

Our quest for evidence: the evidence-based practice straightjacket

By **Ian Jeffreys**, University of South Wales

OVERVIEW

Throughout its evolution, the fitness industry has always had an element of commercialisation and experimentation attached to it. Consequently, although many effective training protocols have emerged from this, there have also been many questionable approaches: some weird and wonderful pieces of equipment promising the world have emerged, often failing to deliver any worthwhile results and subsequently rapidly falling out of fashion to be replaced by the next big thing.

If the strength and conditioning profession was to be different and grounded in best practice, it was clear that there needed to be a concerted effort to put the industry on a more scientific standing. Science held the answer and the concept of evidence-based practice (EBP) has become totemic as a way of ensuring that methodologies used in the industry have a sound grounding in evidence. Undoubtedly, this has been a major step forward for the industry, enabling practitioners to increasingly utilise methods that have a proven scientific basis.

However, whenever a method is introduced into the world, there are often unintended consequences, many of which could not have been foreseen when the original idea was mooted. In this way, although EBP and the development of strength and conditioning as an academic subject has produced a much more robust industry, and one built on a relatively sound theoretical basis, there have been some less than positive effects. This article questions whether an unintended consequence of the development of EBP and the increasingly academic nature of the profession is that it has unwittingly created a straitjacket to original thought and to creative solutions on an individual, organisational and even a whole profession basis.

The nature of evidence-based practice in S&C

Strength and conditioning as a profession is today almost unrecognizable from the form in which it originated. Today, EBP lies at the heart of the scientific application of strength and conditioning. The concept of EBP originated in the medical field, in a similar attempt to ensure the best methodologies were being followed in a range of medical

fields.⁶ Importantly, true EBP is based around three key pillars:

1. Using the best evidence from scientific research
2. Using evidence gained from individuals' applied experience.
3. Considering preferences within the individual ecosystem

AUTHOR'S BIO



IAN JEFFREYS,
PHD, ASCC, CSCS*D,
RSCC*D, FUKSCA, FNSCA

Ian is professor of strength and conditioning at the University of South Wales, and the proprietor and performance director of All-Pro Performance. He is a former board member of the UKSCA and an assessor and tutor with the Association. He is currently a board member of the NSCA.

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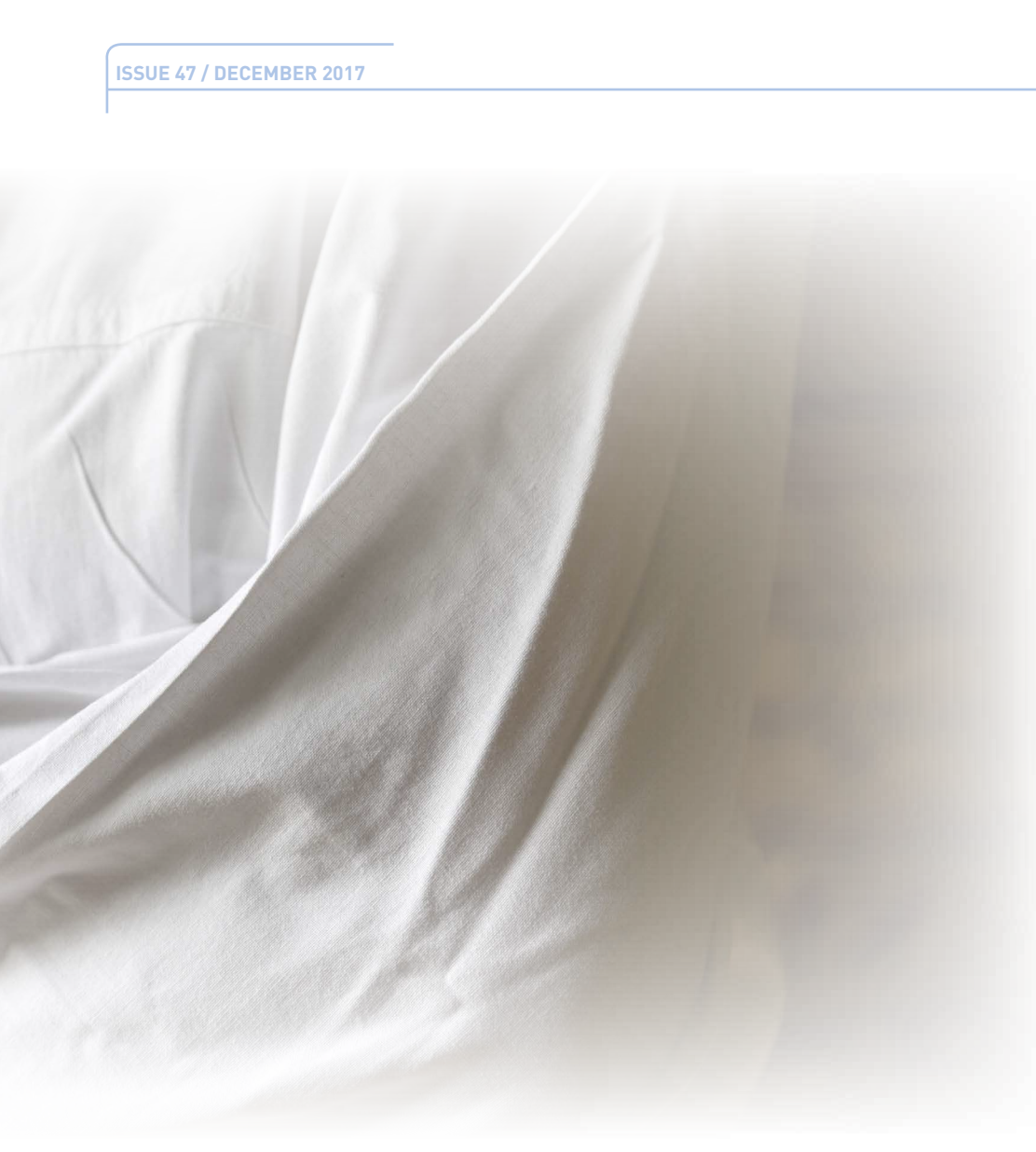


