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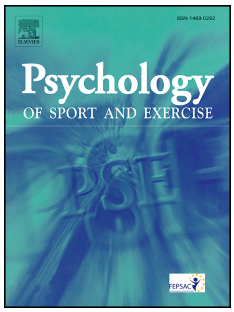

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On the importance of critical thinking: a response to Wulf's (2015) commentary

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Abstract

In a recent paper (Toner & Moran, 2015), we argued that continued improvement among elite athletes requires alternation between external and internal foci of attention. In her commentary on this paper, Wulf (2015) claims that we have misunderstood the 'attentional focus' effect. Our rejoinder has three objectives. *Firstly*, we critically evaluate Wulf's arguments and counter her false allegations and spurious reasoning. *Secondly*, we explain our concerns about certain aspects of attentional focusing research. *Finally*, we propose that in order to explore the dynamic nature of attentional focusing, we need to go beyond restrictive theoretical dichotomies (e.g., "internal" versus "external" processes) using new approaches.

Keywords: Focus of attention, expertise, critical thinking

We are grateful to the editors for the opportunity to respond to Wulf's (2015) commentary on our recent paper (Toner & Moran, 2015). In this rejoinder, our objectives are threefold. Firstly, using the tools of critical thinking (Halpern, 2014), we shall evaluate Wulf's claims and refute any false allegations and spurious reasoning that we detect. Secondly, we shall explain our misgivings about certain aspects of attentional focusing research. Finally, we propose that to fully understand the dynamic nature of attentional focusing we need to go beyond restrictive theoretical dichotomies (e.g., "internal versus external" processes) using new approaches like "pupillometry" - the measurement of pupil dilation as an objective index of mental effort (Laeng, Sirois, & Gredebäck, 2012).

Wulf's (2015) main allegation is that we have misunderstood the "attentional focus effect" – the proposition that "what athletes direct their attention to … will always affect their performance in a less-than-optimal (internal focus) or optimal way (external focus)". Before evaluating this allegation, we must refute two subsidiary claims. Firstly, she alleges falsely (and in an unfortunately personalized manner given that our paper was co-authored) that "Moran has revealed his skepticism with respect to expert performance". To clarify, we are *not* sceptical of "expert performance" but *are* wary of *universal* generalizations about the superiority of one type of attentional focus over another. Etymologically, 'skepticism' originates from the Greek word *skeptomai* meaning "I consider carefully" (Potter, 1993). So, from a careful consideration of relevant evidence, we argue that an internal focus of attention can be helpful in certain circumstances (e.g., when correcting flawed movement patterns). Secondly, following an irrelevant comment about editorial matters, Wulf expresses surprise at the "vehemence of the opposition" she appears to have detected in our

paper. We reject this claim because according to the Oxford dictionaries, "vehemence" means "great forcefulness or intensity of feeling or expression". Having scrutinised the approximately 200 words concerning Wulf's research in our 6,483-word paper (Toner & Moran, 2015), we cannot locate a single word satisfying this definition of "vehemence". Let us now evaluate Wulf's allegation of "misunderstanding".

Although Wulf does not specify precisely *how* we have misunderstood her work, she seeks to correct us by proclaiming rather obscurely (note the double negative) that "adopting an external focus does not mean that the performer is not aware of her or his body movements". However, a few sentences later, she claims that an external focus is "related to the *planning* of the movement, but has nothing to do with the processing of intrinsic feedback or bodily awareness". To us, these two statements about bodily awareness are contradictory. Whereas in the former, Wulf appears to suggest that a performer can adopt an external focus *and* remain aware of his/her bodily movement, in the latter she proposes that an external focus has "nothing to do" with bodily awareness.

