDonald et al. as closely as possible—with the exception of the added manipulation checks.[1] We inserted two self-report items in the postexperimental questionnaire as checks on the unusual/embarrassing quality of the manipulations. One item called for the sub-

[1] One other departure from McDonald et al.'s procedure was the exclusion of the item calling for the self-report of self-consciousness. Although McDonald et al. are not clear on this point, this is not a check on the unusualness or embarrassing qualities of the manipulation. If anything, it is a second measure of self-focus. As such, however, it is problematic. Theoretically, it has been argued that people cannot self-report their situationally induced levels of self-consciousness with any accuracy (Wicklund, 1975), and on an empirical plane, Diener, Lusk, DeFour, and Flax (1980) found this measure to be uncorrelated with other indicants of self-consciousness and correlated instead with a measure of social anxiety.

Table 1
Variable Means in Study 2

Measure	Condition		
	Fast running	Slow running	Control
Self-focus	10.40_a	9.90_a	7.30_b
Heart rate	122.4_c	85.4_d	81.8_d
Unusualness index	$3.47_{e,f}$	4.10_e	2.92_f

Note. In each row, means not sharing a common subscript are different at $p < .05$ by the Newman-Keuls procedure.

ject to rate the experimental task on a 7-point scale from unusual (7) to not unusual (1), and the other item called for a rating of the tasks from embarrassing (7) to not embarrassing (1). Twenty Trinity University undergraduates who had agreed to participate in partial fulfillment of course requirements were assigned randomly to each of the three conditions—control, slow running, and fast running. As can be seen in Table 1, the results we obtained for self-focused attention and for heart rate were substantially the same as those found by McDonald et al. A three group analysis of variance (ANOVA) on the 20-item self-focus measure revealed a significant overall effect, $F(2, 57) = 4.74$, $p < .02$, and a subsequent Newman–Keuls analysis indicated that the control condition self-focus mean was significantly lower than both the slow-running and fast-running condition means, $p < .05$ in each case. A parallel ANOVA on posttask heart rate showed a significant overall effect, $F(2, 57) = 26.69$, $p < .001$, composed of lower rates in the control and slow-running conditions than in the fast-running condition. To this point, then, the pattern of our results mirrors quite faithfully the pattern observed by McDonald et al.

The pattern for the unusualness manipulation check, however, appears to be unlike the one that McDonald and his colleagues took for granted. Shown in Table 1 are the condition means for an unusualness index we created by averaging ratings on the two relevant items; these items were reliably correlated, $r(58) = .37$, $p < .01$, and behaved similarly across conditions. An ANOVA on this index yielded a significant overall effect, $F(2, 57) = 5.78$, $p < .01$, and a Newman-Keuls decomposition of this effect revealed that it was attributable to a single significant difference between condition means. The slow-running condition was seen as significantly more unusual/embarrassing than the control condition, $p < .05$. The fast-running condition was seen as intermediate in unusualness to these extremes and was not significantly different from either. In short, the artifactual cause of self-focus that McDonald et al. feared might inhabit our fast-running condition was in fact only present in their ostensibly similar slow-running condition.

This observation indicates the way in which they obtained their misleading self-focus findings. Doing something unusual probably *is* a cause of self-focus, as theorists often suggest (e.g., Shibutani, 1961). Hence, the especially unusual act of running slowly in place did give rise to self-attention. But in the fast-running condition, the level of unusualness was not sufficient to lead to strong self-focus. In this case, the arousal produced by the more vigorous task came forward to bring self-focus to the same general level as that observed in the slow-running condition.

Correlational data from our replication of the McDonald et al. experiment substantiate this reasoning. Looking at the control and slow-running conditions together, for example, we find a near-significant correlation between the unusualness index and the self-focus measure, $r(38) = .22$, $p < .08$. The correlation between an arousal index (deviation from baseline heart rate; cf. Wegner & Giuliano, 1980) and self-focus in these conditions is nonsignificant, $r(38) = .05$. Given the suppression of arousal and the enhancement of unusualness in the slow-running condition, this pattern is not surprising; it is consistent with the idea that unusualness caused self-focus in slow running. Looking at the control and fast-running conditions together, however, we find a markedly different pair of correlations. The correlation between unusualness and self-focus is trivial, $r(38) = .08$, and the correlation between the arousal index and self-focus is significant, $r(38) = .35$, $p < .02$. These correlations are consistent with the idea that the arousal-inducing properties of fast running, and not unusualness, are the cause of self-focus in the fast-running condition.[2]

[2] Calculating these correlations across all three conditions, we find unusualness unrelated to self-focus, $r(58) = .09$, *ns*, and arousal only marginally related to

Finally, to speak most directly to the McDonald et al. critique, we performed one last set of analyses on the data for the two conditions of crucial importance in our original design—the fast-running and control groups. First, we performed a simple ANOVA and found that these groups differed significantly on self-focus, $F(1, 38) = 7.53, p < .01$. Then, we performed a parallel analysis in which the unusualness index was entered as a covariate. Unusualness was not a significant covariate of self-focus, $F < 1$, and the effect of fast running on self-focus remained significant, $F(1, 37) = 7.08, p < .02$. This indicates that unusualness, at least as measured in this way, was not the aspect of the fast-running manipulation that produced self-awareness. A second covariance analysis shows that this aspect was indeed arousal. The arousal index was a significant covariate, $F(1, 37) = 5.28, p < .03$, and the effect of fast running on self-focus was dissipated when the level of arousal was "held constant" in this way, $F(1, 37) = 2.07, p < .16$.

The implications of these findings are clear. In this study, in the experiment conducted by McDonald et al., and in our original demonstration (Wegner & Giuliano, 1980), fast running led to self-focus by means of arousal. McDonald and his colleagues managed to obscure this observation by instituting a new condition—slow running—that was only superficially similar to ours. In so doing, and also by failing to examine what they were manipulating, they introduced an artifactual variable in their design. The unusualness they attributed to our fast-running manipulation was actually only a property of their slow-running manipulation. By pointing to the similarity of the dependent variable values obtained through these two disparate manipulations, they jumped to the false conclusion that the two manipulations were identical.

Conclusions

What can be learned from this exchange? Perhaps most obviously, we can conclude that arousal leads to self-focused attention under the conditions imposed by several different experimental arrangements. Theoretical frameworks that presume such a connection (e.g., Carver & Scheier, 1981; Pennebaker, 1982; Wegner, 1980) are thus provided with additional evidence. Somewhat less obvious, this exchange offers an interesting insight on the nature of the manipulation check in social research. Ideally, the manipulation check is included in an experiment to ensure that the investigator's interpretation of the manipulation is plausible. But this is all it can do, for as we have seen, it is perfectly reasonable for other investigators to offer alternative interpretations of what was manipulated. In this sense, a manipulation check is only a weak tool for assessing the nature of a manipulation. At the same time, we have also seen the erroneous conclusions that can be drawn from research in which such a check is absent. Thus, although the check cannot guarantee that one's preferred interpretation of a manipulation is correct, it is nevertheless crucial for discerning whether that interpretation is at least possible.

self-focus, $r(58) = .20, p < .07$. As would be expected given the mixture of two routes to self-focus in the experiment as a whole, these overall correlations take on values intermediate to the extremes noted for each of the running-condition/control-condition combinations.

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