Is monitoring one's actions causally relevant to choking under pressure?

DRAFT

Forthcoming in Phenomenology and Cognitive Sciences

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I have a painfully vivid memory of performing the Venezuelan choreographer Vincente Nebrada's ballet *Pentimento.*[1] I was a new member of North Carolina Dance Theatre, and although I had already performed the piece on a number of occasions, this was the first time the director was watching from the audience rather than the wings. In the middle of a *pas de deux*, I choked big time and blanked out on the choreography; try as I may, I could not remember a single step. My partner, who had been with the company for years, knew what was going on and manipulated my limbs until (after what seemed like eons) something clicked and I was able to find the choreography again. After the performance, the director was so appalled that all he could comment on was my makeup: "You need more rouge." I was no doubt pale due to the horror of the experience.

Various factors likely precipitated this mishap: my relative inexperience probably had something to do with it, and the choreography was such that it was not always closely related to the music, making musical cues few and far between. (The music was Bach's *Four Suites for Orchestra*, and the dancers had developed what to any musician would certainly be considered an insane method of counting it; for example, I remember that I had one entrance right after a phrase that ended on "fifteen.") However, it also seems likely that my heightened state of anxiety over being observed for the first time by the company's director played a role. But how does anxiety cause a choke? How did anxiety cause me to perform far, far worse than I have ever done before?[2]

No one fully knows what role anxiety plays in choking under pressure. However, according to one widely held theory, what is sometimes called the "explicit-monitoring theory," anxiety can cause one to explicitly attend to (that is, to monitor) or consciously control processes that would normally occur outside of consciousness, and it is the monitoring and conscious control that lead to disaster (Baumeister 1984, Masters 1992, Wulf & Prinz 2001, Beilock & Carr, 2001, 2005, 2007, Beilock & DeCaro, 2007, Ford *et al* 2005, Beilock 2011).

The central idea of explicit-monitoring theory is that at a high level of performance, many actions are proceduralized, that is, they run offline, without conscious control, and thus choking occurs when extreme nervousness causes one to try to run these actions online, with conscious control. Any conscious mental processes that are involved in guiding one's movement may be implicated, on this view, in choking. However, conscious monitoring and control are often singled out as the central culprits. These two processes are, of course, different, and although control might require monitoring, monitoring can occur during even entirely passive

[1] After graduating from high school at age fifteen and before entering college, I spent a number of years working as a professional ballet dancer with North Carolina Dance Theatre (now Charlotte Ballet), among other companies.

[2] A choke, as I understand it is performing not necessarily far, far worse than ever before (I'm a pushover for manipulated literary allusions, whether perfectly accurate or not) but far, far worse than would be expected. Now, do cases that we refer to as chokes actually require explanation or are they merely cases of poor performance that would be predicted statically? Psychologists who aim to explain choking in terms of increased attention to movement assume that it is a phenomenon that requires explanation; I shall do the same.

bodily movements. (For discussion, see Toner et al. in preparation *a*). However, proponents of explicit-monitoring theory typically see both causally relevant to choking. Furthermore, the type of monitoring that is induced by the experiments that we shall go on to examine (experiments that are seen as supporting explicit monitoring theory) is often thought to encourage control. I shall discuss both (and occasionally other related mental processes, such as focusing on your movements or thinking about your movements). On explicit-monitoring theory, what went wrong with my performance was that I tried to bring into working memory and thus consciously attend to choreography and consciously control movements that I typically perform automatically, choreography that was and should have remained as part of my so-called "muscle memory."

Bringing motor routines that normally occur automatically under conscious control, it is thought, may not only precipitate blanking out in high pressure situations but may also cause athletes, performing artists and others to perform the skills that they typically perform exceptionally well, dismally. Sian Beilock (2010) explains, "highly practiced skills become automatic, so performance may actually be damaged by introspection, which is characteristic of an earlier, consciously-mediated stage." Invoking what I elsewhere (Montero forthcoming) call the "principle of interference," which says that thinking about one's actions as one performs them—where "thinking" is broadly construed to include propositional thinking as well as monitoring and conscious control—is detrimental to occurrent expert performance, Beilock (2010) tells us that in high-pressure situations, sports skills "are hurt, not because of worrying, but because of the attention and control that worry produces" (p. 193).

Beilock's ideas and the direction of her research are in part inspired by the psychologist Roy Baumeister's (1984) views on expert action under pressure. In high-anxiety situations, according to Baumeister (1984), "consciousness attempts to ensure the correctness of… execution of skill by monitoring the process of performance (e.g., the coordination and precision of muscle movements); but consciousness does not contain the knowledge of these skills, so that[,] ironically[,] it reduces the reliability and success of the performance when it attempts to control it" (p. 610-11). Summing up what he sees as the conclusion of a number of studies on the relationship between pressure and poor performance, he says that "competition is arousing; arousal heightens self-consciousness [consciously monitoring and controlling one's movements]; and self-consciousness [consciously monitoring and controlling one's movements] disrupts performance of some tasks" (p. 610).