Any intervention, whether it be medical or in strength and conditioning, is ultimately interactional, and the results are affected by the interventions themselves, the unique characteristics of the individual, and the effects of the ecology in which the intervention is delivered.⁵ In this way, the complex dynamics and structure of strength and conditioning can never be encoded in a small number of equations,³ and full understanding requires information pertaining to the three pillars of EBP. Subsequently, leaving out any of the three pillars in analysing an intervention leads to less than full understanding of the potential impacts and consequences (both intended and unintended) that explain the subsequent results.

However, despite this need for balance between the three pillars, increasingly, the perception of what constitutes EBP is often considered as only being the research-based pillar, often to the exclusion of the other two and with a potentially detrimental effect on the practice of strength and conditioning.⁶

As an illustration of this potential disconnect – and rather ironically for what originated as an applied field – the search for evidence now starts, and often finishes, with a review of research, while the insights and lessons from experienced practitioners are often ignored or classed as simply anecdotal. Within the current model of EBP, largely driven by the academic agenda, a theoretical model of training built upon a series of papers and reviews can be passed as an evidence-based approach, even if it has never been applied in practice, yet an approach utilised by an experienced coach that has been successful over a number of years is not considered evidence-based if it doesn't have scientific papers to prove its efficacy. Although this may be an extreme example, it does illustrate the current discrepancy between the current view of EBP and its original intention – and the dangerous lack of balance creeping in to our approach.

Although this discussion may seem philosophical in nature it does have



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potentially important implications for strength and conditioning and for our ability to creatively apply bespoke solutions to performance challenges. In order to understand this potentially damaging effect it is critical to examine the factors that affect creativity, and our underlying craving for certainty.

Our search for certainty in an uncertain world

Evidence-based practice, as well as enabling the development of a rigorous body of principled practice, is also a comfortable concept given an understanding of how the need for certainty pervades much of our thought. Human beings crave certainty, and try to avoid uncertainty wherever possible. Subsequently, resolving uncertainty is a unifying principle across biology, and EBP plays into this need for certainty; where we can use ‘evidence’ to provide definitive ‘answers’ to guide and subsequently justify any decisions that we make.

The scientific method, influenced by Aristotelian logic and the search for cause and effect, has been the major tool in the quest for EBP. It has allowed us to gain a much deeper understanding of many of the factors that affect our adaptation to training and also allowed us to develop the training principles upon which much of our work is based. Yet, it could be argued that it is also one of the factors that potentially holds us back from gaining valuable insights.

