

Chapter 7

Epilogue



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The present thesis set out to gain more insight into the conditions under which unwanted effects, that is, ironic effects and overcompensation occur in the perceptual-motor domain. As we focused mainly on the role of (visual) attention in unwanted performance we measured participants' gaze behavior (Chapters 2-5) and performance (Chapters 2-6) in several complex aiming tasks, that is, penalty shooting in football, golf putting and dart throwing. In those tasks unwanted effects were induced by using differently worded instructions and/or different load conditions that enhance the probability that one does the opposite of what is intended (i.e., ironic effect), or the opposite of what should be avoided (i.e., overcompensation). The aim of this epilogue is to provide an overview of the main findings accompanied by theoretical and practical implications.

Unwanted Effects, Visual Attention and Cognitive Load

The present thesis demonstrates that there is a strong relationship between visual attention and performance in the perceptual-motor domain also when ironic effects (Chapters 2-5) and overcompensation (Chapter 3) occur. In a penalty shooting task (Chapter 2) the negative instruction *not to shoot within reach of the keeper* induced ironic effects, that is, participants more often shot closer to the keeper. Furthermore, ironic shots were more often preceded by initially looking at the keeper than not-ironic shots.

In Chapter 3, in a golf putting task participants looked less long at the target (i.e., the hole) and longer at one of the inappropriate areas (e.g., in front of the hole) when ironic effects occurred both when participants were instructed not to *undershoot* and when instructed not to *overshoot*. Furthermore it was found that when ironic effects occurred the chain between intention, visual attention and performance was sometimes interrupted between intention and visual attention and sometimes between visual attention and performance. As a specific example, under the *do not overshoot* instruction participants who showed ironic performance looked more in-front of the target, as if they intended to overcompensate, eventually putting the ball ironically past the target. This confirms that ironic effects are not intention driven (Beilock et al., 2001; Wegner et al., 1994). As for overcompensation, the results of Chapter 3 confirm that overcompensation is intention driven as visual attention was always directed

to areas where the ball eventually landed when overcompensation occurred. Thus, a negative instruction, for example, *do not undershoot the target* may lead to the intention to do the opposite of what should be avoided, that is, to overshoot the target, in this case leading to gaze behavior and aiming action to such intended areas.

Chapter 4 more directly revealed that visual attention partially mediates the relationship between instructions and ironic effects on performance. That is, in the penalty shoot-out setting used in this experiment the duration of gaze behavior directed at the keeper was related to the type of instruction as well as to shooting performance. The instruction *not to shoot within reach of the keeper* as well as the instruction *to pass the keeper* led to longer gaze behavior on the keeper and shots closer to the keeper. These findings make clear that in the football penalty setting differently worded instructions probably induce ironic effects by interrupting the chain from intention to visual attention to performance between intention and visual attention (i.e., gaze behavior). Most important, in this Chapter it is shown that not only a negative instruction may lead to ironic effects but also positively formulated instructions in which the to-be-avoided object is mentioned. These findings imply that in every setting in which distracting objects or elements are present in the visual field (e.g., opposing player, supporters, etc.) instruction including this element may increase the probability that ironic effects occur.

Chapter 5 once more confirmed that visual attention plays a crucial role in ironic effects in the perceptual-motor domain. Whereas earlier studies (Chapters 2 and 4) showed that when ironic effects occurred participants looked longer and more often at the keeper, this study revealed that ironic effects were (consequently) accompanied by insufficiently long final fixations on the open goal space. The short final fixation on the target was not the result of shorter response times, but rather of either an enhanced difficulty to disengage from the keeper (i.e., late onset of the final fixation on the open goal space) or higher distractibility by the keeper (i.e., a second fixation on the keeper prior to kicking the ball after gaze was already on the open goal space).

In Chapter 6 it was shown that in a far aiming task (i.e., dart throwing) without a distracting element in the visual field particularly the combination between an ironic (negative) instruction and high emotional load (i.e., anxiety) led to ironic

performance while separately neither the ironic instruction nor anxiety led to ironic effects.

In all experiments discussed above ironic effects were induced, yet not always to the same degree. On one occasion overcompensation effects were also induced next to ironic performance. In most cases it was clear that there was a strong relationship between type of instruction, gaze behavior and performance also when unwanted effects occurred. Furthermore, it is now clear that in the perceptual-motor domain positively worded instructions may also induce ironic effects, implying that the negative formulation (“not”) is not crucial. Finally, it was shown that especially in combination with anxiety certain instructions may lead to ironic effects.

