A Qualitative Analysis of Catastrophic Performances and the Associated Thoughts, Feelings, and Emotions

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Structured in-depth interviews explored the catastrophic experiences of eight elite performers. Participants responded to questions concerning an event in which they felt they had experienced an uncharacteristic but very noticeable drop in their performance, a "performance catastrophe." Inductive and deductive analyses were employed to provide a clear representation of the data. This paper reports on how the dimensions emerging from the hierarchical content analysis changed from prior to the catastrophic drop in performance, during the drop, and after the drop (in terms of any recovery). Two emerging higher order dimensions, "sudden, substantial drop in performance" and "performance continued to deteriorate" provide support for one of the fundamental underpinnings of the catastrophe model (Hardy, 1990, 1996a, 1996b); that is, performance decrements do not follow a smooth and continuous path. The paper examines the implications of the findings with respect to applied practice and future research.

Researchers have recently searched for alternative descriptions and explanations for the anxiety-performance relationship, due to both the lack of predictive power of multidimensional anxiety theory and the flaws that have been identified within it (see Fazey & Hardy, 1988; Gould & Krane, 1992; Hardy, 1996a, 1996b).

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The flaws highlighted include (a) the prediction that cognitive anxiety always has a negative linear relationship with performance and (b) the fact that the theory is used to explain a four-dimensional relationship in a series of two-dimensional relationships. To further investigate these relationships, Gould and Krane (1992) called for qualitative research as well as further quantitative research to be conducted. The advantages of qualitative research are that it can provide a clearer and more detailed perspective of the performer’s emotions and cognitions, particularly within the stress and performance domain.

Despite findings in test anxiety research (Alpert & Haber, 1960), competitive state anxiety research in sport has fairly consistently maintained that cognitive anxiety can only have a negative effect on performance (e.g., Martens, Vealey, & Burton, 1990), and it is only in the last decade that some researchers have begun to examine the potentially facilitative influence that anxiety could have on performance through two closely linked lines of research: Hardy’s (1990) research on the application of the catastrophe models to sport and Jones and Swain’s (1992) facilitative and debilitating effects of anxiety.

The cusp catastrophe model makes several predictions, specifically in relation to the interactive effects within the anxiety-performance relationship, the facilitative effects of cognitive anxiety and hysteresis. The form interactive effects take is that high levels of cognitive anxiety will lead to enhanced performance when physiological arousal is low but to impaired performance when physiological arousal is high. Some support for this hypothesis has been provided (Edwards & Hardy, 1996; Woodman, Albinson, & Hardy, 1997), revealing that the combination of low physiological arousal and high cognitive anxiety led to significantly better performance than the combination of high physiological arousal with low cognitive anxiety.

Related to the previous prediction is that of facilitative and debilitating cognitive anxiety effects on performance. A series of studies by Jones and Swain (Jones, Hanton, & Swain, 1994; Jones, Hardy, & Swain, 1994; Jones & Swain, 1992) confirm that anxiety can have either facilitative or debilitating effects on performance. The important factor is the performers’ interpretations of their anxiety symptoms; if performers perceive their anxiety to be positive, then it is likely to have a facilitative effect on their performance. Consistent with this, the cusp catastrophe model predicts that performers’ best performances should be significantly better and their worst performances significantly worse, when they perform under conditions of high cognitive anxiety than when they perform under low cognitive anxiety (Hardy & Parfitt, 1991; Hardy, Parfitt, & Pates, 1994).

The third prediction of the cusp catastrophe model is that hysteresis will occur under high conditions of cognitive anxiety, but not under low cognitive anxiety. Essentially, this means that under high levels of cognitive anxiety, the path performance takes when physiological arousal is increasing is different (catastrophic) than that which it follows when physiological arousal is decreasing. This has been directly tested in two investigations involving basketball players and crown green bowlers (Hardy & Parfitt, 1991; Hardy, et al., 1994).

An important addition to the basic cusp catastrophe, the butterfly catastrophe model, was the introduction of higher order factors hypothesized to moderate the effects of cognitive anxiety and physiological arousal on performance (Hardy, 1990).

More specifically, this model hypothesizes that if confident, cognitively anxious performers may tolerate higher levels of physiological arousal before experiencing a decrement in performance (Hardy, 1996a, 1996b). Several
explanations have been identified which may help to explain catastrophic drops in performance: Eysenck’s (1979, 1982) processing efficiency theory; Master’s (1992) conscious processing hypothesis, which is closely related to the “trying too hard” concept proposed by Naatenen (1973); and Carver and Scheier’s (1986) control-process model. The selection of these models and theories was based upon the existing literature.

