



Processing head fakes in basketball: Are there ironic effects of instructions on the head-fake effect in basketball?



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ABSTRACT

Instructions in sports are used to improve athletes' performance. However, instructions can also impair performance if they direct athletes' attention to a to-be-avoided behavior which paradoxically provokes exactly that behavior (ironic effect). The present study investigates the impact of different instructions on the head-fake effect in basketball. Specifically, we asked here if deliberate attempts to ignore the deceptive cues gaze direction and head orientation increase the impact of that information and thus, paradoxically increase the head-fake effect. We found that the detrimental impact of spatially incongruent gaze direction and head orientation was essentially independent of whether participants were, or were not, instructed to deliberately ignore the task-irrelevant information. Hence, deceptive actions exert their impact independent of the perceivers' attempts to ignore deceptive cues. We thus conclude that the deceptive cues gaze direction and head orientation are per se hyper-accessible or over-salient and its processing cannot be controlled with any amount of mental capacity (and even not with the non-ironic instruction). However, as both ignore instructions produce general processing costs (i.e., slower reactions) coaches should solely instruct athletes' to focus attention on the processing of the pass direction.

1. Introduction

An important aspect of motor learning and performance are instructions. These can, for example, induce an external or internal focus of attention (e.g., Wulf, 2007; Wulf & Prinz, 2001), provide expert performance strategies during anticipation tasks (e.g., Williams, Ward, Knowles, & Smeeton, 2002), or regulate the perspective during mental imagery (i.e., 'first-person' perspective vs. 'third-person' perspective, e.g., Schul, Memmert, Weigelt, & Jansen, 2014). The general goal of using instructions is to improve athletes' performance. However, instructions can under some circumstances also impair the action outcome: Instructions, which direct people's attention to a to-be-avoided behavior, might paradoxically provoke exactly that behavior. This counterintuitive phenomenon has been observed for different types of mental activity and behavior, such as thinking (Wegner, Schneider, Carter, & White, 1987), acting (Wegner, Ansfield, & Pilloff, 1998), and speaking (Wegner & Erber, 1992), and is called 'ironic effect' (cf. Wegner et al., 1987).

Previous studies in sports and movement sciences investigated ironic effects in aiming tasks (e.g., soccer penalty kicking, golf putting) and balance tasks (e.g., performance at a balance training device). For example, soccer penalty kickers, who are instructed to

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focus on *not* kicking the ball within the reach of the goalkeeper or outside of the goal perform more shoots to the to-be-avoided areas, as compared to when they are instructed to hit specific areas (Bakker, Oudejans, Binsch, Kamp, & Button, 2006; for similar findings, see Barlow, Woodman, Gorgulu, & Voyzey, 2016). In a similar way, the instruction in a golf putting task to focus on *not* to overshoot the hole or *not* to miss a putt in a specific direction does precisely prompt the occurrence of such putting errors (Binsch, Oudejans, Bakker, & Savelsbergh, 2009; Toner, Moran, & Jackson, 2013; Wegner et al., 1998). Also, the instruction *not* to let a wobble board wobble results in more movement errors than the instruction to hold the wobble board steady (Dugdale & Eklund, 2003).

Ironic effects of instructions can be explained with the theory of ironic processes of mental control (Wegner, 1994, 2009). According to that theory, mental control requires the interplay of two processes to work effectively, namely the “operating process” and the “monitoring process”. The intentional operating process searches consciously for items necessary to reach the preferred outcome. The monitoring process searches unconsciously for contents, which are inconsistent with the intended desired state. If the monitoring process detects any failure, or conflict of the intentional operation, the operation process is re-set again. That is, the persons’ attention again is captured by the intended content, or item. However, under conditions of reduced mental capacity, the monitoring process might overwhelm the operating process, which results in the opposite of what is desired, the so called ironic effect. Mental capacity can be reduced, for example, by distraction, cognitive load, and time pressure (cf. Wegner, 1994).