The psychologist Richard Masters' work on this topic also fuels the idea that choking occurs because the mind interferes with well-practiced routines, arguing that performance is likely to decline when experts consciously think about and try to control their well-practiced skills. To do so is to "reinvest," which he defines as "purposefully endeavoring to run a skill with explicitly available knowledge of it" (Masters et al. 1993, p. 655). Anxiety, on his view, leads to problems because anxiety causes reinvesting, and reinvesting, he thinks, degrades performance.

But are these views about the relationship between anxiety and skill correct? Does the experience of anxiety induce experts to monitor and consciously control or think about their movements? And is there a causal connection between such mental processes and poor performance at the expert level? Although the question of whether anxiety causes one to consciously monitor and control one's actions will loom in the background of my discussion, my primary focus is on the question of whether such mental processes interfere with performance at the expert level. And the view I shall argue for here is that there is not sufficient reason to think that they do: experts can and often do perform at their best while monitoring and consciously

controlling what they are doing. Of course, since proponents of the explicit-monitoring theory of choking typically accept that experts do sometimes monitor and consciously control some of their movements without detriment (for example, novel situations may call for explicit monitoring and conscious control), a more precise statement of the position I aim to argue for is that experts can and often do perform at their best while monitoring and consciously controlling movements that proponents of the explicit monitoring theory of choking often think of as strongly proceduralized.

The distinction between the weaker view that experts can and often do perform at their best while monitoring and consciously controlling what they are doing and the stronger view that experts can and often do perform at their best while monitoring and consciously controlling aspects of their movements that proponents of the explicit monitoring theory of choking often think of as strongly proceduralized is subtle, but relevant. If Masters,' Baumeister's and Beilock's position is simply that explicit monitoring and conscious control interferes with skills that are automatic, then there is no conflict between their view and the weaker position, for they generally accept that experts enter novel situations in which some type of thinking is appropriate or that experts may engage in higher level strategizing. (Indeed, the view that explicit monitoring and conscious control interferes with skills that are automatic is consistent with the untenable view that that such mental processes never hinder expert actions since no aspect of expert actions, however fine-grained, are ever automatic), however fine grained, is fully automatic.) However, I take it that Masters, Baumeister and Beilock are saying something more, namely that the motor-processes of highly skilled athletes performing in their domain of expertise, and certainly the "details" of such processes (such as what muscles ought to be employed), generally are automatized and, thus, attention to such processes generally tends to interfere with their execution. This something more is what I aim to question, as well as the recommendation, which often goes hand in hand with this view, that attention to such expert level skills interferes with their execution, or as Beilock (2010) puts it, that highly skilled athletes should not monitor what they are doing but should "just do it" (p. 185). I shall suggest, however, that the better advice might be to practice one's motor routines in such a way so that they do not become proceduralized to such a degree that attention and control interfere with their performance.

There are legions of studies that purport to provide evidence for the view that attention to, monitoring, conceptualization, and conscious control of movement degrades performance of highly skilled movements that are presumed to have become proceduralized, such as a golfer's swing. Some of these studies look at how performance is differentially affected when athletes utilize what is referred to as "internal focus," which involves focusing details of one's bodily movements, such as wrist-flexion during dart throwing as opposed to an "external focus," which involves focusing on something that the bodily movements are intended to affect, such as the target (see, for example, Freudenheim et al. 2010, Stoate and Wulf 2001, Wulf et al. 2001, Wulf et al. 2007). Other studies look at how performance is differentially affected when athletes monitor or think about some particular details of their movements in contrast to when they monitor something external to their movements and unrelated to their athletic skill, such as the sound of randomly generated tones (see, for example, Robert Gray 2004, Beilock *et al*. 2004, 2002, Ford, Hodges, and Williams 2005, and Leavitt 1979). I shall focus on the latter group of studies because I see then as somewhat more relevant to the explicit monitoring theory of choking. The reason for this is because explicit-monitoring theories see the move away from automaticity as being causally relevant to choking and while adopting an external-focus as opposed to an internal one may be conducive to performing the details of movements

automatically, external-focus is still a focus on what one is doing, more generally, and thus can constitute a move away from fully automated performance, where the mind is not engaged at all.

Within the latter group of studies, I concentrate on what I refer to as the "varied-focus experiments." Such studies are seen as substantiating the precept, as Beilock and Carr (2002) put it, that "skill-focused attention benefits less practiced and less proficient performances yet hinders performance at higher levels of skill execution," and are perhaps the most robust source of empirical evidence for the idea that, to put it loosely, thinking interferes with doing. (Note that as Beilock and Carr explain their position in this quote, the idea that "higher levels of skill execution" have been proceduralized is assumed.) After this, I look at some diary studies that support the view that monitoring ones actions, rather than causing choking, is actually a means to avoid it, say a few brief words about what might have prevented my *Pentimento* fiasco, and conclude with some comments on whether attenuated thought and attention might be a last resort strategy to cope with severe performance anxiety.