Processing efficiency theory draws upon both motivation and purely cognitive variables to explain anxiety effects upon performance. Specifically, the theory proposes that if cognitively anxious performers believe that the subjective probability of success is at least moderate, they will invest additional effort on the task. This additional effort acts as a compensatory mechanism, enabling performance to be maintained or even enhanced, despite the reduction in cognitive resources that is caused by task-irrelevant worry. The increased cost of additional effort may be reflected in increased physiological arousal (Frankenhauser & Johansson, 1976), but at some point, this cost outweighs the available resources, the probability of success decreases, and the performer withdraws effort. The withdrawal of effort may result in a (sudden) decrement in performance.

The key components of Carver and Scheier’s (1986) control-process model are anxiety, effort, and the perception of control. According to Carver and Scheier’s (1986, 1988) model, the factor determining whether the anxiety has a facilitating or debilitating effect is perception of control. If individuals feel in control, they will have positive expectancies of being able to cope and of goal attainment and will therefore respond with increased focus on the task (e.g., increased effort, enhanced persistence, and higher levels of performance). Conversely, if individuals perceive an inability to control themselves or their environment, they will doubt their ability to cope, and will consequently experience debilitating anxiety and withdraw effort from the task.

Masters’ (1992) conscious processing hypothesis proposes that performance decrements occur because cognitively anxious performers will regress to higher level cognitive mechanisms in an attempt to consciously control their movements. In essence, anxious performers begin to focus on higher level explicit rules to perform normally automatically produced skills, causing a breakdown in performance, telling themselves what to do, rather than just letting it happen (e.g., Galloway, 1974). Galloway’s inner game method of coaching emphasizes the importance of “relaxed, effortless concentration,” which he suggested helps the performer deal with the stress of competing.

Very little research has attempted to directly link any of these theories to catastrophes in competitive sport performances, and therefore a primary purpose of the present qualitative investigation was to explore such potential explanations of catastrophic performances, both inductively via hierarchical content analysis and deductively via theory fitting analysis. A second purpose was to examine the precise nature of performance catastrophes and perhaps reveal the influence of other variables which have not have been previously identified.

Method

Participants

The sample consisted of eight elite male athletes from a variety of sports: basketball, canoe slalom, gymnastics, power lifting, sailing, and swimming. Each athlete had experienced a catastrophic performance while competing. The athletes were
aged between 19 and 28 (\(M = 24.63; SD = 2.92\)). At the time of their catastrophic performance, the competitive experience of the athletes ranged from 7.5 to 21 years (\(M = 14.06; SD = 5.57\)). The participants' performance levels ranged from a world ranked number one to a top U.S. collegiate athlete. Based on gender difference findings within the anxiety-performance literature (e.g., Jones, Swain, & Cale, 1991) a single-sex design was utilized. At the time of the interviews, five of the athletes were still competing in their respective sports, while three had recently retired.

**Design**

A qualitative methodology was selected for this investigation in order to unearth some of the unique information that elite performers may possess concerning performance. The qualitative process identifies that "The challenge is to make sense of massive amounts of data, reduce the volume of information, identify significant patterns and construct a framework for communicating the essence of what the data reveal" (Patton, 1990, p. 372).

An interview guide was constructed comprising eight sections. The first three sections were conducted during interview one, while the remainder, that is the more specific structured questions, were conducted during interview two.

1. Demographic information;
2. Open-ended familiarization questions on the performance drop, which facilitated the more specific recollection of the experience in 4-6 (i.e., how, when, and where it occurred; cf. Backstrom & Hursh-Ceasar, 1981);
3. Summary from interview one, followed by a member check to confirm the information;
4. Semi-structured questions were then asked regarding performers' experiences prior to the performance drop (thoughts, feelings, emotions etc.);
5. Semi-structured questions regarding athletes' experiences from the actual drop in performance;
6. Semi-structured questions regarding athletes' experiences after the performance drop began, including coping attempts and recovery;
7. Semi-structured questions regarding other similar performance decrements that the athletes may have experienced.

Pilot interviews were conducted to ensure the interviewer was consistent in sequencing and phrasing the questions and achieved the aim of enhancing rapport, comfort, and recall, as well as eliciting truly open-ended responses (Patton, 1990). The pilot interviews were video taped (with the participants verbal consent) and feedback provided by two experts in qualitative research. In addition, the pilot interviews formed part of the training for the interviewer. Consistent with the recommendations of Backstrom and Hursch-Ceasar (1981), the interviewer strove to adopt a neutral, impartial stance to avoid biasing responses and encourage participants to be honest and open with their responses.