What makes the scientific method so effective is also its Achilles heel – the reductionist approach. This approach, involving the isolation and manipulation of variables – the cause and effect paradigm – is at odds with the complex interactions that take place within the human body, and within any training environment.⁶ In these instances, where causation is used to attempt to explain complex dynamical systems, the cause and effect paradigm often falls apart. The world is rarely absolute and in nearly every sphere of human life there is never one but always many points of view.¹³

‘... the greater the number of experiences an individual has, then the greater the number of potential linkages the brain is able to make in solving a problem’

In the performance sphere, uncertainty will most definitely always remain, no matter how we try to deny it. Practitioners are acutely aware that, even when they follow the ‘training rules’, anomalies do occur and it is difficult to ever guarantee results. Despite our need for certainty, effective practice actually requires that we consistently hold a degree of uncertainty, and constantly question our underlying assumptions to gain a deeper understanding of the S&C process. Yet if we listen to many conversations in the S&C field, our language is often of absolutes and of finding the ‘right’ option, when in reality there are often multiple options, each with their own advantages and disadvantages.¹ Relying solely on EBP in its current format and ignoring anything that is not supported by published data could simply be a comfort blanket shielding us from the uncertain, but potentially enlightening, real world.

The reality – bespoke solutions

Although principles should always underpin our decisions, and science is the best tool we have for developing these, what is crucial is that we are able to create bespoke solutions to any training situation we face. Rather than search for absolutes, our search should be for options, a range of tools and tactics we can deploy as and when needed. Just as in medicine, where we would prefer to undertake a treatment tailored to our preferences and needs,⁸ any training intervention should be based on more than simply ‘research’ and include all pillars of EBP. Science can give us guidelines but it cannot categorically tell us what to do.⁶ Instead, a pragmatic approach is therefore crucial, where we devise the solution that is optimal given the unique situation we face at any given time. This will be affected by numerous aspects such as time and resource availability, athlete preferences and limitations, coach requirements etc. Consequently, it is essential that we are flexible and creative in our approaches, ensuring that we can devise appropriate solutions whatever the scenario we face. However, creativity depends upon a range of factors, many of which are unfortunately tempered by our bias, assumptions and potentially our education processes.

The capacity to generate multiple solutions requires a degree of creativity and the capacity to synthesise multiple sources of information from within and outside the training ecosystem. Although a plan is essential, flexible thinking is equally important, as at any instance circumstances

may change: an athlete may be injured, a fixture date may change, the hotel the team is staying at may not have the equipment expected and so on, and we need to be able to adapt rapidly. Similarly, we must find different ways of achieving the same goals, as – without this – athletes may just get too used to the systems we use and/or become bored by the same diet of training. Consistent execution requires creative programming, delivery, communication, the way we deal with behavioural issues and so forth. In short, there will always be uncertainty as to the best path to follow; and working in this environment requires not just knowledge, but – far more importantly – deep understanding.

Understanding – not data – is key

‘Give me data’: this is the call of the scientist in attempting to solve any problem. Ironically, there has never been more data or information available in the S&C field, and in many instances, we often feel more like data analysts than S&C coaches. Yet even a data-driven intervention that holds well in theory may not be the correct approach if it doesn’t consider the wider implications of the intervention and how it affects the ecosystem functioning. It must always be remembered that data in itself is meaningless: meaning is achieved by interpretation. Interpretation in turn requires wisdom and this is only gained when information becomes embodied understanding.

We are in the world to understand it and true understanding can only come from immersion in the field of the interrelated nature of the factors being analysed.¹² Here, trial and error is critical, which means we must engage with the world empirically.¹¹ This is how we construct the architecture of our brains; through experimentation. By actively engaging with the sources of ambiguous information we develop a much greater understanding of the intricacies of any training intervention.¹¹ Deeper understanding comes from digging into the assumptions that are leading us to any conclusion, and challenging underlying assumptions and biases where appropriate. This requires a realisation that we may not get coherent answers, or the answers we either expect or want; instead our observations may simply lead to even more questions. However, once we lose our pre-occupation with right and wrong and embrace uncertainty this can be of value.

Rather than insist on the perfect solution (which may not even exist), pursuing pragmatic solutions will increase our insights, our understanding and subsequently the options available to us. Similarly, we need to switch our focus from the search for answers to the search for the right question. Simply stepping back, and looking at the multiple possible 'whys' behind any finding can be illuminating and often open up previously unconsidered avenues of enquiry. Optimising this requires the ability to look at a problem from multiple perspectives, thus maximising our 'perceptual space'.