Varied-focus experiments

Paring away the details, here is a description of what I call the "varied-focus experiments." Participants, usually college students, are divided into two groups, the more highly skilled group and the novice group, where the division may be based on some type of team status, or number of years playing, or institutional rating. Both groups are then asked to perform a skill under various conditions: as they normally perform it (the single-task, or control condition), while directing their attention to a specific aspect of their own movement (the skill-related supplemental task condition), and while engaging in an extraneous task (the skill-unrelated supplemental task condition). And generally the results of such studies are that, relative to the control condition, the more highly skilled athletes perform significantly worse in the skill-related task condition yet only marginally (or negligibly) worse in the skill-unrelated task condition, whereas novices, relative to the control condition, perform significantly worse in the skill-unrelated task condition and, if anything, slightly better in the skill-related task condition. In other words, the more highly skilled individuals, when focusing on what they are doing, do worse in comparison to when they are focusing on an extraneous task. For the less skilled individuals, however, focusing on what they are doing does not seem to interfere with performance while focusing on an extraneous task does.

Those who accept the explicit-monitoring theory of choking think that 1) anxiety causes explicit monitoring and 2) such monitoring causes one to choke. The varied-focus experiments aim to support the latter link. Now, one question one might ask is whether the relatively small declines in performance that are usually illustrated by such studies are relevant to the drastic flubs one typically identifies as a choke. But that is not my concern here. Nor, as I said, is it the interesting question of whether anxiety increases one's tendency to monitor and control what one is doing. Rather, my concern is with the relation between monitoring and controlling one's movement on the one hand and performance on the other.

To clarify the nature of the varied-focus experiments, let me explain a study by Ford *et al.* (2005). Subjects were divided into two groups, the more highly skilled and the less highly skilled, and were asked to dribble a soccer ball through a slalom course. In the skill-related supplemental task condition, participants were instructed to perform the dribbling task while continuously monitoring their feet (not necessarily visually), in order to be able to identify, upon hearing a randomly generated tone, which side of the foot had just been in contact with the ball. In the skill-unrelated supplemental task condition, subjects were asked to perform the dribbling

task while continuously monitoring a range of single syllabus concrete nouns in order to identify the target word, "thorn." The results were in line with the general picture above: the more-highly skilled soccer players performed worse under the skill-related condition than under the skill-unrelated condition, and for the less-highly skilled players, the pattern was reversed: they played worse in the sill-unrelated condition than in the skill-related condition.

How do we account for these results? Wulf (2007) summarizes the research in this area by saying that the "findings clearly show that if experienced individuals direct their attention to the details of skill execution, the result is almost certainly a decrement in performance" (p. 23). Thus, focusing on what you are doing, such research seems to show, interferes with expert skill, or as Toner and Moran claim, "a practical implication…is that it would appear prudent for skilled performers to avoid consciously attending to their movement during competitive performance."[3]

However, before we ask athletes to avoid focusing on the details of their actions, let us take a closer look at this research, for I think that there are other reasonable interpretations of the data, which, when combined with results of diary studies, should lead us to reject Beilock and others' just-do-it conclusions.

Let me present three reasons to possibly question the just-do-it conclusion of these experiments.

Objection 1: The experiments are not ecologically valid

An ecologically valid experiment captures relevant real-life conditions so as to make it viable to generalize the conclusions of the experiment beyond the laboratory walls and to the relevant population, which, for my purposes, is the population of experts. Though it is difficult to say what exactly it is for an experiment to be ecologically valid, there are a number of features of the varied-focus experiments that—though I think do not tell the whole story—intimate trouble.

One arguably ecologically invalid feature of these experiments that might seem significant to their outcome is that what subjects are asked to perform in the skill-related supplemental task is not something they would normally do. John Sutton et al. (current issue) explains this with an analogy. Asking players to continually monitor their feet, he tells us, is like asking a driver to continually monitor the rearview mirror while driving. On his view, just like a driver would perform suboptiamally while doing this even if it is important to occasionally monitor the rear view mirror, a soccer player would perform suboptimally while continually monitoring their feet even if such monitoring is part of typical play.