Next, Wulf claims that if performers plan actions in terms of specific bodily movements the outcome will 'always be less-than-optimal'. We agree that attempts to consciously control movement patterns often impair skilled actions and performance proficiency. However, we are reluctant to endorse Wulf's claim that an internal focus of attention will *always* prove 'less-than-optimal'. Indeed, Rienhoff, Fischer, Strauss, Baker, and Schorer (2015) showed that an external focus of attention led to a significant *decrease* in basketball shooting performance relative to internal focusing and no-instruction conditions for players of differing expertise. Unfortunately, Wulf

appears to base her conclusion on methods that typically require performers to adopt an unfamiliar attentional focus (either internal or external). The problematic nature of this approach was pinpointed by Maurer and Munzert (2013) who discovered that skilled basketball players' free-throw performance was superior under familiar compared with unfamiliar focus conditions - *irrespective* of focus direction (i.e., internal or external). They concluded that "frequently used familiar focus strategies become integrated into the proceduralized skill components and are no longer disruptive to skill execution" (p. 737). Beyond the laboratory, Rory McIlroy, the world's number one ranked golfer, revealed his preference for a *familiar* internal focus of attention in his quest for improvement. Specifically, he always uses "a couple of little swing thoughts, whatever I'm working on at the time whether it's to do with holding my right elbow or making sure that I turn my shoulder under my chin or whatever it" ("What makes the perfect golf swing?", 2015). Clearly, some elite athletes value the importance of an *internal* rather than external focus of attention *in certain circumstances*.

We do not propose to dwell unduly on Wulf's speculation about the causes of Tiger Woods' slump in form. Although Woods' problems could be due to an over-reliance on technical thoughts, they may also reflect the waning powers of a player who, because of prolonged injury, is no longer capable of executing skilled movements with his erstwhile efficiency.

Wulf concludes her commentary by expressing her confidence that accomplished athletes and their coaches can use relevant external foci to facilitate technical change. This perspective is contrary to our belief that skilled athletes must direct their

attention internally (e.g., to make them aware of the kinaesthetic difference between the flawed movement and the desirable one; see Carson & Collins, 2011) to achieve successful technical change. We know of no empirical evidence to indicate that an external focus can be used to address flaws in skilled movement patterns. Interestingly, the study by An, Wulf, and Kim (2013) that Wulf cites to support her claim that an external focus can be used to enhance movement form was conducted with low-skilled golfers. Also, whereas Abdollahipour, Wulf, Psotta, and Palomo Nieto, (2015) reported that skilled gymnasts benefited from an external focus, there was no evidence to suggest that these participants had been performing sub-optimally due to being in a slump or that they were attempting to regain a lost movement pattern. This latter issue is important because our paper argued that an internal focus is necessary when skilled performers are seeking to refine 'attenuated' movement patterns. So, although we are open-minded about the validity of Wulf's claim that coaches can use relevant external foci to induce technical change in skilled performers, we require evidence that this approach will *actually work* before recommending it to practitioners.

To conclude, rather than getting bogged down in a debate over the relative *merits* of different attentional foci, let us consider the broader question of how to explore the dynamic nature of attention itself. In this regard, cognitive researchers (e.g., Anderson, 2011) suggest that we need to go beyond restrictive theoretical dichotomies (e.g., "internal" versus "external"; "top-down versus "bottom-up") because such binary distinctions are "fuzzy" and leave crucial explanatory gaps (since different aspects of attention interact extensively). Thus, Ristic and Enns (2015) propose that to in order to understand how attention functions in everyday life, we need new tools for

studying individual differences and situational variability. In attentional focusing research, a tool like pupillometry could prove fruitful. Specifically, using pupil dilation as a dependent variable, researchers could investigate individual differences in the attentional effort elicited by different focusing instructions over time. This approach could help to elucidate the dynamic processes underlying attentional focusing.

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Highlights:

- We counter the false allegations and spurious reasoning evident in Wulf's (2015) commentary.
- We re-iterate a number of our methodological and theoretical concerns about attentional focus research.
- We consider the need to go beyond restrictive theoretical dichotomies