Instructions in the aforementioned studies directed participants’ attentional focus on to-be-avoided aspects of the action outcome (e.g., movement of the balance board) or on unwanted effects of the action (e.g., hit/miss of target areas). What has not been investigated yet is if the instruction not to focus on a perceived kinematic cue ironically increases the impact of exactly that cue. This is of high relevance for the performance in situations in which the opponent uses deceptive actions to provide misleading information about his/her own action intention. For such situations, coaches should know whether it is better to explicitly instruct their athletes not to attend to the misleading cue or to explicitly instruct them to just focus on a particular non-deceptive cue. To address this issue, the present study investigates the impact of different instructions on the processing of a deceptive action. Specifically, ironic effects of instructions are investigated for the head fake in basketball in a reaction time experiment with speeded responses as a paradigmatic example (e.g., Kunde, Skirde, & Weigelt, 2011), because mental capacity should be reduced, when performing a task under time pressure (Wegner, 1994).

The head fake is a deceptive action used by routine in basketball, where a player gazes in one direction, but passes the ball into the opposite direction. Differences in reaction times (and error rates) between responses to direct passes and to head fakes signify the head-fake effect (Kunde et al., 2011). Recent studies extensively evaluated influencing factors of the head-fake effect, such as dynamic versus static stimuli (Alhaj Ahmad Alaboud, Gldenpenning, Steggemann-Weinrich, Kunde, & Weigelt, 2016; Experiment 2), the complexity of the response (simple button presses vs. whole body movements, Alhaj Ahmad Alaboud et al., 2016; Experiment 1), the proportion of fake trials (Alhaj Ahmad Alaboud, Steggemann, Klein-Soetebier, Kunde, & Weigelt, 2012; Gldenpenning, Alhaj Ahmad Alaboud, Kunde, & Weigelt, 2018), the role of practice with the task (Gldenpenning, Schtz, Weigelt, & Kunde, 2018), and the role of basketball expertise (Weigelt, Gldenpenning, Steggemann-Weinrich, Alaboud, & Kunde, 2017). The head-fake effect arises from a conflict of information processing between the task-relevant pass direction and the task-irrelevant gaze direction (Kunde et al., 2011) and reflects an interference effect, which can readily be observed in a number of interference paradigms in cognitive psychology, such as the Stroop task (Stroop, 1935) and the Simon task (Simon & Rudell, 1967).

A special feature of the aforementioned studies on the head fake in basketball is that they all used the same instruction for the participants, namely “to react as fast and as accurately as possible to the pass direction and to ignore the gaze direction”. Although this was not intended by the experimenters, the ignore-instruction might have ironically provoked participants to especially attend to the task-irrelevant gaze direction. With regard to ironic processes of mental control, if participants are instructed to ignore the gaze direction, the operating process includes the suppression of the gaze direction and thus, is engaged in locating the absence of a feature (i.e., gaze). The complementary monitoring process, in contrast, searches for gaze direction and is therefore engaged in locating the presence of a feature (i.e., gaze). As the monitor’s job to detect the presence of a feature is easier than the operator’s job to detect the absence of a feature (Newman, Wolff, & Hearst, 1980), the monitoring process might supersede the operating process and an ironic effect is provoked: instead of ignoring the gaze direction, gaze direction is overly attended. Thus, the head-fake effect observed in previous studies using such ignore-instructions might at least partly be an arte-fact of instruction.