**Procedure**

All athletes were initially contacted by phone or in person. They were informed of the nature of the investigation and asked if they felt they had experienced a catastrophic performance drop within the past year. A catastrophic performance was defined as a performance that had begun in a normal fashion but had dropped
significantly. Those performers who had experienced a catastrophic drop in their performance confirmed that this was an infrequent occurrence, to ensure that they were not regular "chokers" (as this was not the focus of the investigation). The time frame of within a year was selected in order that the participants could accurately recall their thoughts, feelings, and emotions. Additionally, the interviewer ensured that the performers were comfortable talking about their catastrophic performance. It was stressed that participation was voluntary and that all data would be strictly confidential. Times were scheduled for the two interviews, and participants were either given or mailed a sheet outlining what they would be asked to recall in order to familiarize them with the content of the interviews.

Interviews occurred at a place convenient to the athlete, either at their training venue or their homes, to ensure a familiar environment. Each athlete was asked an identical sequence of questions that appeared in the interview guide (as outlined above). Specific clarification and elaboration probes enabled the athletes to expand on their response (Patton, 1990) in order to provide the interviewer with complete in-depth understanding of the meaning of all their responses. Follow-up additional probes differed slightly among the athletes, depending upon the athletes' responses. When the interviewer was unclear about a comment, clarification probes were utilized that asked participants to repeat or clarify their comment. All contact with the athletes was by the first author.

Following the interviews, athletes were thanked for sharing what in most cases was a distressing experience. All athletes felt they had benefited or gained something from the interviews. They indicated that it had heightened their awareness of the important factors that they felt were contributors to their catastrophic performance. They also felt it had helped them to highlight potential strategies that they could learn in order to cope with such a performance drop should one happen in the future or, better still, learn skills which could prevent such a drop occurring. Indeed, two of the athletes are currently working on such strategies with their respective sport psychology consultants.

The interview process was successful in eliciting detailed and rich responses, and as Scanlan, Ravizza, and Stein (1989) succinctly phrased it, "We do not feel that we 'tested' these individuals or that they were 'subjects' in our study. Rather, we collaborated with them to better understand issues that were important to us. They provided the in-depth, rich information, we listened" (p. 63).

Data Preparation and Analysis

Both inductive and deductive approaches were employed in the development of the interview guide and the data analysis. The inductive approach allows themes and categories to emerge from the data, while the deductive approach uses a predetermined set of themes and categories to organize the data (Patton, 1980). The interview guide was developed from a theoretical framework, as described earlier, and thus represented a deductive approach.

The investigators imposed deductive reasoning on the data by separating the interview into sections: pre-catastrophe experiences, during catastrophe experiences, post-catastrophe experiences, and coping strategies. These sections were structured because the associated cognitive and physiological/somatic responses of the catastrophe experience were thought to vary before, during, and after catastrophic drops in performance (Hardy, 1990), and separating the data into these time frames allowed us to examine emerging differences.
All tape-recorded interviews were transcribed verbatim. Quotes that represented the performers' thoughts, feelings, and experiences at each stage of the performance were extracted from the transcripts and used as the raw data for the analysis. Hierarchical content analysis (Glaser & Strauss, 1967; Patton, 1980) employed inductive procedures to organize the quotes into interpretable and meaningful themes and categories. Two researchers performed the hierarchical content analysis. A third experienced investigator provided a reliability check (Scanlan et al., 1989). This involved the third researcher coding 20% of the raw data quotes from one section of the interview into raw data themes, matching all the second dimension themes to their third dimension themes and matching all the third dimension themes to the general dimension themes. Reliability levels were 100% for the raw data quotes, that is all of the 37 raw quotes were correctly coded; 87% of the second to third dimensions were correctly coded; and 100% of third dimension to general dimension themes were correctly coded.

Following the first interview, an idiographic profile was developed and consensus reached by two of the researchers, which was then read to the performer at the beginning of the second interview. This member check provided a further reliability check of the participant's first interview. Consensus-validation procedures were used to remove any potential bias (see Scanlan et al., 1989).

**Deductive Model and Theory Examination**

A list of questions (see Table 1) was generated, distinguishing the fundamental differences of each of the models and theories proposed in the current investigation, namely, the cusp (Hardy, 1990, 1996a) and butterfly (Hardy, 1996b) catastrophe models, processing efficiency theory (Eysenck, 1979), conscious processing hypothesis (Masters, 1992), and the control-process model (Carver & Scheier, 1988). Based on the transcripts and the understanding gained from the qualitative process, these questions were then answered by two of the researchers, relative to how they reflected the experience of each athlete. The responses for each question were coded yes, no, and maybe, and for the overall model the responses were coded provides support, does not provide support, and provides some support. The model/theory offering the best fit for each performer's experience will be discussed.