Limiting our perceptual space

Perception is actually one of the most misunderstood concepts in science: two people watching the same event will not necessarily have the same perception of that event and their concept of its reality may be very different. Critically, our perception is not the event or information itself, but instead it is the meaning the brain gives to

the meaningless information it receives.¹¹ Importantly, simply changing perception can result in the development of different meaning (of both current and historical events) and thus open the door to new possibilities. Simply changing perception allows the same challenge to be viewed in multiple ways, even if at first it seems as if there can only be one way.¹¹ Indeed, the whole world of 'illusion and magic' is based around fooling people's perception and so a subtle change in perception can have an important impact on possible solutions. Unfortunately, although this may sound easy, changing perception is difficult, as it requires addressing underpinning assumptions that can in themselves be hard to change.

Crucial to changing perception and to opening up potential solutions is the need to enhance experience. There are theories supporting the idea that creativity will often take place in the boundaries between various disciplines.¹⁰ Studies into brain function support this, suggesting that the greater the number of experiences an individual has,



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then the greater the number of potential linkages the brain is able to make in solving a problem.¹¹ This is the concept of perceptual space. Consequently, someone trained in a single discipline will always naturally look for the answer within that discipline, and be trained in seeing challenges via the methods associated with that discipline.⁴

In terms of neural connections, those associated with the discipline will be extremely strong, but these patterns will be relatively fixed and lack multiple dimensions. They will therefore naturally look for solutions through these patterns and therefore their available thought options – their ‘perceptual space’ – will be limited. However, someone trained in a multi-disciplinary nature, and with multiple experiences, has an infinitely greater number of potential linkages and thus a much greater potential ‘perceptual space’ with which to come up with a solution.

Indeed, creativity is often seen as someone piecing together two pieces of information that would not naturally be linked. This is often seen as a remarkable insight, yet to the person involved, this often seems no more than natural thinking, as both pieces of information were in their perceptual space and linking them seemed like an obvious process.¹¹ Subsequently, the bigger a person’s perceptual space, developed by multi-disciplinary education and critically multiple experiences, the greater the potential neural linkages and the greater the potential to link information from seemingly diverse fields. Unfortunately, with a limited perceptual space, the opportunities for cross-fertilisation of ideas and concepts are limited. Consequently, what can seem an obvious linkage for one individual can seem like a massive leap for another with a small perceptual space.

We’re all individuals!! Or are we?

So how can the development of EBP and the establishment of strength and conditioning as an academic discipline be a potential constraint to creativity and innovation? This is again linked to perceptual space

and the factors that shape the way we see the world. Our perception of any problem is made up by our past experiences and this past determines the physical make-up of the brain. It also determines how an individual will think and behave, now and in the future. Given this, and the fact that our history is individual to us, then our perception should also be individual. This is true to some degree, but this misses a key aspect of our past – our ecology and all the interlinked relationships that affect our perception.¹¹

The effects of ecology and how groups often think in the same way can clearly be seen from diverse aspects such as voting patterns passed from generation to generation, sports that dominate in certain areas, sporting team preferences in specific areas etc. Our ecology and education will always play a major role in dictating how we perceive information and dictates to a great degree what our response may be. So, groups who undergo the same ecological development have a tendency towards similar perceptions, and subsequently tend to think in the same way. Therefore, although we will all have individual biases based upon our own individual experiences, where our ecological development is increasingly homogenised, then our biases and assumptions can similarly be dictated by these factors.

Where people with similar thought processes work together, the homogeneity of the group may result in what neuroscientist Beau Lotto refers to the ‘physics of no’ looming large, due to similar assumptions, being taken as given.¹¹ When individuals are drawn from a similar background and especially from a single discipline, they will often have the same biases and assumptions preventing them from seeing problems from a different viewpoint. To tackle this challenge of ‘groupthink’, many innovative companies are using as wide a range of insights as possible when dealing with any creative challenge. Rather than use panels of experts from the same field, they prefer to use both experts and less experienced individuals, drawn from a much wider range of disciplines: a process of conceptual blending.¹⁰

The idea is that the perceptual space made possible by this group is far greater, enabling the group to ask the questions that challenge assumptions and increasingly challenge the 'physics of no', which necessarily limits what you think, do and feel. Could the same thing be happening in strength and conditioning, where our increasing dependence on academic training and EBP is limiting our perceptual space and blinding us to potential opportunities to enhance our practice? Answering this question requires a trip into the past.