Therefore, the present study investigates if the instruction to ignore the gaze direction increases the head-fake effect as compared to the instruction to only attend to the pass direction. We additionally tested a group of participants with the instruction to ignore the head orientation, as it could also be that rather the (more salient) head orientation and not the gaze direction causes the head-fake effect. Therefore, a reaction-time experiment with a quasi-realistic procedure was conducted (cf. Gldenpenning, Schtz et al., 2018). Participants were asked to react to video scenes of a basketball player either directly passing to the left/right side (i.e., direct pass) or to video scenes of a basketball player passing to the left/right side while gazing into the opposite direction (i.e., head fake). Participants’ responses were whole body movements to the left/right side to press specific response buzzers. Whereas the first group of participants was instructed to react as fast as possible to the pass direction and to *only attend to the pass direction* (non-ironic instruction group), a second group was instructed to react as fast as possible to the pass direction and to *ignore the gaze direction* (ironic instruction group ‘gaze’), and a third group was instructed to react as fast as possible to the pass direction and to *ignore the head orientation* (ironic instruction group ‘head’). In line with the theory of ironic processes of mental control (Wegner, 1994, 2009), we predicted that the head-fake effect would be more pronounced in the ironic instruction groups.

2. Methods

2.1. Participants

For a between-within interaction effect of $f = 0.25$, a medium sized correlation between measures of 0.5, and an α -value of 0.05, a sample of at least 66 participants was required to reach a power of 0.95. Calculations were carried out using G.Power 3.1.3 (Faul, Erdfelder, Lang, & Buchner, 2007).

One-hundred-one participants without any specific basketball expertise took part in the experiment. However, data from nine participants was excluded due to technical problems (i.e., malfunction of the wireless transmission of the reaction time data). Moreover, data from ten participants was excluded from data analyses as they did not behave as instructed (i.e., they did not lift both hands from the start buttons when they performed a response, see below) in more than 15% of the trials. Consequently, data from 82 participants was analyzed. The non-ironic instruction group consisted of 30 participants (15 females, mean age = 23.0 years, $SD = 2.8$, 3 left handed). The ironic instruction group 'gaze' consisted of 33 participants (11 females, mean age = 23.2 years, $SD = 3.6$). The ironic instruction group 'head' consisted of 18 participants (8 females, mean age = 23.6 years, $SD = 3.5$)².

Ethics Statement. All participants volunteered and provided written informed consent. All rights of the participants were protected, and all experiments were carried out according to the seventh revision (Fortaleza) of the 1964 Declaration of Helsinki by the World Medical Association (WMA). This research was also reviewed and classified as ethically noncritical by the Ethics Committee of the University Paderborn. No identifying information was obtained from the participants for the purpose of the study apart from their age and handedness. Moreover, written informed consents informed the participants that their data will be anonymously saved, analyzed and published. Accordingly, the present article does not include any potentially identifying information to which participants did not consent.

2.2. Apparatus and stimuli

Video sequences of a basketball player wearing a black shirt and black shorts were used as stimulus material. During video recording, the basketball player stood in front of a grey wall. The distance between the player and the wall was approx. 80 cm. Before each trial, the basketball player held the ball in his hands, centered the ball in front of the body, and straightly looked into the camera (starting position). The basketball player was recorded during passing the ball to the left or to the right side, either with or without performing a head-fake. After video-recording, a video-sequence of a pass and a head fake to the right side and to the left side, respectively, with comparable spatio-temporal parameters were chosen for the experiment (cf. Fig. 1).

Stimuli were presented with a short-throw beamer (Optoma X320 UST) onto a wall of the laboratory. The size of the presented video was 250 cm \times 190 cm. The presentation of the stimulus material was controlled with an IBM-compatible personal computer and the software Presentation (Version 14.5; <http://www.neurobs.com>).

A custom-made apparatus was constructed to provide a realistic response behavior. This apparatus consisted of two steel holdings with a distance of 170–220 cm (adapted to participant's body size: wingspan + 20 cm), onto which two buzzers were mounted (cf. Fig. 2). Responses to the video sequences had to be given by leaning to the left/right side, in order to slap against the left/right buzzer (response buzzer), as if to intercept the observed pass. Between this apparatus, two additional buttons were placed on a small table with a height of 100 cm. These buttons (start buttons) were kept pressed by participants with the left and right hand at the beginning of each trial and controlled the onset of the stimulus video. Time measurements started with video onset. Participants released the buttons when they initiated their response to the left/right buzzer. Releasing one of the buttons triggered a signal, which represented the end of the reaction time (RT) and the beginning of the movement time (MT). Slapping the buzzer signaled the end of the movement.