**Results**

The hierarchy of the dimensions reported begins with the raw data themes, which are clustered to form the first dimension, and this process continued through the second and third dimensions, culminating in the highest order dimensions named general dimensions. The following overview of the hierarchical content analysis focuses only on the most noticeable changes across the time period, reporting the number of quotes and performers contributing to the dimensions explored. Both those factors that are consistent with the models/theories proposed and those factors previously unexamined (or which have received little attention) within the stress and performance context are explored. Each of the three phases (pre, during, and post catastrophe) produced five different general dimensions. The most noticeable changes in the emerging dimensions from the pre to post catastrophe phases of confidence (cognitive anxiety, physiological arousal/ somatic anxiety, control, effort, and evaluating performance) are examined more closely in the following
section, and any links between them and possible explanations for their emergence are also explored in the discussion.

**Drop in Performance**

The first dimension of importance was the general dimension “drop in performance,” which emerged in the catastrophe phase and which was essential given that the purpose of this study was to examine performance catastrophes. Forty-four quotes described the catastrophic drop in performance of seven of the participants. One performer did not describe his drop in performance as sudden and substantial, however a closer look at his performance indicated that the magnitude of his performance drop was significant. Specifically, the performer was ranked number one in the world, and it was predicted that he would win the World Championships. In fact, he completely “bombed out,” not even managing to complete the preliminary rounds of his competition. Six of the athletes described their sudden, substantial drop in performance, and five of the athletes described how their performance continued to deteriorate. The following quote is an example one of a canoe slalomist’s sudden, substantial drop in performance:

> It was in the middle of the course and that’s where I took the touch, I took the penalty and along with those doubts and suddenly [claps] bang, that was like, it was a big wound and I would say it takes, what 5 to 10 seconds to recover, too late.

Similarly, one of the gymnasts explained his drop in performance:

> It went from this steady, um, performance that I was doing throughout the day, nothing was going wrong, um, confidence was just the same . . . and then all of a sudden I got on one piece and the performance went from a good start or an unexpected good start to this unexpected, "I’m on the floor!" . . . um, and it was like just from one extreme to the next.

The hierarchical content analysis therefore provided support for the catastrophic nature of the performance decrements experienced.

**Confidence**

Confidence emerged as the largest dimension in the precatastrophe phase (comprising 286 quotes from all of the performers), thereby demonstrating the importance performers place on confidence for successful performance. This finding is, therefore, in line with the presence of confidence in the butterfly model and in the suggested explanation of processing efficiency theory.

From the precatastrophe phase to the catastrophe phase, confidence dropped considerably. The change in confidence was further emphasized by its emergence as the largest general dimension in the precatastrophe phase, while emerging as the “lack of confidence” third dimension in the catastrophe phase, and the “reduced confidence” second dimension in the postcatastrophe phase. Indeed, seven of the performers were unable to return to their previous level of performance, despite one performer being able to remain confident, having a belief in recovery throughout his performance drop. One performer, whose performance failed to recover, described his confidence change: “I think I felt quite confident at the start,
not very, but you try not to get overconfident, but then very quickly in the first 15-30 seconds, just not confident.”

The general instability of confidence exhibited by the performers was also highlighted by the following quote: “Toward the end, maybe two-thirds of the way through, where I actually felt like I was getting back to normal, until something else went wrong and then I lost it all over again.” Similarly, a gymnast, who was unable to regain his high performance level, exhibited confidence prior to the performance drop: “I knew what I was going to do and I was confident everything was going to be fine,” then lost his confidence following the drop: “. . . confidence just like plummeted . . . I wasn’t confident then that I could actually do it.”

The second gymnast momentarily lost his confidence, yet maintained a belief in recovery and then was able to regain his performance. He described his momentary confidence drop after his fall off the pummelled horse:

I mean I had doubts, that everyone has, like what happens if I fall off again . . . but I mean that’s only momentarily and then you start telling yourself just to calm down and get back on and do it cleanly. . . . I knew I could do it easily. . . . But as I say I was confident that I could, confident that I could do it—and, well, it’s just your heart rate goes up and you feel your chest pounding.

This demonstrates how self-confidence may moderate any potentially negative cognitive anxiety and physiological influences on performance.

**Cognitive Anxiety**

The second largest general dimension in the precatastrophe phase was cognitive anxiety, which emerged from 182 quotes involving all of the performers. Seven participants were “expecting a tough event,” six of whom identified that it was “an important event” and five also identified feeling “nervous,” having “self-doubts,” and “negative feelings.” One performer described feelings that he felt were debilitating to his performance: “I know I was excited in a bad way . . . what if I miss this, because I was more nervous than excited. I remember being really nervous.” Conversely, the gymnast, whose performance recovered, identified that “I almost think of it as being a positive thing that I’m so nervous.” Again, this mirrors the catastrophe models predictions and the theories that may offer explanations for this, in that cognitive anxiety can have either a facilitative or debilitating effect on performance.

During the performance drop, cognitive anxiety emerged as a second dimension, comprising quotations by three performers. After the substantial performance drop, seven of the eight performers felt either nervous, had self-doubts, felt puzzled, or their confidence had dropped.