This seems reasonable, however, it may be worthwhile to ask whether it is actually known that even continually monitoring one's feet while playing high level soccer would interfere with performance. I would like to see a study that looks into this, a study that simply asks players to continually monitor their feet, yet does not also ask them to report on what they have identified via such monitoring. Of course, in such a situation it would be more difficult to know whether subjects are complying with the request. But on the other hand, such a setup would seem to be more ecologically valid. Participants in Ford et al.'s study, however, are not merely asked to monitor various aspects of their skills; they are asked to monitor and report them, and sometimes to report on actions that have already gone by: individuals are instructed to attend to the side of the foot that *had just been* in contact with the ball. This does make it less like real-life conditions since even if expert soccer players were to consciously focus on their feet in real-life situations, it is highly likely that they do not reflect back on past foot action. Thus Sutton's analogy should be to a driver who is asked to continually monitor the rearview mirror

[3] However, see Toner, Moran and Montero (forthcoming).

and then when she hears a randomly generated tone, report what she has most recently noticed.[4] If continually monitoring the rearview mirror was already going to interfere with performance, this would make driving even harder.

Another way in which the experiments are not ecologically valid is that they fail to capture the high-stakes situations athletes find themselves in when they are playing a real game. Because of this, it is very likely that an athlete will find herself in at least slightly different psychological state during an experiment than during an actual game; in particular, the controlled environment might not elicit the type of intense focus that is characteristic of expert level performance in situations that matter.

Varied-focus experiments are often seen as supporting the view that, as Beilock et al. (2004) put it, expert skill is "governed by proceduralized knowledge that does not require explicit monitoring and control," and that an extraneous task (such as listening to a recording of words and aurally identifying a target word) "should not degrade performance in comparison with skill execution under single-task conditions, as attention should be available to allocate to secondary task demands if necessary without detracting from control of the primary skill." But even if attention to a secondary task does not degrade performance in an experimental setting, it might degrade performance in the wild. In a psychology experiment, subjects may be motivated, but it is unlikely that they are as highly motivated as there are in an actual game. Thus they might not engage their full conscious powers while performing the tasks. And because of that an extraneous task might not degrade their performance. However, in a high stakes situation, one's attitude, presumably, is different. Moreover, experts in a wide range of fields demand settings with as few distractions as possible: the home crowd stays entirely quiet for the home team at the free throw line and one can hear a pin drop during important chess tournaments. And one reasonable explanation for why this is so is that an extraneous focus does degrade performance. (It is also interesting to note that one reason athletes claim that they take the drug Adderall—a drug often given to those with ADD—is that it increases focus and eliminates distractions.)[5]

However, that the varied-focus experiments fail to capture real-life settings cannot be the entire explanation for why they appear to show that certain forms of expert action are harmed by monitoring since both the less and more experienced participants perform ecologically invalid tasks, yet ability is differentially affected. Why is this if not for the reason, as Beilock (2002) concludes, "well-learned performance may actually be compromised by attending to skill execution"?

Objection 2: The skill-related supplementary task may be more distracting for experts in particular.

The more experienced soccer players are faster at the dribbling task than the less experienced players and because they are faster at completing the slalom course, they have to look back further when the tone is sounded. This in part could account for why the more highly skilled participants do worse in the skill-related task than in the skill-unrelated task and why this is not the case with the less-skilled soccer players. However, although all of the varied focus experiments involve reporting on one's focus, not all involve reporting on what might be a past

[4] So as to guard against the possibility of seeing both a red and blue car, one can imagine this task being doing in low traffic situations, or—as are some of the experiments on expertise—done in a laboratory simulator that will ensure that there is never both a red and blue car visible.

[5] I would like to thank Lorenzo Ruffo, an undergraduate student at the College of Staten Island, for drawing my attention to this issue.

focus. For example, in one experiment, participants are requested to report at the sound of a tone when their bats are moving up and when they are moving down (in swinging at a virtual baseball.) But it still might be that the quicker you can perform such a task, the more distracting it is to report on your movement.

Furthermore, it could be that experts are simply better at focusing on their own movements; that is, it could be that because experts know how to direct their minds to their bodies while in action and can do it with a vengeance the request to focus on an aspect of their movement that would normally call for focus (or would not be the only thing that would normally call for focus) will be more distracting for experts than for novices. For example, if recalling which side of the foot was most recently in contact with the ball is not relevant to their skill, this focus may interfere with their performance more than with novices' performance, as novices are not able to monitor these details of their movements as well. And it could even be that since novices have not developed the ability to focus on their movements, even the skill-related supplementary task focus helps them to develop such focus, which thereby helps their performance.

Beyond this, if we assume both that some type of bodily-focus is beneficial at high-levels of performance and that distractions that are closer to or more similar to what you aim to focus on impede performance more than distractions that are dissimilar to your intended focus (like the how identifying numbers might interfere with computational tasks more than identifying letters) the skill-related supplementary task may have degraded the more skilled participants' performance more than the skill-unrelated supplementary task since the skill-related task induces a type of focus that may be close to, but not the same as the type of focus that more highly-skilled players have found beneficial. That is, it could be that because the skill-related supplementary task brings about a type of focus that is close to but not exactly the type of focus that is most beneficial (which, we're assuming is another type of skill-focus), it distracts experts more than the skill-unrelated task. Again, for novices, who may not have developed this important aspect of skill, there is nothing to be distracted from, and any improvements (some studies document slight improvements) could be explained in terms of the request to monitor their feet: for example, simply helping them to develop this important type of focus.