2.3. Procedure and design

Participants of the three experimental groups (ironic instruction group 'gaze', ironic instruction group 'head', non-ironic instruction group) received different instructions regarding the task of the experiment: all groups were instructed to respond as fast as possible to the pass direction of the basketball player by slapping at the left or right response buzzer. The ironic instruction group 'gaze' and the ironic instruction group 'head' received the additional information to ignore the gaze direction of the basketball player or to ignore the head orientation, respectively. The non-ironic instruction group received the additional instruction to only attend to the pass direction. Participants were placed in front of the screen wall at a distance of 200 cm behind the small table with the start buttons. The instruction was presented on the screen three times, before the start of the practice block, as well as before the first and second experimental block. At the end of the instruction, participants received information how to start the experiment (i.e., "To start the experiment, please press the right response buzzer").

Each trial started with the instruction presented on the screen to put both hands on the start buttons. 500 ms after pressing both start buttons, a fixation cross appeared and remained on the screen for 1000 ms, followed by the onset of the video. The trial ended

² We also tested 32 participants in the ironic-instruction group 'head', however, most of the data loss due to technical problems affected this group. Accordingly, the size differed between groups. This, however, should not have affected data analyses procedures, as variances were homogeneous between groups (see data analysis section).

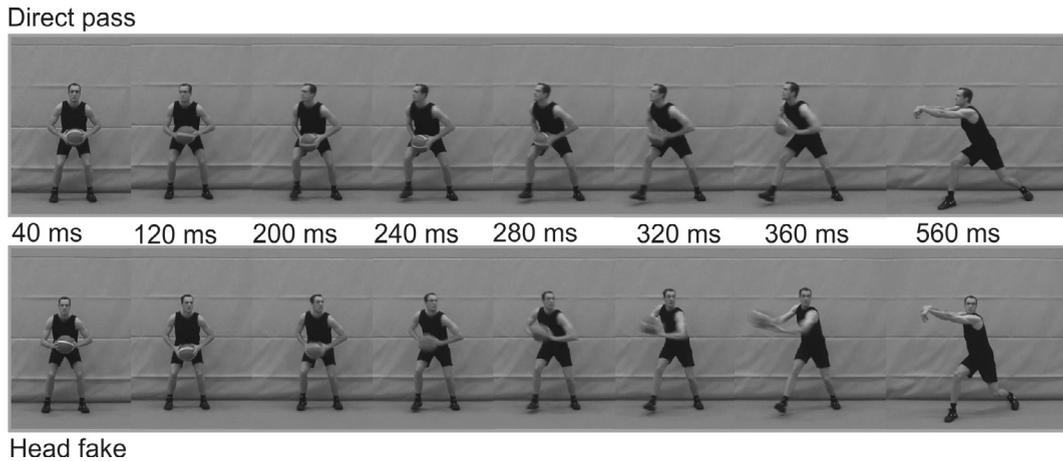


Fig. 1. Example of the stimulus material used in the study. The video sequences of a direct pass to the left side (upper line) and a pass to the left side whilst performing a head fake (lower line) are depicted here as series of “frozen” picture frames of that sequence.



Fig. 2. Set-up of the experiment. A participant places both hands on the start buttons, which are placed at the table. The trial immediately starts with the presentation of the fixation cross (left picture). When the video sequence starts, participants were asked to react as fast as possible and press the response buzzer, which corresponds with the pass direction of the presented basketball player (right picture).

with participants’ response at one of the two buzzers. The next trial began immediately with the instruction to place both hands at the start buttons. The first block of 16 trials was considered as practice to familiarize participants with the experiment. Data from this block were not analyzed. The practice block was followed by two test blocks. The first test block consisted of 100 trials and the second test block consisted of 80 trials. During each test block, the four possible stimulus conditions (direct pass to the left/right side, pass with head-fake to the left/right side) occurred equally often.