**Somatic Anxiety and Physiological Arousal**

Physiological arousal/somatic anxiety is the other major variable within the catastrophe models, and so, although neither emerged as general dimension, they did emerge as second dimensions. Specifically, somatic anxiety emerged from quotes by three performers as a second dimension in the precatastrophe phase within the general dimension “unease.” One performer described his physical symptoms as “my neck felt tight, you know, I felt that tension, that tight feeling in my neck and that was before I even left to go over [to the competition hall].” “Physically nervous”
emerged as a second dimension, contributed to by three performers, during the catastrophe phase, with one performer describing how he felt: "And so everything just tightens up, your heart's going up, you know, like speeding up no end." In line with the temporal patterning research (Jones, et al., 1991), physical symptoms dissipated, as they did not emerge in the postcatastrophe phase.

Control

Control, central to Carver and Scheier's (1986) model, changed considerably across the catastrophic experience. Within the precatastrophe phase, the third dimension, "self-control," emerged from 29 quotes by all of the performers. The performers described how they felt either feelings of control, mental preparedness, or focus, with seven of the eight stating feelings of control. One performers' quote epitomizes the level of control the performers felt prior to their performance: "I was very in control of what I could do." A further quotation clearly emphasizes the strength of the feelings of complete control: "I felt very in control. I didn't think anyone could have stopped me, no matter what I did, I was going to get the ball." These feelings of control dissipated once performance began to deteriorate. This was reflected in the catastrophe phase by the emergence of the second dimension "lack of control," which comprised quotes from three performers, and by the end of the performance drop, seven of the performers felt they had "no control" (a second dimension). Specifically, the postcatastrophe phase second dimension, no control, comprised the following first dimensions: "lost control," "no control," "no control over their performance," or "no control over emotions." Two performer quotes describe the change in feelings of control: "I'd lost the control I had from the start of the day," and "[At the start] I was in complete control. . . . By the end . . . I had absolutely no control." Interestingly, three of the performers felt that although they had lost control over one of control in general, control over emotions, or control over performance, they had maintained control over one of the other aspects of control. One performer, who felt he lost control over his performance, also stated that "I still felt very much in control of my emotions."

Effort

Perceived effort, in line with processing efficiency theory, was an interesting dimension that changed considerably across the catastrophic experience. In the precatastrophe phase, "not having to put much effort in" was a first dimension representing seven quotations from four performers; the remaining four performers made no reference to effort expenditure. An example of "not having to put too much effort in" is, "I wasn't having to try very hard. . . . I wasn't having to pull particularly hard." This changed during the catastrophe phase, as three performers identified that they were expending "inappropriate effort" (second dimension). More specifically, they identified things such as "trying too hard but wasting energy," and "felt like I was putting more effort in . . . but fighting the boat instead of letting it happen," and

So I was actually forcing things to happen, um, and timing can be wrong on like one element to the next, but you automatically adjust it, um, but if you just, if you force it, if you're forcing an adjustment, it ruins it, it exaggerates what was wrong in the first place. And that's what happened.
By the postcatastrophe phase, all the performers described varying levels of “resignation and withdrawal” (third dimension), which emerged from three second dimensions, namely “resigned to failure,” “withdrawal of effort,” and “feelings of apathy.” A quotation from one performer demonstrates the feeling of effort withdrawal: “I know I felt I’d virtually given up by the end of the last race.” A further example of a loss of motivation is described by another performer:

I still didn’t have 100% motivation and excitement and thrill ... so I still went through the motions, but I didn’t have that zip, that I might have had if I’d been clear at that stage.

Following is an example of the quotes indicating that the performance drop preceded the effort withdrawal (i.e., the opposite direction to Eysenck’s 1979 theory):

My effort or probably my physical effort didn’t change a lot, but my psychological effort probably did. ... But my heart really wasn’t in it after that, after I’d taken my penalty, my heart wasn’t in it, um ... I’d screwed up and I knew that I wasn’t going to achieve what I’d dreamed that I could achieve.

**Evaluating Performance**

A general dimension that emerged only during the catastrophe phase, “evaluating performance” represented 103 quotes by all of the performers. Interestingly, this theme did not emerge in either the pre or postcatastrophe phases. However, the magnitude of its presence during the catastrophe phase suggests that it warrants further attention and fits comfortably with Masters’ (1992) conscious processing model. Quotes within the dimension reflected the performers’ thoughts and feelings toward the catastrophic drop in performance in terms of evaluating every aspect of the performance, including the potential causes and strategies for dealing with it. “Evaluative state” was a second dimension within this general dimension and emerged from nine quotes by six athletes. The following quotation describes this dimension: “I slipped into an evaluative state, I hit a pole, after half a second it suddenly dawned on me what I’d done and for the next few seconds, my mind was evaluating what that meant.” Putting this quotation into context, the event was canoe slalom, and the length of time the paddler is on the course is approximately one minute, thirty seconds, thus a few seconds spent evaluating performance would be a large proportion of the event time. Another second dimension referred to self-awareness. It comprised seven quotes from five performers and was epitomized by the following: “... but I was aware that I was trying.” One performer described how he changed from “I knew what I was going to do and I was confident,” to thoughts of confusion and evaluating the rest of his performance, which should normally have been an automatic routine:

I’d fallen off twice. I’d gone all tight and it’s like I’ve got to do something, confidence, no, but I can’t ... or should I not do them now, shall I miss those, that bit out and carry on the rest.