Objection 3: The "experts" are not experts.

In discussing whether the experiments are ecologically valid, I suggested that in a controlled experiment, experts might not be motivated to perform in the highly focused way they would perform in situations where it really matters, and it might be because of this less intense focus, skill-unrelated distractions are not detrimental to their actions. And in discussing the idea that the skill-related supplementary task may be more distracting for experts than less skilled subjects, I suggested that experts might be more distracted during the skill-related task than the less skilled participants since they have something to be distracted from (the correct focus) and they are better able at complying with the request. But the fact of the matter is that controlled experiments rarely use experts as subjects.

Or rather, whether they do, depends on how one understands "experts." What is an expert? This is a complicated and much debated issue in the psychology of expertise, which I discuss in detail elsewhere (Montero forthcoming). However, the group of individuals for which I would like to suggest can beneficially monitor and control sometimes even quite low level aspects of their actions are those who have practiced their skill in a thoughtful, critical manner on

a near daily basis for at least around ten years and are still practicing their sills in such a way. This group of people roughly lines up with those who we think of as professionals, and controlled experiments, such as those conducted by Beilock, rarely have such individuals as research subjects. For example, Beilock et al.'s (2002) investigates rather "high-level skill" by performing experiments on "Michigan State University students with 2 or more years of high school varsity golf experience or a Professional Golfers' Association (PGA) handicap less than 8," and undergraduate students at McMaster University with 8 or more years of competitive soccer experience. This is good, but it doesn't
make them experts in the above sense. How does this relate to the outcome of the varied-focus experiments? In brief, although the professional level soccer player, for example, may be used to training with deliberate focus and conscious control, the amateur mid-level soccer player (who fall into the more skilled group in the varied-focus experiments) might not be; because of this, the performance of the more skilled participants might be hampered by conscious control and explicit monitoring (as they are not used to practicing with such a focus) while the performance of the group of individuals who I count as experts might not be hampered in this way.

Let me take that a bit more slowly. Researchers such Dreyfus and Dreyfus (1986) and Fitts and Posner (Fitts 1964; Fitts & Posner 1967) see the progression from novice to expert as leading to greater and still greater automaticity. However, on Anders Ericsson's theory of skill acquisition, falling into automaticity results in a plateau of skill, or what Ericsson refers to as "arrested development." On his view, once one achieves automaticity, merely repeating an action over and over again does little to improve it, and thus, as Ericsson (2008) sees it, "the key challenge for aspiring expert performers," Ericsson tells us, "is to avoid the arrested development associated with automaticity." (Think about tying your shoes and how little you have improved over the past couple of years; however, if you were to work in a focused manner on increasing your speed, or the strength of the knot or the aesthetic qualities of the bow, such as its symmetry, you might improve.) Those who move beyond automaticity by engaging their conscious minds during analytical, thoughtful and effortful practice—the group I'm referring to as "experts"—might not, for all the varied-focus experiments show, be derailed by focusing on and reporting on skill-related tasks. (Similarly, those of us who don't work on improving our shoelace tying might be derailed by thinking about it while those who are working on improving are not.) In contrast, it may be that the subjects who participate in these studies are at a level of skill that is both more proceduralized than a beginner's and less conceptualized than an expert's. If so, it would not be surprising that for such individuals, skill-related supplementary tasks interfere with performance more than skill-unrelated tasks and, moreover, for the novices that this pattern would be reversed or at least not present. (Some studies, such as Beilock and Carr 2002, show very little difference in performance for novices under the two conditions. This, of course, is what one would predict since with little skill to begin with there is little room for deterioration.)

In sum, there are a number of interpretations of the varied-focus experiments that do not support just-do-it. I have not shown that any of them are correct, but the mere existence of these alternate interpretations means that even if high anxiety can cause athletes and others to focus on their skills, such experiments leave room to doubt whether high anxiety interferes with performance because it induces athletes to consciously attend to what they are doing.

Distraction theory and qualitative studies of choking under pressure

Although the idea that pressure induces choking because it provokes experts to focus on or think about what they are doing is a widely accepted theory about the relationship between performance anxiety and choking, there is a competing theory, which, far from supporting the idea that high level performs proceeds best with it runs offline, runs counter to it. This is the view, sometimes referred to as "distraction theory," that high pressure draws attention away from the task at hand and to irrelevant aspects of performance, such as worries over how performance will be judged and the possibility of failure (Wine 1971). Distraction theory is supported by the idea that anxiety is thought to impair working memory and executive control (e.g., Ashcraft & Kirk, 2001; Darke, 1988; Derakshan & Eysenck, 1998; Eysenck et al., 2005; Hayes et al., 2008; MacLeod & Donnelan, 1993), both of which are important components of, among other things, planning and strategizing, or, as I like to put it fast and loose, thinking while doing.[6]

