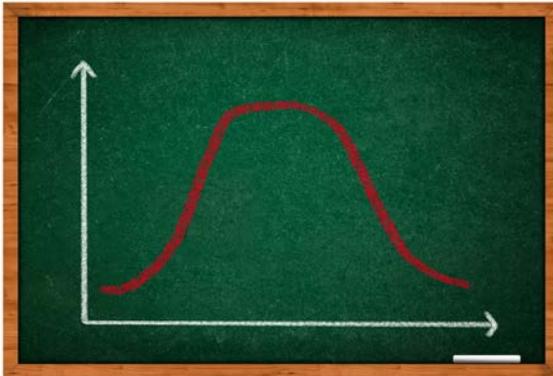


Fazey and Hardy (1988)

The Inverted-U hypothesis: A Catastrophe for Sport Psychology.



Background and aim: The **inverted-U hypothesis** originated from a study of habit-strength formation in mice under different conditions of punishment stimulus frequency (Yerkes and Dodson, 1908) and was built upon by Oxendine (1970) to describe the relationship between arousal and motor performance in a range of different conditions.

Fazey and Hardy suggest there are three big problems with the hypothesis, namely: There are difficulties with the basic constructs of the hypothesis, a lack of consideration of situational specificity and the multidimensionality of the stress response, and a lack of supporting evidence from sport psychology. This study considers these issues and proposes two **catastrophe models** of motor performance under anxiety which describe the relative contributions to performance of cognitive anxiety, 'on the day' physiological arousal, task difficulty and self-confidence.

Method: The study is a monograph, which is a specialist work of writing on a single subject which identifies and considers the **three problem areas** with the hypothesis. The authors also propose an alternative model and a number of testable hypotheses of the model are stated and an extension of the model.

Difficulties with the basic constructs

Two questions in relation to the inverted-U hypothesis need to be addressed:

- If physiological arousal is a unitary construct, then is it related to performance by an inverted-U function?
- Does this say anything about a systemic relationship between stress and performance?

Difficulties with the corroborative evidence

No previous research has considered the influence of the different anxiety systems on the stress response, or the possibly different effects of increasing and decreasing **stress levels**. There is still little convincing, sound experimental evidence for the inverted-U hypothesis as a model of the relationship between **stress and performance**.

Difficulties in applying the model

Fazey and Hardy present three major criticisms of the inverted-U hypothesis:

- The failure to recognise the **multidimensionality** of the anxiety and arousal systems.
- The general lack of sound experimental **support** for the detailed predictions of the hypothesis.
- The apparent lack of **predictive validity** in practical situations.

Catastrophe model of anxiety and performance

Fazey and Hardy discuss two alternative approaches that have been used to study the effects of stress upon performance. These ideas have been used to develop the 'catastrophe' model of anxiety and performance.

The model states that anxiety has at least two components, **cognitive anxiety and the physiological arousal response**. Physiological arousal is the degree of generalised sympathetic physiological response reflected by somatic anxiety or other physiological changes. Cognitive anxiety determines whether the effect of physiological arousal is smooth and small, large and catastrophic, or somewhere between the two.

This model **fits** with existing data which shows a **negative relationship** between cognitive anxiety and performance and **mixed** positive and negative effects for physiological arousal upon performance during **high** cognitive anxiety. But how does cognitive anxiety alter the effect of physiological arousal on performance? It may be that higher levels of performance are shown under conditions of **high** physiological arousal in simple or well learned tasks. It is possible that cognitive anxiety **disrupts** this control by **distracting** the individual's attention and by creating doubt about what is a beneficial physiological effect and what is an **adverse effect**. As a result, physiological demand is high and the cognitive control demand is **low**. Cognitive anxiety might lead to **enhanced** performance when physiological arousal is **high**. Conversely, in tasks with a **low** physiological demand but a high control demand, cognitive anxiety would usually lead to a **drop** in performance when physiological arousal is **high**.

Fazey and Hardy's proposed catastrophe model hypothesises that:

- Physiological arousal is **not** necessarily detrimental to performance, but it will be **associated** with catastrophic effects when cognitive anxiety is **high**.
- During high cognitive anxiety, **hysteresis** will occur, i.e. performance changes as physiological arousal **increases**, compared to when physiological arousal **decreases**. During low cognitive anxiety, hysteresis will **not** occur.
- Intermediate levels of performance are most **unlikely** in conditions of **high** cognitive anxiety.

Higher dimensional catastrophes – Although the catastrophe model is able to describe the roles of cognitive anxiety and physiological arousal in performance under stress, other factors such as **task difficulty** and **self-confidence** may also play a part. Therefore, the model has been extended to a **higher-order butterfly catastrophe** which explains the influence of these two factors. Task difficulty is known as a bias factor and self-confidence as a **butterfly factor**.

Physiological arousal level at which catastrophes occur in cognitively anxious individuals **gradually shifts** to the left as cognitive processing demands of the task increase, which supports the **inverted-U hypothesis** and research into the effects of arousal and anxiety on tasks with differing cognitive processing demands (Humphreys and Revelle, 1984). However, self-confidence allows the cognitively **anxious performer** the possibility of regaining the smooth stable area of performance; this is increased when self-confidence is **very high** and/or when anxiety is **not extreme**.

The extended catastrophe model (Butterfly catastrophe model) predicts that:

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- Difficult tasks with a high processing load shift the hysteresis loop to the **left**, while simple tasks shift the loop to the **right**.
- When cognitive anxiety is at an **intermediate level**, individuals with a high degree of self-confidence will demonstrate a trimodal distribution for performance. At more **extreme levels** of cognitive anxiety, the same individuals will produce bimodal performance-distribution curves. In particular, **intermediate levels** of performance are possible only for confident performers or at **relatively low levels** of cognitive anxiety.

Conclusions: The inverted-U hypothesis is **flawed**: 'The real catastrophe would be for sport psychology to remain tied to the inverted-U hypothesis as the only plausible model of the stress performance relationship'. Catastrophe models of motor performance under anxiety can be applied to describe the relative contributions to performance of cognitive anxiety, 'on the day' **physiological arousal, task difficulty** and **self-confidence**. There are a number of plausible models to explain the **stress-performance relationship**. Most notably, stress and performance can be explained through the **application** of a **catastrophe model**.

Evaluation

Usefulness of research: Fazez and Hardy's research has been useful in explaining the stress performance relationship. From this research a number of **strategies** have been developed to improve performance in athletes including pep talks, self-talk, the use of imagery and rituals such as the Haka which all 'psych up' the athletes, while relaxation training programmes and breathing exercises can **reduce** anxiety.

Reductionism/holism: Fazez and Hardy have heavily criticised the inverted-U hypothesis. One criticism is its **reductionist** nature in that only anxiety is linked to performance. The catastrophe models are more **holistic** in that they consider other factors such as **task difficulty** and **self-confidence** of the individual. However, other **variables** such as the setting and familiarity of the task may also play a part in performance.

Research Method: Although researchers are able to measure physiological arousal and the performance of an athlete, it is **not possible** to measure cognitive anxiety while the athlete is performing; therefore, the conclusions reached by Fazez and Hardy may not be **valid**. Furthermore, it is unclear at what specific level anxiety and arousal need to be in order to see a catastrophic drop in performance. It seems that there are still a lot of unanswered questions.

Exam Style Questions

Using the research by Fazez and Hardy (1988), explain optimising arousal, controlling anxiety and measuring anxiety in sport. (10)

Explain how the research by Fazez and Hardy (1988), could be used to manage arousal and anxiety in sport. (10)