The good old, bad old days

Strength and conditioning is a young profession and one which has seen massive changes in its short history. Historically, there was little, if any, formal training in the field and definitely no formal academic courses or qualifications were required. Indeed, it was only in 1985, that the first formal accreditation in the west (the CSCS from the NSCA) came into operation. Initially, S&C practitioners had diverse backgrounds: many were ex-athletes, many were teachers, others were simply people with an interest in fitness. At the same time, there was little formal information available as to what training methods were optimal in developing various fitness categories, and much was based on anecdotal evidence from coaches working with athletes. In order to gain information practitioners typically had to experiment within their own training environment, trying various methods, and empirically evaluating these against their success in enhancing performance. Publications were few and far between, but generally articles that were available were written by experienced practitioners who outlined the methods they used and some of the results they found.

Ironically, although the knowledge we have today was lacking then, and undoubtedly many systems and methods of training were tried that were unsuccessful, the environment was conducive to creativity and was rich in terms of those elements that enhance insight and creativity. The 'physics of no' had still to develop and practitioners were able to more freely explore potential training methods that they felt may enhance their athletes' performance. Ironically, many of the training systems we utilise today were developed in this period of field-based investigation and experimentation; evaluating the direct effects of various systems of training. Additionally, as practitioners were drawn from a wide range

of disciplines, they were not hindered by the doctrines of single disciplines. The diverse viewpoints encouraged multidisciplinary thinking, and highlighted the critical importance of the coach to the S&C process. In terms of creativity, this environment had many of the advantages highlighted in this article, yet in our quest to intellectualise the profession have we inadvertently taken a step in the wrong direction, and lost much of what drove this initial creativity?

The move to an academic discipline

I am not suggesting that these days were Utopian. Learning simply from trial and error, although critical to understanding, is naturally inefficient, and undoubtedly multiple methods were used that today would not hold up to any level of scrutiny. To enhance practice, coaches started to share their knowledge and expertise. Indeed, it was this desire to pool and share knowledge that initially led to the formation of the NSCA in 1978. This involved analysis of what coaches were doing, and the results they produced in the training environment.

Most coaches generally acknowledged that there was a growing need for evidence to support or rebuke methodologies. Subsequently, this led to an increase in the quantity of research carried out in the field and the move towards strength and conditioning becoming an academic discipline as well as an applied discipline. This move has been critical to the enhanced standing of the profession in terms of its academic underpinnings. However, it could also be argued that, as an unintended consequence, there has been a reduction in the opportunity for creative thinking and especially in the role that top practitioners have in driving the industry forward. Similarly, whereas the original intention was to generate research that guided training methods, it could be argued that the academic aspect of strength and conditioning has become an end in itself, governed by the rules and regulations of academia, rather than being guided by its original intentions.

A more homogenous industry

Undoubtedly, it is vital that the S&C industry actively promotes the development of the most highly skilled and knowledgeable individuals, and that appropriate education should play a major role in the development of S&C coach of the future. Yet this has

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potentially come at a cost: whereas in the past S&C coaches would come from multiple backgrounds, with not all having a classical education in a sport science discipline, today, it is increasingly the case that practitioners entering the field will have sport science degrees (and increasingly strength and conditioning degrees) and even Masters degrees.

At its heart, this is potentially a good thing, as the underpinning knowledge of today’s S&C practitioner has never been higher. Yet true understanding comes from interacting with the environment and this cannot be developed through academic study alone. Similarly, the increased homogeneity of the profession has also had potentially limiting unintended consequences. Although many coaches in the past may not have had classical scientific education, what they did often have were other skills, drawn from multiple disciplines, that made them highly effective S&C coaches. For example, many were trained teachers, and so often had exceptional teaching-based skills which made them great coaches. These would often communicate through stories rather than data, which are generally considered to be a far more effective tool of persuasion. Yet today S&C coaches are educated in the language of science, where data is everything and subsequently communication is often built around this rather than the real tools of effective communication. It is no surprise in these situations that athletes are often unenthralled and indifferent to our messages.

Thus, the diverse skills that characterised the early profession are increasingly being lost and subsequently a less diverse industry is being developed, which may lead to a reduction in the capacity for more creative thinking. Progress in many industries often comes from people who question underpinning assumptions and move in different directions. With increasingly everybody being educated in the similar manner, and developing the same basic assumptions are we unwittingly limiting our capacity to develop our field? As Einstein is reported to have said: ‘The only thing that interferes with my learning is my education’; could our current education unwittingly be limiting potential creativity?