Researchers who explain choking under pressure in terms of "thinking too much" accept that anxiety can have distracting and negative cognitive effects as well, but as they see sports skills as not highly dependent on cognition (since they understand such skills as automatic) they feel the need to unearth another account. But if one holds, that thought (broadly construed to include monitoring and conscious control) is an important component of expert action, there is no need explain choking under pressure as occurring because anxiety provokes thinking. Anxiety might, among other things, lead one to focus more on what one is doing, or monitor ones actions, but, from what we have seen, there is room to doubt that such focus interferes with performance. And, in fact, there is some evidence that expert athletes, rather than suffering because of the type of thought anxiety provokes, use increased focus and effort as a tool to cope with anxiety.

That experts increase their focus on the task at hand in order to cope with pressure is suggested by studies carried out by the sport and exercise psychologist Adam Nicholls (2006) and colleagues that asked elite athletes to keep a diary of stressors that occurred and coping strategies that they employed during games, as well as to rate, on a scale of 1 to 5, how effective these coping strategies were. Though small-scale, the study indicates that a common method of dealing with stress involves redoubling both effort and attention and that such methods are perceived as more effective than other methods. For example, in a study of eight first-class professional rugby union players over a one-month period during which they played four tournament games, Nicholls et. al (2006) found that, although the players dealt with the pressure in a variety of ways, "the most effective coping strategies that were used on a frequent basis were increasing concentration on task and increasing effort."

Of course, it is not clear that "increasing concentration on task and increasing effort" involves monitoring and conscious control of one's actions. But they are in tension with performing automatically. Moreover, Nicholls' research is in tension with the idea that at high levels of performance, nonskill related distractions do not interfere with skills (an idea that researchers who perform the varied-focus experiments sometimes claim is supported by such experiments). To be sure, there are limitations to diary studies, as Nicholls point out. For example, as is common of longitudinal studies, diary studies typically have a high dropout rate. Beyond this, some research suggests that diary methods inspire subjects to report only concrete and discrete events and ignore more complex problems (Folkman & Moskowitz, 2004).

[6] Also, high anxiety induces various physiological changes that appear to hinder performance. The fight-or-flight response which anxiety produces shunts blood flow to the larger muscles, leaving cold feet and hands, and thus motor skills relying on the hands or feet may be harmed. It can cause loss of peripheral vision, increased perspiration, and tremors. These points may be obvious, but they are often not mentioned in the literature on choking. The choke is thought to be something different in kind. But is it?

Nonetheless, such studies fail to suggest that reducing monitoring and conscious control of one's actions is an effective strategy for an expert to deal with stress.

Nicholls' results are consistent with the findings of another sports psychologist Dave Collins, who, along with colleagues (Collins, Jones, Fairweather, Doolan, & Priestly, 2001), measured kinematic aspects of elite weightlifters' performance during training and competition and questioned these athletes about their conscious use of any movement-change strategy in response to competitive pressure. Collins et al. (2001) examined movement variability in seven elite male athletes from the British Olympic weightlifting under both low pressure situations (practice) and high pressure ones (competition) and found that although the participants modified their movements as a result of competitive pressure, and claimed to consciously do so, such modifications did not diminish their overall performance.[7] Since consciously modifying one's movements involves conscious control, this too puts pressure on the explicit-monitoring theory of choking.

Of course, one may wonder whether athletes, or anyone for that matter, have accurate insight into what goes on in their minds. Even in the varied-focus experiments, it is difficult to know whether the participants are actually focusing on what they were supposed to be focusing on. Presumably, to be able to accurately report which side of the foot had just been in contact with the ball, subjects need some conscious awareness their feet, however, we are not told how accurate soccer players were at making such identifications. Nevertheless, perhaps merely making the attempt to report this indicates that they were focusing on their feet. Nicholls' and Collins' work, in contrast, depends on what seem to be less reliable post-performance reports. How can we tell that the rugby players or weightlifters actually were thinking about what they claim to have been thinking about? It seems that we can be less certain of this than of the occurrence of the relevant mental processes in experiments such as Beilock's. Yet there is a tradeoff between reliability and ecological validity, and Nicholls'and Collin's work, while perhaps dependant on less reliable indicators of conscious thought in their participants, is more ecologically valid because it looks at experts in real-life settings, asking them, while playing, to do nothing other than what they would normally do.[8] In contrast, an experiment which asks subjects to say "stop" at the exact moment one finishes the follow-through of one's golf swing (Beilock p. 10) is not something that expert golfers do in tournaments.