2.4. Data analysis

Responses of each participant were analyzed for incorrect responses (1.2%), performance errors (3.9%), and outliers (6.8%). A response was incorrect if participants pressed the wrong response button. A performance error occurred if participants did not behave as instructed, that is, if they did not lift both hands from the start buttons when responding to the stimulus. Participants with more than 15% performance errors were excluded from further data analyses. RTs below 100 ms and above 1000 ms were classified as outliers, as well as MTs below 100 ms and above 800 ms. Most of the outliers occurred as participants only subtly pressed the response buzzer with un-sufficient power and had to slap the buzzer again. Together, 11.9% of the responses were excluded from further data analyses. After this filtering process, reaction time (RT) and movement time (MT) were analyzed with a mixed ANOVA with regard to the within-subjects factor *pass condition* (direct pass vs. head fake), and the between-subjects factor *instruction* (ironic instruction group ‘gaze’ vs. ironic instruction group ‘head’ vs. non-ironic instruction group). As group sizes differed, the assumption of homogeneity of variances was controlled with Levene’s test. No violation of homogeneity of variances could be detected.

To foreshadow the results, the conducted ANOVA did not provide evidence for the predicted interaction effect between *pass condition* and *instruction*. A Bayesian ANOVA using the software JASP (JASP Team, 2018) was conducted to quantify the evidence for the absence of the interaction effect. The Bayes factor hypothesis test compares the predictions of two competing statistical models (e.g., the null-hypothesis and the alternative hypothesis). The ratio of the probabilities of the competing models (e.g., the probability of the alternative hypothesis/probability of the null-hypothesis) serves as index of the predictive accuracy of one model relative to the other and is called Bayes factor BF_{10} . A Bayes factor $BF_{10} > 3$ provides moderate evidence for the alternative hypothesis whereas a

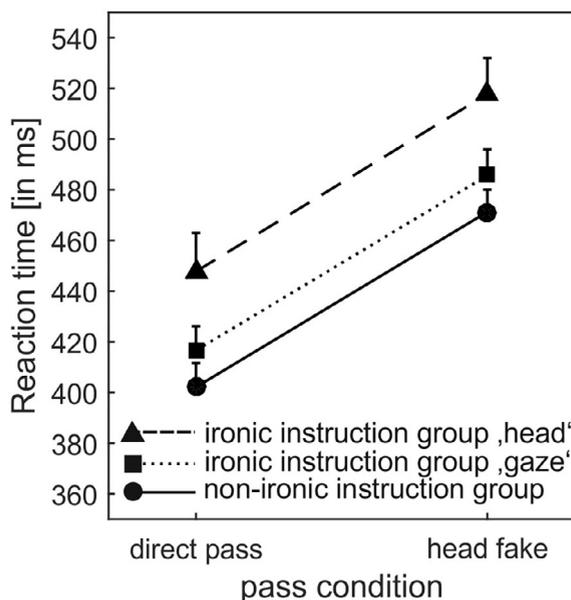


Fig. 3. Mean reaction times and standard errors of the mean (to simplify reading, standard errors are drawn in either upward or downward direction) to direct passes and head fakes for the non-ironic instruction group (solid line, circles), the ironic instruction group 'gaze' (dotted line, squares), and the ironic instruction group 'head' (dashed line, triangles).

Bayes factor $BF_{10} < 1/3$ provides moderate evidence for the null-hypothesis (Rouder, Morey, Verhagen, Swagman, & Wagenmakers, 2017; Wagenmakers, Marsman et al., 2018; Wagenmakers, Love et al., 2018). Consistent with the standard ANOVA, *pass condition* was treated as within-subjects factor and *instruction* was treated as between-subjects factor.