The academic agenda

As discussed, it could be argued that the quest for EBP in strength and conditioning

is increasingly being driven by an academic agenda and dominated by research-based evidence, often to the exclusion of the other critical two pillars. Subsequently, a potentially crucial input – that of the practitioner reporting upon the application of the theory in the real world – is being lost, and as a result we are losing potential insights into outliers, deviations from the expected results, unintended consequences of applications, and so on.

Additionally, the trend of many of our publications to service the academic agenda may also be unwittingly limiting creative thinking. Academics are under pressure to publish in high impact journals and, as a result, journals themselves try to increase their academic impact factor. One of the ways of doing this is to insist all publications are evidence-based and to reduce the number of opinion and practice-based articles, as these do not fit with the limited single pillar academic classification of evidence. Again, this results in a more homogenised product, with often a virtual straightjacket on original thought unless there is data-driven research to support it. Consequently, authors are increasingly being drawn solely from the academic community and valuable insight from experienced practitioners is being lost. Additionally, the pressure to publish often results in studies that are well constructed scientifically but have little practical impact, as they don’t address the key questions that practitioners wish to be answered. The aim of science should never be simply to do good science, but instead should be to learn about the world and to gain insights,⁹ enabling us to act.

Furthermore, the peer review process, although held as a necessary standard of academic publication, can itself limit diversity. Peer reviewers increasingly get drawn from a more homogenous pool, with similar assumptions and bias. As a result, writers of more diverse articles, especially those that challenge assumptions, find it increasingly difficult to get them published, even if they are practitioners with evidence from their own experience. Consequently, many applied practitioners are unable to report many of their anomalies and valuable insights into the training process, and this valuable information fails to get into the academic domain. Thus, coaches who want to disseminate their findings have to look for other outlets for their insights such as websites or via presentations.

It could be argued that as long as practitioners have access to this information then it shouldn't matter. However, the evidence-based nature of S&C education means these potentially valuable insights cannot be utilised in academic work as they fail to meet the necessary publication-based requirements. Subsequently academic assessments will often have to exclude valuable insights, instead focusing simply on what has been published, as these assessments require 'evidence'. Given that formal education is the time when many assumptions and biases are made, and students will only have access to these academic publications, the perceptual space available to the budding practitioner is increasingly narrowed.

Importantly, this trend is likely to be multiplied in the future, as people educated via these systems become the practitioners and educators of the future. The career academic will become increasingly prevalent, meaning that there will be educators who have spent all their time in the education system, with no real-world training experience, inculcated into these biases and passing them onto the next generation. Thus, the reliance on the one pillar of EBP and a separation between the academic agenda and the requirements of the coach could widen further - again potentially limiting creativity and innovative thinking.

We must remember that strength and conditioning is at its heart an applied field and that the industry needs to

serve the needs of the practitioner and not simply the academic agenda. In this way, practice-based articles, where skilled practitioners can outline challenges they face along with the results they have gained through various methods are important in identifying potential avenues for enhanced practice. Additionally, experienced practitioners also need to be able to contribute to the education of our future generations of coaches - and not be limited by the academic agenda of an academic qualification-driven appointment system.

Moving forward

The industry has come a long way in a relatively short period of time, and to an extent is unrecognisable from what it was 15 to 20 years ago. Information on the training process has never been so vast, and we have never had a greater number of practitioners with immense knowledge of the training process. Evidence-based practice has been critical in driving the industry forward. But the focus on research only in EBP is increasingly marginalising the huge potential input of the experienced practitioner, the only person able to report on the entire impact of any training intervention - and critically able to report on both intended and unintended consequences.

As we move forward, we need balance - balance between the three elements of effective EBP, balancing the education of future practitioners between the

academic and the applied field, and balancing the quest for certainty with the need to manage uncertainty in the real world of performance. We need to be comfortable that we may never have a full understanding of the intricate factors affecting performance, and that there will likely always be things we do not know - but that at any instant we have the necessary information to be able to act appropriately in our unique context. We need to avoid being tied to dogma and doctrine and to avoid absolutes, comfortable in the knowledge that evidence may emerge that changes many of our basic assumptions at any time. We need to be comfortable to explore areas we believe may offer potential but for which no current evidence exists. A rich, diverse, development environment will maximise our ability to think creatively and optimise solutions in a wide range of environments. Are our education and professional development systems ensuring that we are sufficiently skilled and flexible to deal with this uncertainty? That is the key question.

To conclude, history often has things to teach us, and in terms of where we are in the industry perhaps the opening lines of Charles Dickens' *A Tale of Two Cities* may accurately sum up where we stand:

'It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of darkness.'

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