What would seem to be correct is that although some thoughts could hinder performance, the expert engages in thoughts that help. This is precisely the conclusion of a study performed by Toner and Moran (2011). In this study, expert golfers were instructed to monitor their clubhead and report after each putt exactly where on the putter face they thought they had struck the putt (and after every fifth putt they were reminded to maintain this focus). This interfered with performance. However, Toner and Moran (2011) also found that when holing balls while engaging in a think-out-loud protocol (which indicated that players engaged in numerous skill-focused thoughts), the golfers' performance was just as good as when they were asked to simply hole balls. The researchers conclude, not that experts should putt without thought, but "that golfers may need to choose their swing thoughts very carefully because focusing on certain elements of movement, such as the impact spot, could lead to an impairment in performance

[7] See also Ravn, S., & Christensen, M. K. (2013).

[8] Might their performance be affected by the fact that they knew that after playing, they would need to record what was going on in their minds? It certainly might, however, although this might be relevant to the question of how much athletes think during games which they are not asked to do this, I don't think it is relevant to the question of whether thinking interferes with performing. Even if the athletes end up thinking more than they normally would, it would seem that their reports of the effectiveness of their thoughts would not be significantly affected.

proficiency" (680). This sounds quite reasonable, however, I wonder if experts need to be careful about this. It might be, as the think-out-loud protocol analysis indicates, that the thoughts they have in the normal course of play do not interfere with performance. And it might even be that if thoughts about impact spot are part of a golfer's normal routine, even these would not interfere with performance.

Do similar considerations apply to "blanking out"?

Flubbing a golf shot that one could normally perform well is a different kind of mistake from blanking out, or not remembering something one would normally know well. And one might wonder whether, even if conscious self-monitoring isn't implicated in the former, the phenomenon of consciously trying to remember what to say is implicated in the latter.

According to Dreyfus (2013), "in total absorption, sometimes called flow, one is so fully absorbed in one's activity that one is not even marginally thinking about what one is doing." He cites Merleau-Ponty in support:

> The orator does not think before speaking, nor even while speaking; his speech is his thought. The end of the speech or text will be the lifting of a spell. It is at this stage that thoughts on the speech or text will be able to arise.

This might seem to apply to dancing as well: it might seem that during a performance a dancer must remain under the spell of what her body has learned so well that the choreography is no longer in her mind but, rather, her movements are her thoughts. Is this the right picture?

I would like to suggest that it is not. There may be exceptions—perhaps Merleau-Ponty was one—however, many excellent orators consciously review their talks beforehand and at least claim to productively think while speaking (or at least this is what my informal surveys indicate). The thinking, of course, could take many different forms depending on the task at hand: if presenting a work in progress, one might actually be trying to figure out ideas as one is speaking; if presenting a well-rehearsed speech or fully worked out ideas, the thinking may be focused more on delivery and the audience's reactions. But even in this latter case, it seems useful to keep the content present in the conscious mind, and consciously reviewing the speech ahead of time facilitates this. A similar effect is found in dance: dancers often review choreography beforehand—no matter how well they know it—which helps them to keep it present to their minds as they dance, which, arguably, guards against blanking out. Correlatively, it would seem that to be under a spell is dangerous precisely because it leaves oneself open to blanking out. If one is not even marginally thinking about what one is saying, then if one all of a sudden switched to consciously guiding one's words, the words may not be there to find. Similarly, after my embarrassing performance, the advice I was given from other dancers was to review all the choreography, no matter how well you know it, before each performance. This would bring the choreography into the conscious mind, and once there, thinking about it would not lead to blanking out. Heidegger tells us that when a lecturer enters a familiar classroom, the lecturer experiences neither the doorknob nor the seats and that such features of the room for the lecturer are "completely unobtrusive and unthought." All of such things would indeed seem to be beneficially unthought so as to leave plenty of mental space to think about the lecture.

Heidegger, Merleau-Ponty, Dreyfus and indeed most researchers in sports psychology all agree that thinking occurs when there are difficulties that need to be addressed. John Dewy puts it like this: "Thinking begins in what may fairly enough be called a forked-road situation, a situation which is ambiguous, which presents a dilemma, which proposes alternatives [yet]…as long as our activity glides smoothly along from one thing to another, or as long as we permit our imagination to entertain fancies at pleasure, there is no call for reflection" (Dewey, 1910/1997, p. 11). However, experts are continually in forked-road situations: their activities glide smoothly from the observer's perspective, however, from the point of view of the expert herself, there is always room for improvement and thus experts are always considering, trying, and reflecting on how to surpass what they have done in the past. Heidegger says that "in our natural comportment towards things we never think a single thing, and whenever we seize upon it expressly for itself we are taking it out of a contexture to which it belongs in its real content" (Heidegger, 1975/1982, p. 162). This may be generally true, but expertise is not natural; it involves pushing beyond what is natural.