3. Results

3.1. Reaction times

3.1.1. Analysis of variance

Mean RTs are illustrated in Fig. 3. The within-subjects factor *pass condition* was significant, as participants reacted faster to direct passes ($M = 422$ ms) than to head fakes ($M = 492$ ms) [$F(1, 78) = 1045.91, p < .001; \eta_p^2 = 0.93$]. Also, the between-subjects factor *instruction* was significant [$F(2, 78) = 4.16, p = .019, \eta_p^2 = 0.10$], pointing out that the instruction to ignore the head orientation resulted in significantly slower RTs ($M = 483$ ms) than the instruction to only attend the pass direction ($M = 437$ ms) ($t(49) = 2.86, p < .006, d = 0.84$). The instruction to ignore the gaze direction resulted just in descriptively slower RTs ($M = 451$ ms) than the instruction to only attend to the pass direction ($p = .282, d = 0.27$) and did also not differ from the instruction to ignore the head orientation ($p = .067, d = 0.56$). Most importantly for the present study, however, the two-way interaction between *pass condition* and *instruction* did not reach significance ($p > .10$).

3.1.2. Bayesian analysis of variance

The two-factorial design of the study revealed five models (cf. Table 1, left column). The BF_{10} column depicts the Bayes factors for

Table 1
JASP output table for the Bayesian ANOVA.

Models	P(M)	P(M data)	BF_M	BF_{10}	Error %
Null model	0.200	4.634e-46	1.853e-45	1.000	
Pass condition	0.200	0.365	2.303	7.885e+44	1.095
Instruction	0.200	1.184e-45	4.735e-45	2.555	0.755
Pass condition + instruction	0.200	0.559	5.072	1.207e+45	5.811
Pass condition + instruction + pass condition * instruction	0.200	0.076	0.327	1.630e+44	16.360

Notes: The column "Models" lists the models under consideration. Column "P(M)" indicates prior model probabilities. Column "P(M|data)" indicates the updated probabilities after having observed the data. The column "BF_M" indicates the degree to which the data have changed the prior model odds. Column BF_{10} depicts the Bayes factors for the comparisons with the Null model. Note that JASP uses exponential notation to represent large numbers; for instance, "7.885e+44" represents 7.885×10^{44} . The column "% error" indicates the size of the error in the integration routine relative to the Bayes factor (for more information on Bayesian ANOVAs, see Wagenmakers, Marsman et al., 2018; Wagenmakers, Love et al., 2018).

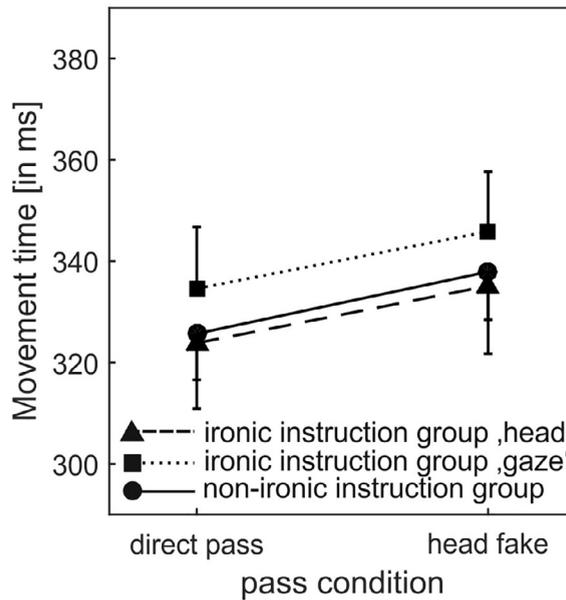


Fig. 4. Mean movement times and standard errors of the mean (to simplify reading, standard errors are drawn in either upward or downward direction) to direct passes and head fakes for the non-ironic instruction group (solid line, circles), the ironic instruction group 'gaze' (dotted line, squares), and the ironic instruction group 'head' (dashed line, triangles).