Theoretical implications

Overall the results in the present thesis seem to be in line with predictions of Wegner’s theory of ironic mental processes (Wegner, 1989, 1994, 1997, 2009). In brief, this theory is based on the sensitive interaction of two cognitive processes, that is, an operating process and a monitoring process to replace unwanted thoughts or actions into thoughts or actions that matches desired states. The operating process is initiated when an unwanted thought is perceived by the monitoring process which searches the contents of consciousness for any trace of unwanted thoughts. When an unwanted thought is detected by the monitoring process, the operating process is initiated to replace this item. However, when attentional resources are depleted, the process to replace unwanted items may fail, resulting in manifestation of the contents of the monitoring process (i.e., an unwanted thought or action).

The present thesis makes clear that ironic instructions may also lead to overcompensation which is not necessarily in conflict with Wegner’s theory (cf. Beilock et al., 2001; De la Peña, 2008). For overcompensation the sensitive interaction of both the operating and monitoring processes may not be interrupted because the intention to do the opposite of the to-be-avoided is actually the desired state of affairs. As it is not possible to investigate overcompensation in the cognitive domain (see Introduction) it is suggested that further research concerning overcompensation should use perceptual-motor tasks (e.g., golf putting and penalty shooting) in combination with negatively worded instructions.

Furthermore, as argued in Chapters 5 and 6, there are striking resemblances between the theory of ironic mental processes (Wegner, 1994) and self-regulatory mechanisms proposed in the Attentional Control Theory (ACT; Eysenck et al, 2007) to explain the effects of anxiety on performance. The ACT predicts that anxiety impairs performance via its adverse effects on attentional control. Performers who are confronted with circumstances that increase anxiety find it difficult to exercise attentional control, to inhibit the effect of distracting stimuli, and to shift attentional resources to task demands efficiently, hereby suffering from impaired performance as attentional resources are needed for effective performance. Both Wegner's theory of ironic processes and ACT are dual-process theories in which automatic and controlled processes in working memory are proposed to interact, and in which the interaction may be affected by emotional load leading to suboptimal performance. It is a challenge for future research to develop one theoretical framework to explain effects of anxiety as well as ironic instructions on performance.

Finally, as for the 'alternative' explanation for ironic effects, namely, priming (cf. Bargh, Chen, & Burrows, 1996), the results of the present thesis show that priming and Wegner's ironic processes rather complement than exclude each other. Priming seems to play a crucial role in inducing ironic effects. Priming is based on James' (1890) principle of ideo-motor action, which holds that the mere act of thinking about a behavior or key word may increase the tendency to engage in that behavior or to think about a specific action (cf. Bargh et al., 1996). Although in earlier research concerning ironic effects and/or overcompensation (Beilock et al., 2001; Wegner et al., 1998) the priming approach was argued as an opposite and independent theory to explain the occurrence of unwanted performance, this thesis suggests that the combination of the ironic mental process theory and the priming theory may best explain the occurrence of ironic effects as ironic effects may be triggered by a negative or positive instruction that primes the unwanted thought or item (e.g., do not shoot within reach of the *keeper*; pass the *keeper*). Thus, priming may play an important role in the initiation of ironic effects by putting the unwanted items in the cognitive system while the failure to replace these items ultimately results from the hampered interaction between monitoring and operating processes as proposed by Wegner's theory of ironic processes.

Practical implications

Overall, the findings described in the present thesis make clear that in learning and performance settings involving perceptual-motor tasks it may be best not only to avoid negative instructions but also to avoid any instructions that involve objects that should be avoided and are present in the visual field of performers. As people look at where they aim, and vice versa, they aim at where they look, the use of inappropriate instructions may prime the wrong target which may lead to unwanted effects. Therefore, the focus on what to do (e.g., pass the keeper) should be combined with the right wording involving the target (e.g., shoot in the open space), which was found to lead to the most accurate performance, as mentioning the target will draw attention, and hence performance, in the direction of the target. Furthermore, as particularly the combination of high anxiety and negative instructions provides the most dangerous combination for ironic performance, next to avoiding particular instructions, preventing, reducing and/or learning to cope with anxiety would provide additional ways to minimize the chances on ironic behavior.

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