(Again, though different from expert-level motor-skills like those of a golfer, it seems that there are many cases in ordinary discourse that thinking rather than just doing is beneficial as well. Merleau-Ponty emphasizes that in our everyday conversations we proceed unreflectively and that "the conventions of our milieu…immediately elicit from us the words, the attitudes, the tone suited to them" (p. 126). Unfortunately, however, what are elicited unreflectively are sometimes stereotypical reactions (for example, complementing a girl's looks and a boy's brains) built upon implicit biases that perhaps can, at times, be avoided only by explicitly thinking about what you are doing or saying.[9])

"Don't think" as a last resort?

The conclusion I think we should draw from the considerations I have canvassed is that even given the admittedly suggestive varied-thought experiments, the idea that, as Beilock put it, "skill-focused attention…hinders performance at higher levels of skill," lacks the type of support that would make it reasonable to accept what some see as its corollary: that experts generally ought not to engage in skill-focused attention during skill execution. What this means for the explicit-monitoring theory is that regardless of whether anxiety causes increased focus on,

[9] This is not to say that simply thinking about stereotypes helps avoid the detrimental effects of stereotyped discourse, for as research by Beilock has indicated, merely mentioning a stereotype such as, "girls perform worse on standardized tests," hinders girls' performance on standardized tests. However, I take it that the situation I am describing is relevantly different primarily because the person who might make stereotypical remarks about girls and boys is not the one who is overtly negatively affected by the remarks; rather, it is the little girls who are always complimented on their looks are (or at least is seems reasonable to think that at least in our culture this could have a negative effect.) Another difference is that what I think is useful to keep in mind is not just the stereotype, or not even just the idea that there such a view is mistaken, but the idea that making remarks in accord with the stereotype should be avoided, the idea that you should not complement a girl's looks. (It might be interesting to test how girl's performance on standardized tests is affected by priming the idea that although there is a stereotype that they do worse than boy's, there is no truth to it and that in taking the test they should overcome this and prove that they are just as (if not more) capable than boys.) Still another differences is that presumably making a casual remark to a girl takes far fewer cognitive resources than taking a standardized test and so diverting cognitive resources to the thought that one needs to say *this* rather than *that* would presumably not have a negative effect on one's ability to make such claims whereas diverting cognitive resources even to thoughts about avoiding stereotypes might have a detrimental affect on the highly demanding task of taking a test. For other ways in which focusing more and thinking about one's ordinary actions as one is performing them can improve those actions, see Shusterman (2008, 2012).

monitoring of and conscious control of one's movements, there is room to question whether such mental processes are causally relevant to coking. Thus, we should rethink the view that preventing experts from engaging in such mental processes can prevent a choke.

Could it be, however, that for those with overwhelming performance anxiety, the only way to cope is to revert to an automatic mode of performing? I cannot answer this question, however, I think that there are various reasons for why, unless all else fails, one should not attempt to perform automatically. One, quite simply, is that if thought is important at a high level of performance, then an entirely automatic performance is one in which the performer is not thinking about what need be thought about and thus an even better performance might result from a more thoughtful approach. Moreover, as we saw, Nicholls' (2006) qualitative research suggests that one way to mitigate anxiety is not to act automatically, but, actually, to redouble focus and attention.

Another problem is that it is at least not clear that one can deliberately achieve a state of not thinking, and thus, eliciting automaticity is not as controllable as eliciting thoughtful, deliberate actions, as the paradoxical command "be spontaneous" illustrates. I can deliberately focus my mind on various aspects of my performance, but it seems that achieving the state of letting things just happen, of acting automatically, is something one can no more do than making oneself fall asleep. Indeed, Dreyfus and Kelly (2011), who argue that the type of relation the expert has to her actions is analogous to how we stand in relation to the process of falling asleep—it is more like something that happens to us rather than something we do—point out as much. So even if playing automatically is one way to avoid choking, if playing with increased attention and effort is another equally effective means, it might be better to go with what one can control.

Finally, when acting automatically, at any moment, it seems, the mind might jump back into the picture and thus, as my performance in *Pentimento* indicates, it may be best to have the mind present all along. The high diver standing motionless on the board for a moment before she jumps goes over the dive in her mind and thus is painting her body with thought so that the conscious mind will be present in the dive as well.

Of course, it might be that when things do start to go wrong, extra attention is called forth. As such, poor performance might be associated with explicit monitoring and conscious control. This might lead one to think of such attention as causally detrimental, yet it may be that the choke causes the heightened attention rather than such attention causes the choke. Again, one cannot attend to every detail and thus some aspect of the performance will need to be automatic. But my contention—a contention which I argue for in depth in [omitted for the purpose of blind refereeing]—is that the level of focus is at times much more fine grained than proponents of the explicit-monitoring theory of choking believe. In an interview, Paul Zollo's asked the musician Paul Simon whether it is possible that knowledge can impede spontaneity. Simon's response: "in popular music and rock and roll…the problem is that people don't know enough." Something like this might be true of sports as well: it's not that athletes are choking because they try to apply declarative knowledge to actions which ought to proceed spontaneously. Rather, when things go wrong, the problem is that they are not applying their knowledge at all.

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