

# Grand Unified Theory of Sport Performance

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## Human Movement Science

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## Towards a Grand Unified Theory of sports performance

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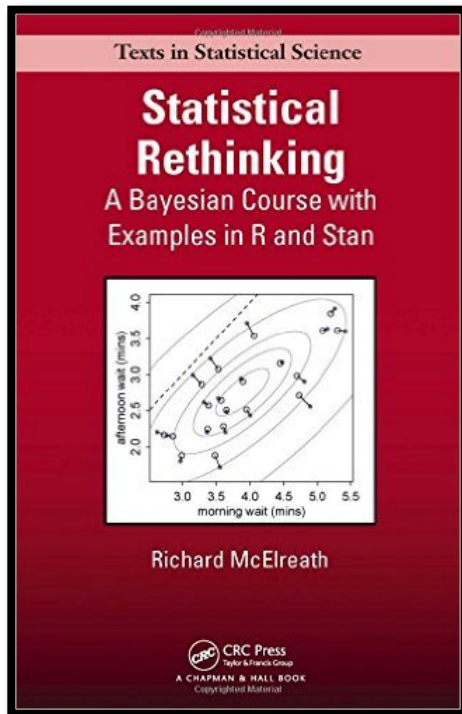
## ABSTRACT

Sports performance is generally considered to be governed by a range of interacting physiological, biomechanical, and psychological variables, amongst others. Despite sports performance being multi-factorial, however, the majority of performance-oriented sports science research has predominantly been monodisciplinary in nature, presumably due, at least in part, to the lack of a unifying theoretical framework required to integrate the various subdisciplines of sports science. In this target article, I propose a Grand Unified Theory (GUT) of sports performance—and, by elaboration, sports science—based around the constraints framework introduced originally by Newell (1986). A central tenet of this GUT is that, at both the intra- and inter-individual levels of analysis, patterns of coordination and control, which directly determine the performance outcome, emerge from the confluence of interacting organismic, environmental, and task constraints via the formation and self-organisation of coordinative structures. It is suggested that this GUT could be used to: foster interdisciplinary research collaborations; break down the silos that have developed in sports science and restore greater disciplinary balance to the field; promote a more holistic understanding of sports performance across all levels of analysis; increase explanatory power of applied research work; provide stronger rationale for data collection and variable selection; and direct the development of integrated performance monitoring technologies. This GUT could also provide a scientifically rigorous basis for integrating the subdisciplines of sports science in applied sports science support programmes adopted by high-performance agencies and national governing bodies for various individual and team sports.



## Model Thinking

Scott Page



## The Golems of Science

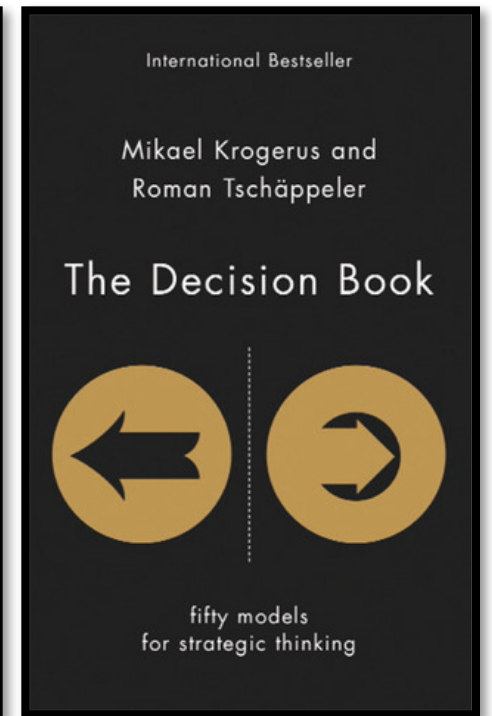
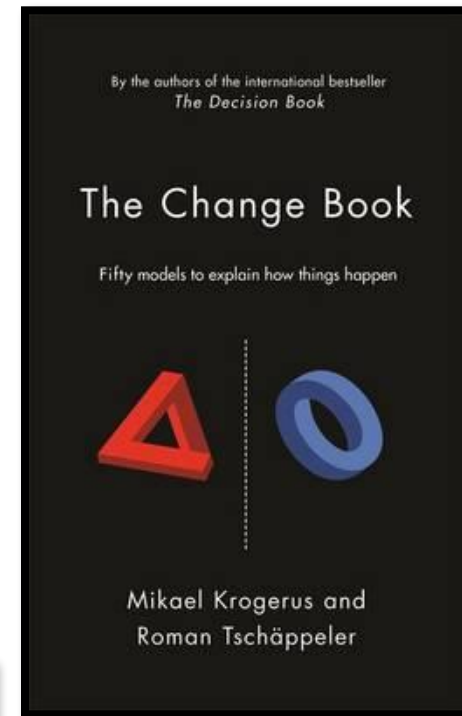
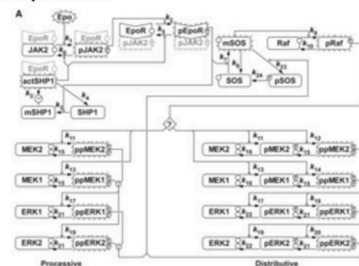
### Golem