the comparisons with the Null model. The first model is the Null model, which conveys the probability that participants' reaction time does neither depend on *pass condition* nor on *instruction* (null hypothesis). The second model conveys the probability that participants reaction time depends on *pass condition* (main effect for pass condition). The third model conveys the probability that participants reaction time depends on instruction (main effect for instruction). The model for both main effects (fourth model) reveals the strongest support. Adding the interaction decreases the degree of this support by the factor $1.207 \times 1045 / 1.630 \times 1044 = 7.40$. This is the Bayes factor BF_{10} in favor of the two main effects model versus the model that also includes the interaction. A BF_{10} of > 3 indicates moderate support for the model with two main effects. The evidence for the interaction between pass condition and instruction on its own can also be calculated. That is, the BF_{10} of the model with the interaction has to be compared against the BF_{10} of the model with only the two main effects, which is $1.630 \times 10^{44} / 1.207 \times 10^{45} = 0.135$. Following the classification scheme for the interpretation of Bayes factors BF_{10} (Lee & Wagenmakers, 2014), this result indicates moderate evidence against the interaction model compared with the model for both main effects.

3.2. Movement times

Mean MTs are illustrated in Fig. 4. The within-subjects factor *pass condition* was significant, as participants moved faster to direct passes ($M = 328$ ms) than to head fakes ($M = 340$ ms) [$F(1, 78) = 51.08, p = .000; \eta_p^2 = 0.46$]. The between subjects-factor *instruction* and the two-way interaction between *pass condition* and *instruction* were not significant ($p = .959$).

4. Discussion

The present study investigated if the instruction to ignore the gaze direction or the instruction to ignore the head orientation increases the head-fake effect as compared with the instruction to only attend to the pass direction in basketball. Such a pattern of results would point out that ignore instructions ironically draw the attention of participants to the deceptive kinematic cues (i.e., gaze direction/head orientation), instead of the particular suppression of the deceptive cues, and thus, generates ironic processes of mental control (Wegner, 1994).

Replicating the general findings of previous studies on the head-fake effect in basketball (e.g., Alhaj Ahmad Alaboud et al., 2016; Gldenpenning, Alhaj Ahmad Alaboud et al., 2018; Gldenpenning, Schtz et al., 2018; Kunde et al., 2011), the present results revealed faster reaction times and movement times to direct passes than to head fakes. Most importantly, the size of the head-fake effect was not modulated by the instruction. Also the Bayesian ANOVA provides moderate support for the model of two main effects and moderate evidence against the interaction model. Thus, our study does not provide any evidence for any ironic effects of instruction on the processing of the head fake in basketball. This is surprising, given that ironic effects have been found in a large number of other sports- and movement-related studies (Bakker et al., 2006; Barlow et al., 2016; Binsch et al., 2009; Dugdale & Eklund, 2003; Oudejans, Binsch, & Bakker, 2013; Toner et al., 2013; Wegner et al., 1998).

How can the absence of any ironic effects in the present study be explained? The ironic instructions in previous studies were related to the own action outcome (e.g., movements on a balance device, hitting specific target areas). In our study, in contrast, ironic

instructions were related to a kinematic cue of another person's action (i.e., gaze direction, head orientation) whose visual processing had to be inhibited. Might it be possible that ironic processes only effect action generation, but not attentional aspects of action perception? This suggestion can be refuted from considering the literature on the 'attentional white-bear' phenomenon or 'ironic-capture' hypothesis (cf. Havlíček, Müller, & Wykowska, 2019). That is, studies investigating ironic processes in visual search tasks showed that foreknowledge about an upcoming distractor cue ironically increases the interfering impact of that distractor as participants shifted the attention to the location which they were intending to ignore (Huffman, Rajsic, & Pratt, 2017; Lahav, Makovski, & Tsai, 2012; Tsai & Makovski, 2006). Ironic processing, thus, can in principle also be found in reaction times for visual tasks and not only for high-level processes (i.e., thought, speech, and action). A way to study how instructions guide visual attention in our case might be the monitoring of eye movements. Interestingly, in a preliminary study on 18 participants (9 females, $M_{\text{age}} = 22.56$, $SD = 1.9$), we found that participants, who were instructed to react to the pass direction and to ignore the gaze direction, did neither shift their gaze into the pass direction, nor into the gaze direction. This observation suggests that eye movements are a too coarse measure of *overt* attention that do not tap into the processes of *covert* attention, which are more relevant here (Alaboud, Güldenpenning, Steggemann-Weinrich, Kunde, & Weigelt, 2017, November).