After the performance decline, performance evaluations did not emerge. Performers at this stage seemed to have moved beyond this evaluative state and onto thinking about the consequences of the performance drop such as “thinking about the outcome” (a second dimension), “attributions” (third dimension), and trying to get
something positive out of the performance "positive feelings" (third dimension).

**Results of the Deductive Analysis**

The results of the deductive analysis provided mixed but generally at least some support for the models and theories examined (see Table 1). Specifically, seven of the eight performers' experiences provided some support for the cusp catastrophe model, while all eight provided support for the butterfly catastrophe model. In terms of offering explanations for the catastrophic drop in performance, seven of the eight performers' experiences were consistent with processing efficiency theory, while the remaining performers' experience could be only partially explained by processing efficiency theory (Eysenck, 1979). Seven of the eight performers' experiences were consistent with the conscious processing hypothesis (Masters, 1992) and the control process model (Carver & Scheier, 1986), while the experience of the one performer whose performance recovered provided no evidence regarding these models.

**Discussion**

Although it is important to recognize both the methodological and conceptual advances that have been made in competitive state anxiety research, it is also evident that many questions remain unanswered. Very little published research has examined the precise nature of performance drops. However, not only does anecdotal evidence (e.g., Greg Norman's collapse at the 1995 U.S. Masters; Yana Novotná's collapse in the Wimbledon final, 1996) suggest that the pattern of performance is not as uniform as suggested in previous research (inverted-U and multidimensional anxiety theory), some researchers (e.g. Hardy, 1990) have proposed that performance follows a discontinuous path with a much more dramatic decline. Consequently, one purpose of this investigation was to examine such performance drops through structured interviews. The investigation also provided an opportunity for the athletes to identify further factors that they felt might have influenced their performance drop.

The concurrent emergence of the two largest general dimensions, confidence and cognitive anxiety (both comprising quotes from all of the eight athletes), suggests that the two factors are independent. However, this finding is contrary to arguments presented by several researchers that self-confidence and cognitive anxiety represent opposite ends a bipolar factor (Bandura, 1977; Borkovec, 1978; Martens et al., 1990). Rather, the present findings provide support for those researchers who have identified these two variables as orthogonal factors that may exert relatively independent effects on the anxiety-performance relationship (Burrows & Simpson, 1977; Hardy, 1990, 1996b). In addition, the deductive analysis emphasized that confidence, cognitive anxiety, and physiological arousal were present and changed across the performance. The presence of confidence, and changes in confidence levels prior to and following the performance drop, provides greater support for the butterfly model (Hardy, 1990). Such varying levels of confidence appeared to play a significant part in the catastrophic performances.

Having said all this, the data does not unequivocally suggest that the interaction among elevated cognitive anxiety and physiological arousal and reduced confidence resulted in the dramatic performance drop. Indeed, the direction of causality could be in the reverse direction; thus, the interpretation of causal influence
Table 1  Summary of Deductive Data Analysis

<table>
<thead>
<tr>
<th>Catastrophe Model</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Were PA and CA high?</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ii. Did CA enhance performance at any stage during the performance?</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>iii. Did PA influence performance?</td>
<td>6</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>iv. Was there a significant difference in performance prior to and following the catastrophic drop?</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Did the athlete regain the upper performance level?</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>vi. If the athlete regained performance, was this due to a reduction in physiological arousal and/or cognitive anxiety?</td>
<td>7 NA</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Butterfly Catastrophe Model</th>
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<th>No</th>
<th>Maybe</th>
</tr>
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<tbody>
<tr>
<td>(as above but also including these:)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Were confidence levels different prior to and following the catastrophic drop?</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ii. Were feelings of control (of self or environment) different prior to and following the catastrophic drop?</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Did the athlete regain an intermediate/upper level of performance?</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>iv. If performance was regained, was it due to an increase/maintenance of self-control?</td>
<td>7 NA</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Processing Efficiency Theory</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Was the subjective probability of success different before and after the drop in performance?</td>
<td>8</td>
<td></td>
<td></td>
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<tr>
<td>ii. Was the effort expended different before and after the performance drop?</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Was the motivation different before and after the performance drop?</td>
<td>8</td>
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<td>iv. Did the subjective probability of success influence the amount of effort put in?</td>
<td>8</td>
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<tr>
<td>Control Process Model</td>
<td>Yes</td>
<td>No</td>
<td>Maybe</td>
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<td>i. Was there a noticeable difference in the athlete’s perception of control in their ability to cope with the event and of attaining their goal, from before the drop in their performance to once the drop had started?</td>
<td>7</td>
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<tr>
<th>Provides support</th>
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<tr>
<th>Conscious Control Hypothesis</th>
<th>Yes</th>
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<tr>
<td>i. Did the athlete lapse into conscious processing prior to the drop in performance?</td>
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should be treated with caution. The implications of the results suggest that if cognitive anxiety remains high, with physiological arousal high or increasing and self-confidence low, performance will continue to decline (or will not return to the upper performance surface) as appeared to be the case with seven of these performers.