- Made of clay
- Animated by “truth”
- Powerful
- Blind to creator’s intent
- Easy to misuse
- Fictional



### Model

- Made of...silicon?
- Animated by “truth”
- Hopefully powerful
- Blind to creator’s intent
- Easy to misuse
- Always false



# Golems of Sport Performance

## Injury and Pain

- Biomechanical model of injury
- Bio-Soc-Psych model

## Training Load

- Banister model
- Training Stress Balance
- Damped Pendulum
- PerPot model

## Fatigue

- MAS/MSS
- CP/W'
- VO2max / Cardiovascular model
- Noakes
- Mercora
- EnoKa
- Morton Hydraulic Models

## Skill Acquisition

- Cognitive psychology
- Schmidt Schema
- Constraints-led
- Ecological psychology
- Nonlinear pedagogy
- TGfU





**Foxes are better forecasters. Hedgehogs are better TV talk show guests.**

### **How Foxes Think**



Multidisciplinary

Adaptable

Self-critical

Tolerant of Complexity

Cautious

Empirical

### **How Hedgehogs Think**

Specialized

Stalwart

Stubborn

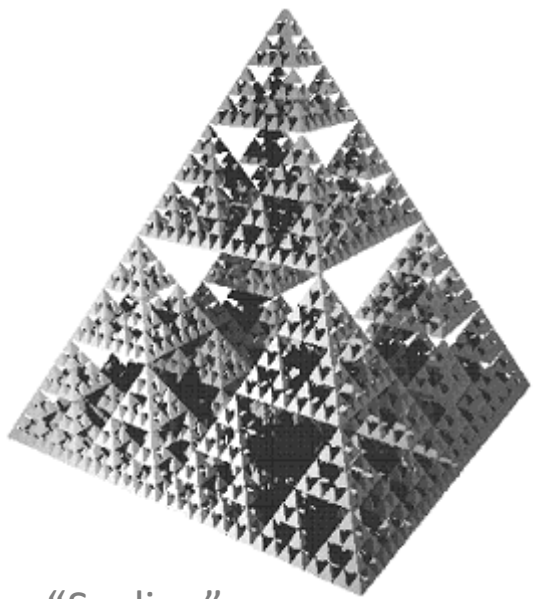
Order seeking

Confident

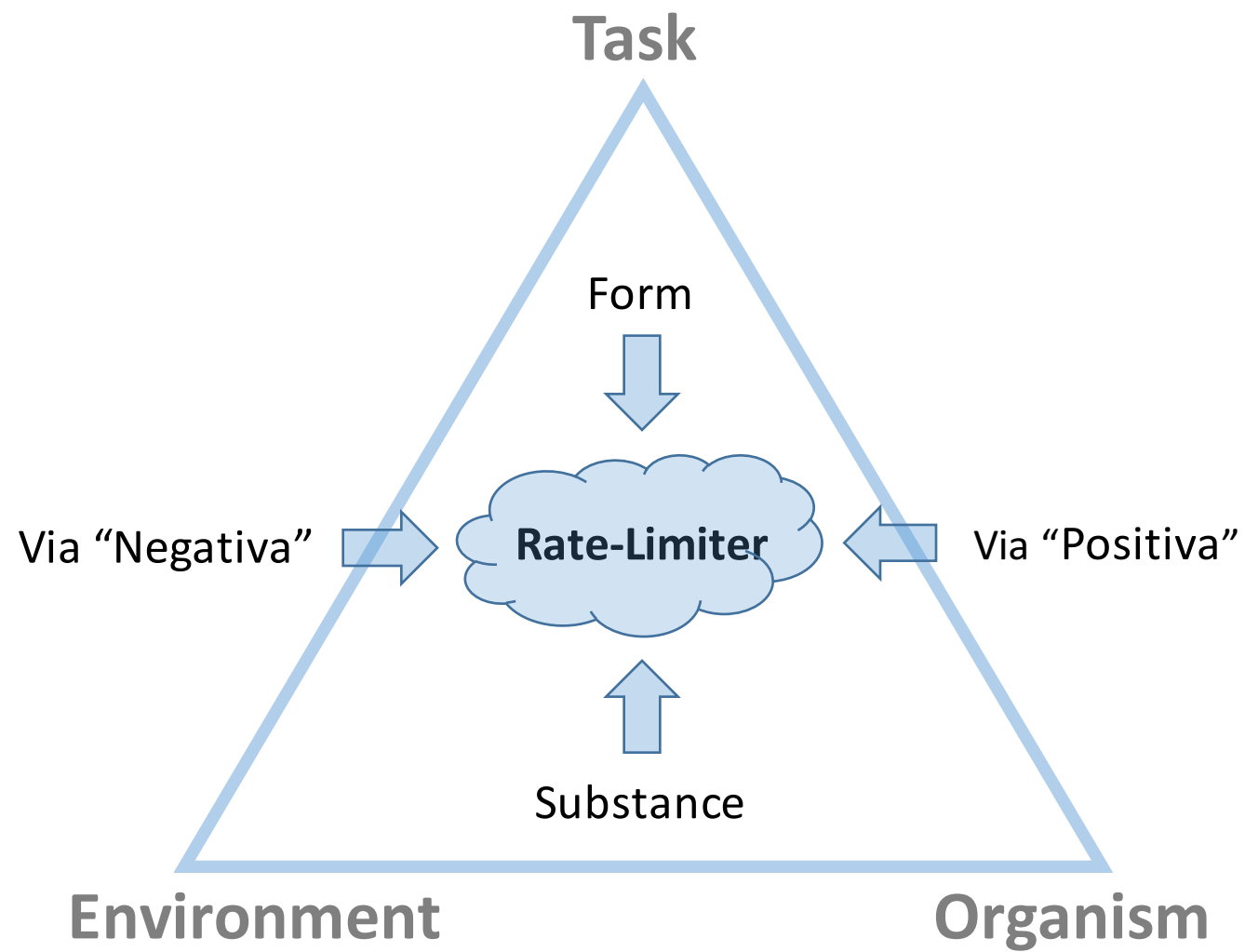
Ideological



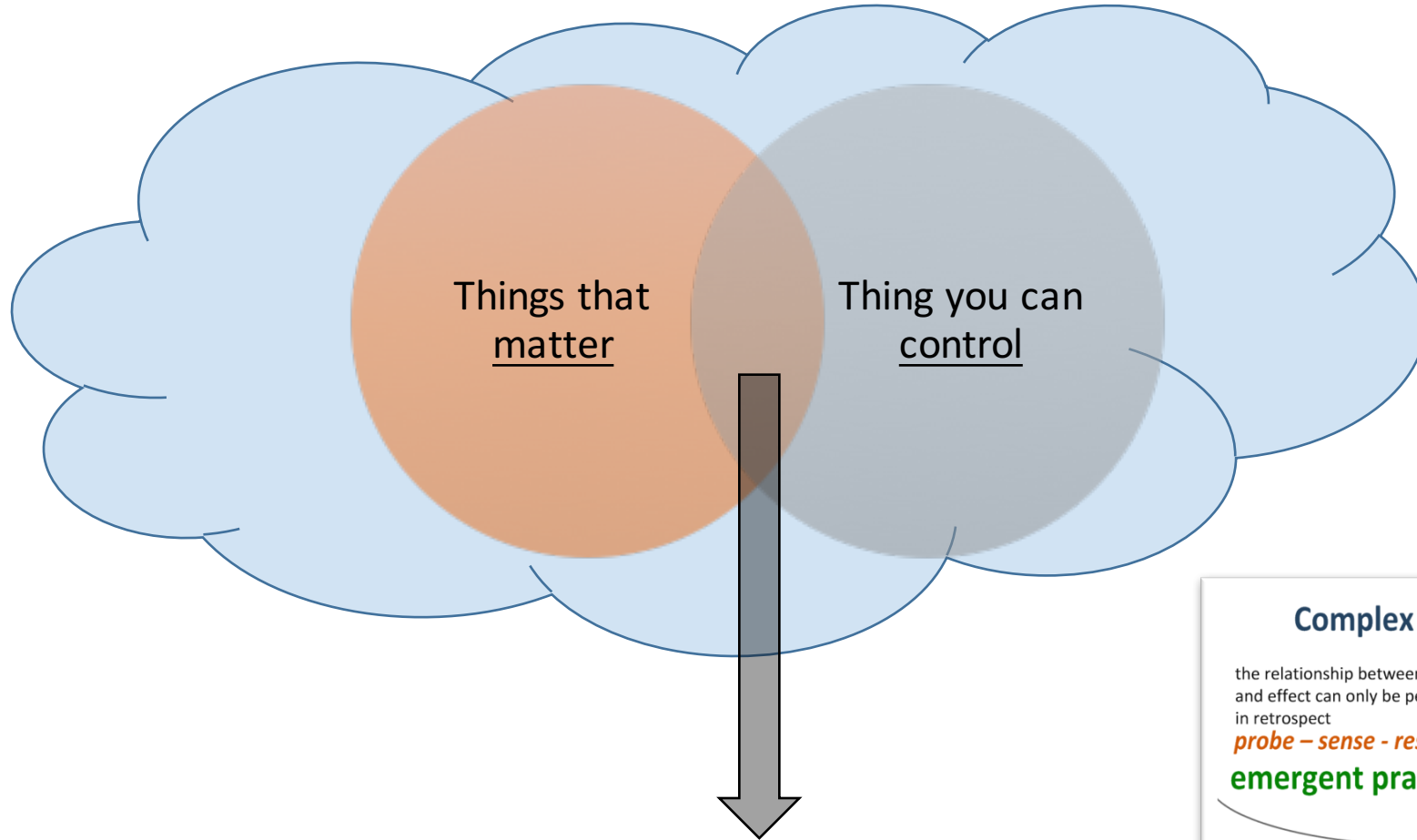
From "The Signal and the Noise: Why So Many Predictions Fail -- but Some Don't" by Nate Silver



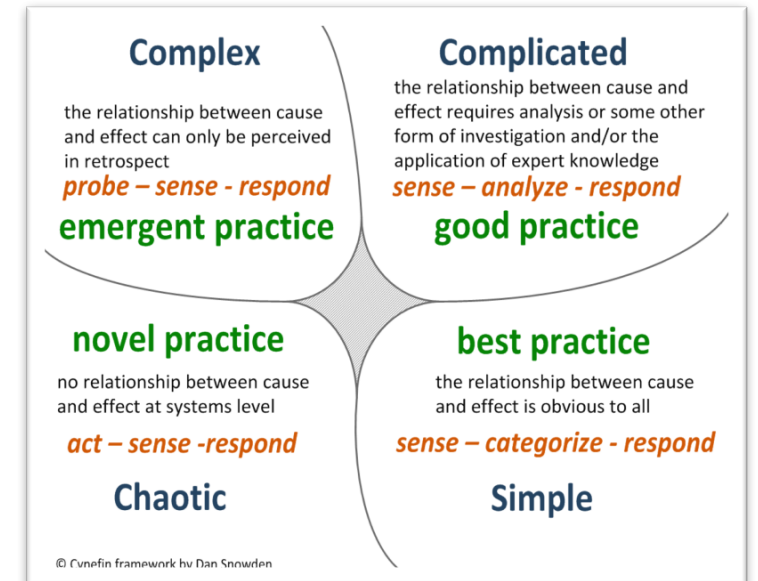
“Scaling”



# Rate-Limiter



What you should focus on



# Agile Periodization

## Agile Method