Further reasons for the absence of ironic effects need to be discussed. First, it might be possible that participants did not consider the specific instruction provided. This argument can be refuted by the observation of higher RTs with rather than without ignore instructions. Trying to ignore the task-irrelevant feature gaze direction/head orientation did produce some general processing costs in RTs but no ironic effects. Possibly, ignore instructions here, and in general, impose higher uncertainty about, or conflict between, relevant and irrelevant aspects of the task. This is an important aspect for practical implications and is further emphasized in the Section 5. Second, it might also be possible that the reaction time task (i.e., time pressure) was not demanding enough to challenge the operating system by the monitoring system, and thus, to produce ironic effects on mental processes. With little doubt, the time pressure in the present task put already considerable mental load on the participants, as indexed by the presence of the head-fake effect as such, which would probably not occur if participants could respond at leisure. However, the question whether additional mental load in terms of a secondary task increases the head-fake effect is certainly a question for future research. In fact, we already evaluated the head-fake effect under conditions with cognitive load (counting back from 1000 in steps of three, cf. Binsch et al., 2009) and without cognitive load in another study (Güldenpenning, Weigelt, & Kunde, submitted for publication). Important here is that the head-fake effect does not increase with cognitive load, and thus, does not provoke an ironic effect. The lack of ironic effects in our study thus seems not to be due to insufficient mental load. Third, we initially suggested that the monitoring process itself might surface and even overwhelm the intentional operating process when instructed to ignore the gaze direction/head orientation, which results in a larger head-fake effect. In contrast to our expectations, we did not find a larger head-fake effect with the ignore instructions. Presumably, the processing of the gaze direction/head orientation could not be controlled with any amount of mental capacity (even not with the non-ironic instruction), because the feature gaze direction/head orientation was *per se* hyper-accessible or over-salient (e.g., Friesen, Ristic, & Kingstone, 2004; Langton & Bruce, 1999). Instructing to ignore the gaze direction/head orientation did not additionally strengthen the impact of the gaze/head (ceiling effect).

5. Conclusion

The study strengthens the present literature on the general effectiveness of fake actions in sports (e.g., Bishop, Wright, Jackson, & Abernethy, 2013; Mori & Shimada, 2013; Rowe, Horswill, Kronvall-Parkinson, Poulter, & McKenna, 2009). Specifically, the present study is reassuring in that it rules out that previous demonstrations of the head-fake effect were just an artifact of the specific instruction (Alhaj Ahmad Alaboud et al., 2016; Alhaj Ahmad Alaboud et al., 2012; Güldenpenning, Alhaj Ahmad Alaboud et al., 2018; Güldenpenning, Schütz et al., 2018; Weigelt et al., 2017). With regard to practical implications, it could be assumed that the lack of ironic effects implies that coaches cannot do much wrong when they instruct their athletes to ignore a particular deceptive cue. However, this is not the case, as both ignore instructions produced general processing costs (i.e., slower reactions). Coaches thus should solely instruct athletes' to focus attention on the processing of the pass direction. It might be worthwhile for future studies to investigate if the head-fake effect can be reduced with other methods, for example with an extensive visual training and acquired perceptual strategies ('sports vision training' (SVT); cf. Appelbaum & Erickson, 2018).

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Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.humov.2019.102499>.

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