Maintaining momentum

Dr Ruud J R den Hartigh heads a collaborative effort to investigate fundamental performance processes, such as momentum and talent development. He discusses the creation of a new approach and his aspirations for future research and education.

How did you develop an interest in your current area of research?

I became fascinated by momentum shifts in sport during my time as a tennis player. How is it possible that athletes enter upward or downward spirals? I was struck by the fact that periods in matches during which upward and downward spirals may develop were largely omitted from sport psychology literature. I therefore collaborated with experts in dynamical processes and sport psychology to research performance processes in real time, paying particular attention to the development of positive and negative momentum.

We have now extended our research to focus on the development of talent in sports, business, music and education. This interest in talent development is also related to questions that intrigued me towards the end of my tennis career: how was it possible that some of my peers, who were among the best in the country aged 12, never came close to reaching the top, but others, who were not as good, suddenly became brilliant at age 16?

Can you explain the concepts of momentum and talent in terms of human performance?

It is important to realise that momentum can be both positive and negative. Positive momentum means that an individual progresses towards a desired goal. This can pertain to domains other than sport; for instance, at work the goal might be to develop a product, or at school it might be to finish a paper. Negative momentum means that an individual regresses in relation to the desired goal. During periods of positive and negative momentum, changes typically occur in the psychological and behavioural states of the individuals.

Talent can generally be considered as someone’s potential to excel in the future. In the past, we considered talent from a relative standpoint – for example, a child who is clearly better at football than other children of the same age. However, research and practice are increasingly focusing on the developmental aspect of talent in individuals; how can an individual’s potential be maximised relative to previous performances? Together, both momentum and talent can be considered dynamic performance processes.

How does your approach to measuring performance differ from traditional strategies?

Traditional strategies in psychology investigate if the values of a fixed variable can explain the value of another fixed variable. For instance, an individual’s level of performance can be predicted by the additive effects of high motivation, physical fitness, many practice hours and so forth. Researchers typically study these variables in a large sample at a certain moment in time to analyse the relationships between them, trying to explain variance in performance levels based on single measures of potential predictive variables.

Our approach differs in that it assumes that states are formed over time, through ongoing interactions between changing variables. An individual’s recent success, or the levels of support they receive, might influence their motivation, which in turn influences the supporting environment, consequently raising their chances of future success. Such networks of interacting factors are thus dynamic and often differ between individuals. Therefore, to obtain a deeper insight into momentum and talent development, we apply the scientific tools of the dynamic systems approach, enabling us to explain how individual performance processes actually change over time.

To what extent is performance affected by positive and negative momentum?

If performance processes are dynamic then there is no clear-cut answer. People may perform well at the start of positive momentum, where they want to extend the advantage they have already developed, but they might also attempt to recover at the start of negative momentum.

However, when the positive momentum continues, people might temporarily reduce their efforts, which impacts upon their performance. On the other hand, performance might drop further still if negative momentum continues and the person believes their goal has become unattainable. Thus, the answer lies in the process, meaning the effects of momentum can only be understood when temporal changes are taken into account.

Where do you see your research going in the future?

I will continue to focus on momentum and talent development. Given our finding that negative momentum often has a big impact and is difficult to break, how can we make people more resilient to negative momentum in a range of sectors?

I am interested in finding which kinds of dynamic performance networks lead to the development of excellent performance and how they respond to setbacks. For instance, what happens when a particular athlete is injured? And how might the development of a footballer change if he or she is placed in another team? These are some questions I will explore in the future.
SPANNING SPORT, SCHOOL, music and work, there is a wide range of domains where human performance is key. Insights into how periods of ‘good’ or ‘bad’ performance develop is therefore highly important for institutions such as companies, schools and sports clubs. Indeed, increasing attempts to harness the talents of students and young athletes, as well as workers of all ages, are accompanied by policies that aim to stimulate performance and talent. However, successfully stimulating performance processes first requires understanding them – and this presents a major challenge.

In any domain, people are influenced and affected by an interplay of many different factors that constantly change over time. For instance, while the thoughts and feelings common to all humans affect performance, this does not happen in isolation; mental processes are embedded in a network of environmental factors with which they interact in an ongoing fashion. In the case of a footballer, for instance, such factors might include a poor refereeing decision, what their manager is saying to them from the touchline, how their teammates are performing or the actions an opponent takes. In a situation with so many changing variables, the footballer also has changing thoughts and behaviours, which in turn impact their environment. Thus with environmental and personal factors in a state of constant flux, the complexity and dynamism of human performance is unsurprising.