In terms of explanations based on these findings, a closer look at those theories that combine the effects of cognitive anxiety and confidence appears to be essential. Processing efficiency theory (Eysenck, 1982) provides one possible explanation for the current findings, particularly given the emergence of high effort expectations precatastrophe, shifting to a withdrawal of effort postcatastrophe. In this respect, the theory mirrors the following quotation from Bandura (1977):

> Through expectations of eventual success it (self-efficacy) can affect coping efforts once they are initiated. Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. (p.193)

The present investigation is consistent with Eysenck’s (1982) motivational explanation, that is, the athletes were investing considerable effort, possibly because of the elevated cognitive and somatic anxiety, thus enabling performance to be maintained. In addition, the deductive analysis indicated that all the performers’ experiences were consistent with the theory. Specifically, the performances demonstrated that the following variables were different prior to and following the performance drop; probability of success, effort expended, motivation, and also that the probability of success influenced the amount of effort put in.

As previously stated, causality is not clear from the performers’ responses as identified in the quotes presented in the results. A few quotations supported the direction of Eysenck’s (1982) theory, for example, “more effort not to make a mistake.” However, some of the raw quotes suggested that effort was withdrawn after the drop in performance, which is counter to Eysenck’s (1982) theory in which it is the withdrawal of effort that results in performance decrements.
It is worth considering that prior to the catastrophe, effort did not emerge as a higher order dimension while confidence was high; in contrast, the catastrophe phase revealed inappropriate effort, an evaluative state and a decrease in self-confidence, while the postcatastrophe phase revealed a withdrawal of effort and further decreases in confidence. The changes in these variables from the precatastrophe phase through to the catastrophe and postcatastrophe phases are consistent with the variables in Eysenck’s (1982) theory but are inconsistent with the pattern that they follow. The inappropriate effort expenditure (Weinberg, 1978; Weinberg & Hunt, 1976) may have resulted in conscious control, evident in the evaluative state general dimension, when performance catastrophically dropped. Various researchers (Gallwey, 1974; Naattenen, 1973; Weinberg, 1978; Weinberg & Hunt, 1976) have identified the impact of inappropriate effort on performance, and more recently, Masters (1992) proposed the conscious processing hypothesis. This approach has been found to be effective under empirical testing (Hardy & Ringland, 1984).

Findings in the present investigation, therefore, offer some support for the conscious processing hypothesis (Masters, 1992), suggesting that more research be devoted to examining this explanation for performance drops. Of course, causal influences can only be suggested from true experimental designs, structural equation modeling, or similar techniques that assess the specific order of influences on performance.

In total, the findings suggest that the best explanation currently available may be a combination of processing efficiency theory and the conscious processing hypothesis (similarly suggested by Hardy, Mullen, & Jones, 1996). Essentially, cognitively anxious performers maintain their performance through the compensatory mechanism of effort. However, their increased effort expenditure may lead to conscious processing (the evaluative state dimension) and decrements in performance. Furthermore, high levels of effort will only be expended while the performer remains at least moderately confident of success. If self-confidence drops below this level, effort will be withdrawn, resulting in a (further) rapid performance decline. In the present investigation, performers identified reduced confidence in addition to effort being withdrawn and evaluation (i.e. evaluative state), which together provide a possible explanation for the dramatic drop in performance. This is consistent with this combination of the theories.