A SHIFT IN FOCUS
Attempts to understand the mechanisms behind human performance is not a new endeavour. Yet quantifying exactly which factors affect individual performance has been considered as a type of Holy Grail. In the past, researchers tended to study the factors that influenced performance in relative isolation. For instance, they focused on the amount of time spent practising, as well as on levels of individual motivation and the amount of support given to individuals. However, given the fact that these factors undergo change, as

Harnessing enhanced performance

Researchers in the University of Groningen’s Department of Psychology, Netherlands, are investigating human performance processes in athletic, academic and business settings, in order to develop policy and coaching strategies to develop talent and creativity.
do performance levels, and that they influence each other reciprocally, human performance cannot simply be reduced to such specific explanatory components.

In an attempt to achieve a better understanding of human performance, one team of researchers is taking a different approach. Together, Drs Ruud J R den Hartigh and Ralf Cox and Professors Paul van Geert and Nico W Van Yperen – all from the University of Groningen – as well as Professor Christophe Gernigon from the University of Montpellier, are collaborating to analyse the process of performance, with the aim of unravelling how different states of performance are actually formed over time.

**PSYCHOLOGICAL MOMENTUM**

In one study, the team focused on psychological momentum – that is, the dynamic process that includes positive and negative changes in psychology and behaviour. They introduced an experimental dynamical research design, which involved pairs of rowers competing against virtual opponents. A screen in front of each pair broadcast the race to them through computer graphics and was manipulated at certain points to show the human rowers in front or behind to generate either positive or negative momentum. In addition to this, effort exertion and interpersonal coordination between the rowers were continuously measured.

When the researchers generated negative momentum, the results showed negative psychological changes, both in terms of each individual’s perception of collective efficacy and task cohesion. Likewise, when positive momentum was generated, this led to positive psychological changes. However, the most fascinating finding from this study – and others alongside it – is that the effects of negative momentum are far more profound than that of positive momentum and are in fact history dependent: “One consistent finding from our studies is that psychological states and efforts respond more strongly to negative momentum than to positive momentum,” den Hartigh explains. “For instance, cyclists who lose their potential and perform at the highest possible levels for the maximum amount of time.

also found that athletes develop a negative spiral less rapidly if they have a history of successful races, suggesting that momentum can be transferred to future performances and can make athletes more resistant to negative changes.

**TALENT DEVELOPMENT**

By demonstrating the ongoing changes of psychological states and performance, and how they are shaped by interacting processes in real time (during a race) and throughout the long term (the history of races), new light is shed on the nature of human performance.

Importantly, these ongoing, bidirectional interactions can also be seen in a range of other achievement-focused domains such as school and work. For example, Dr Henderien Steenbeek – one of den Hartigh’s colleagues at Groningen University – has revealed that scientific reasoning skills are not just present in a child and will not linearly increase through instruction from the teacher. “Rather, these skills are shaped by an ongoing process in which the teacher is sensitive to the ability, motivation and enthusiasm of the child, who in turn responds to the teacher,” den Hartigh discloses. “This ongoing interaction shapes the performance level of the child at the next moment in time, which cannot simply be reduced to separate components.” Indeed, studies have shown that the supportive interplay between children and their environment can enable them to exceed both targets and expectations, a principle that can also be translated to other contexts.

As a result of the interest and expertise of the team and its collaborators in the domains of performance processes and talent development, the Department of Psychology at the University of Groningen has created a new Master’s programme entitled Talent Development and Creativity. The programme is scheduled to begin in September 2016 and will focus on educating and training students how to detect, develop and stimulate talent and creativity.

**OBJECTIVES**

- To elucidate how positive and negative psychological momentum emerge over time
- To investigate the developmental process of human performance over multiple years
- To teach students how to detect, stimulate and develop talent and creativity

**KEY COLLABORATORS**

Dr Ralf Cox, Professor Paul van Geert, Professor Nico W Van Yperen, University of Groningen, Netherlands

Professor Christophe Gernigon, University of Montpellier, France

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**CONTACT**

Ruud J R den Hartigh

Assistant Professor

Faculty of Behavioural and Social Sciences

Department of Psychology

Grote Kruisstraat 2/1

9712 TS Groningen

Netherlands

T +31 50 363 9726

E j.r.den.hartigh@rug.nl


RUUD J R DEN HARTIGH is currently Assistant Professor in the Department of Psychology at the University of Groningen, where he is also the coordinator of a new Master’s programme entitled Talent Development and Creativity. In April 2015, he completed his PhD (awarded with the distinction cum laude) on the study of complex processes of human performance.