The findings also offer support for a cyclical relationship among confidence, perceived control, cognitive anxiety, physiological arousal, effort and performance. The eight performers in the study all experienced an initial performance decrement, which was accompanied by various cognitions and attempts to overcome it, which was then followed by a further catastrophic decrement. For example, a slalom canoeist hit one pole, then began to evaluate his performance and hit another; a basketball player missed a shot, evaluated it, began to try and compensate for the error only to produce further errors; and a gymnast missed one release and regrip move, appeared to regress to explicit rules, and subsequently missed his remaining regrip moves. Essentially, the findings suggest that ongoing performance needs to be examined when determining theoretical explanations for the patterning of performance and causal influences. The following statement by Eysenck and Calvo (1992) is worth considering in the light of the findings from the present investigation:

The performance can be integrated into a general conceptualization of the anxiety-performance relationship as a dynamic process where there are interactions between cognitions and motives over time during task performance
(e.g., Covington & Omelich, 1988; Schwarzer, 1986), with an appraisal function to monitor and evaluate current threat and task performance (Jerusalem, 1990) and a self-regulatory function aimed at coping with task demands and personal feelings of inefficiency (Rost & Schermer, 1989). (Eysenck & Calvo, 1992, p. 431)

Indeed, this quotation highlights the dynamic process and over time, reinforcing the need for this to be addressed in future research. Some test anxiety researchers (e.g., Hagvet & Ren Min, 1992) have examined cognitive performance as a process construct rather than a summary construct (e.g., an average or total score). Their findings may be related to athletic performance. Specifically, as performance continues, the performer will respond differently depending upon whether the performance has become easier or more difficult (or whether the performer is successful or not). Essentially, the current findings suggest that ongoing performance needs to be examined when determining theoretical explanations for the patterning of performance and causal influences.

The presence of self-control (identified by all athletes) mirrors Hardy and Jones’ (1990) interviews with six elite athletes, who emphasized the importance of being in control, both of themselves and the environment. Lack of control following the catastrophic performances was associated with continued poor performance, as only one performer experienced a performance improvement after the catastrophe. The importance of control within the present investigation reflects previous reports, such as those of Steve Backley (javelin, twice Olympic silver medallist), who emphasized the importance of feeling highly aroused yet still in control of himself and his environment and of David Hemery (1968 Olympic 400m hurdles gold medallist and world record), who emphasized that performance “very much depended on having the stress of competition under control” (p. 251; see Jones & Hardy, 1990).

Similarly, researchers have not only proposed that self-control mediates the effects of stress (Fisher, 1984; Hardy, 1990) but have also suggested that the perception of control may be a crucial indicator of when performers will disengage and thus experience decrements in performance (Carver & Scheier, 1988; Gould, Eklund, & Jackson, 1992a, 1992b, 1993; Hardy & Jones, 1990). Additionally, Hardy (1990) proposed that self-control might provide a butterfly factor within the butterfly catastrophe model, allowing moderate performance levels. However, this model has yet to be fully tested. Despite what appears to be considerable evidence for the role of perceptions of control within the anxiety-performance relationship, very few investigations have been conducted to examine its influence within models of anxiety and performance.

Preliminary investigations by Jones and colleagues (Jones, 1995; Jones & Hanton, 1996) have adopted Carver and Scheier’s (1982, 1986) test anxiety model, proposing predictions for competitive sport anxiety. The model is not dissimilar (if perhaps slightly more vague, in terms of its underpinning theoretical explanations) to Eysencks’ (1982) processing efficiency theory, in which the key components are anxiety, effort (the compensatory factor), and subjective probability of success. Although it is not clear from the present investigation whether control had a causal influence on the dramatic drop in performance, its emergence as an important dimension combined with the previous literature examined suggests that further investigations of perceived control and Carver and Scheier’s model in sporting contexts would be worthwhile.
The implications from the present investigation emphasize three areas for intervention strategies, namely, increasing self-confidence, controlling anxiety and arousal, and increasing perceptions of control. Strategies should therefore include emphasizing past performance accomplishments (Feltz, Landers, & Raeder, 1979), improving the quality of training, and varied practice through simulation training (Orlick & Partington, 1988), which could include repeated experiences of success outcomes. Both of these strategies could best be enhanced by encouraging holistic, process goals (e.g., Kingston & Hardy, 1994; Orlick & Partington, 1988). Further strategies include enhancing positive self-talk and verbal persuasion strategies (Bunker, Williams, & Zinsser, 1993) and including cognitive restructuring. The latter could help to control debilitating anxiety and/or arousal by reframing it as readiness or excitement (Apter, 1982). Multimodal stress management strategies (Burton, 1990) would also be recommended for recovering catastrophic performance drops; specifically, physical relaxation, cognitive restructuring, and reactivation once the upper performance surface has been regained (Hardy, 1996a). Finally, over-learning strategies (Schneider & Shiffrin, 1977) would reduce the working memory demands placed upon the performer, thereby helping to prevent negative effects of cognitive anxiety on performance.

In terms of future research directions, higher order catastrophe models should be examined to include both self-confidence and perceived control (as in Hardy, 1996). Further research also needs to examine theoretical explanations of performance catastrophes, particularly the combination of Masters’ (1992) and Eysenck’s (1979) models.

References


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**Authors’ Note**

Superscript 1Hierarchical content analysis figures are available from the first author upon request.

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