

SYSTEMS THINKING: S&C IMPLICATIONS

Ten tools for the systems thinking coach

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OVERVIEW

Part one of this article outlined why systems thinking is crucial to developing a deeper understanding of the challenges we face as strength and conditioning (S&C) coaches and how it can open up a world of options via which to enhance our practice. This naturally leads us to a key consideration: how do we become systems thinkers and what steps can we take to put this approach into action, especially when our biases, and the biases of our discipline, often act against systems thinking? This second part of the article will highlight some ways of applying systems thinking to our work, helping us to take important steps to becoming systems thinkers. It is not meant to be an exhaustive list and most definitely not a foolproof or linear list. Indeed, one common feature of emergent systems is that any time we feel we have the tools to understand the inherent complexities, something will emerge that immediately challenges this assumption. Instead, it needs to be considered as a web of tools; ways of thinking and acting that work together to help develop a more comprehensive and inclusive analysis of the challenge facing us and assist us in making more holistic decisions.

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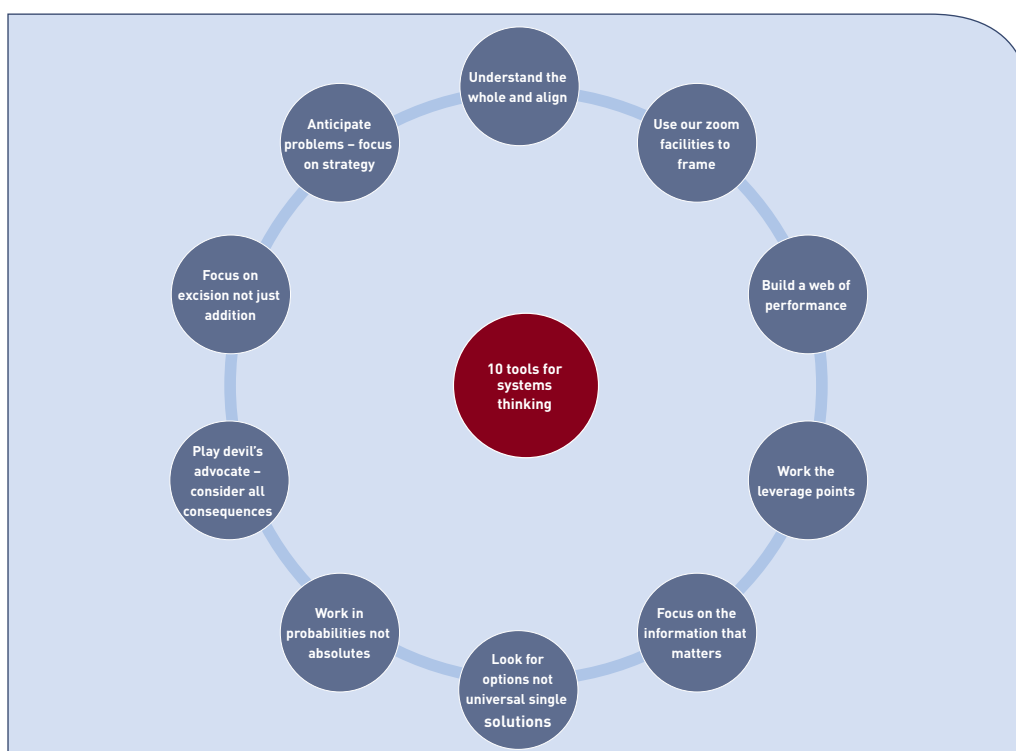


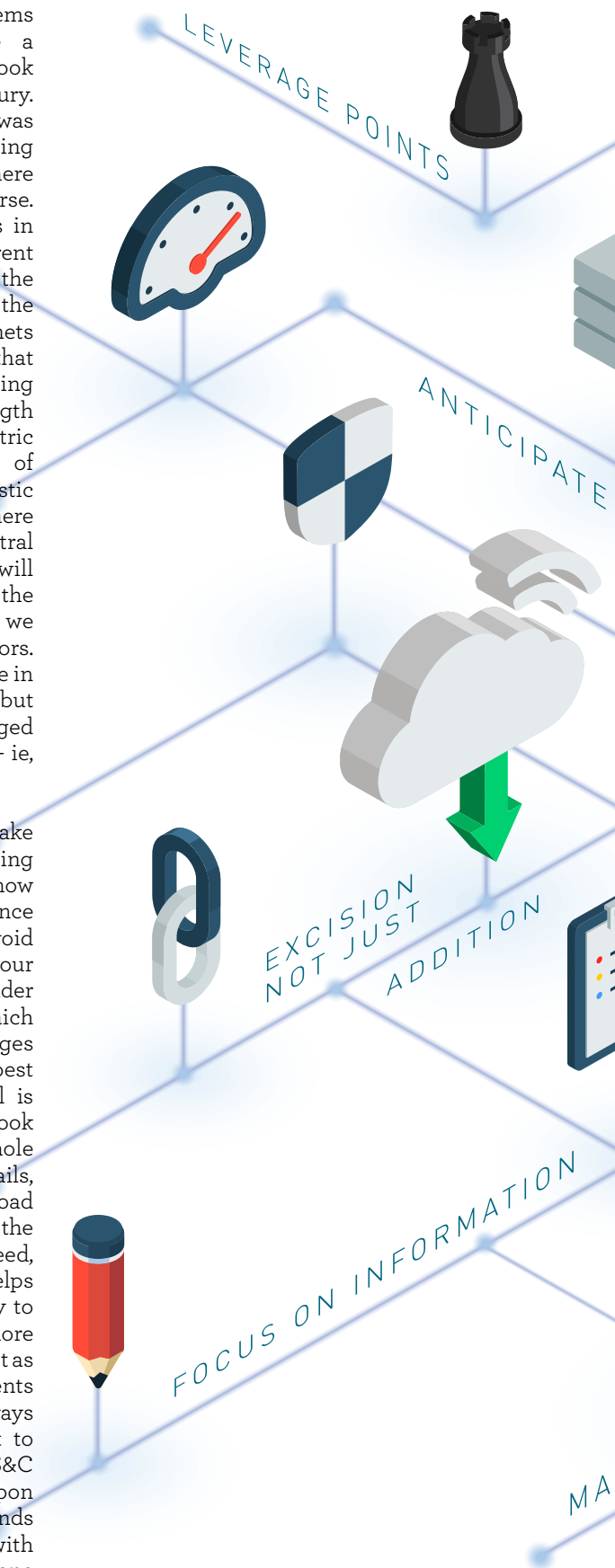
Figure 1.
Ten tools for systems thinking

‘Although there are undoubtedly areas in our practice that necessitate complicated analysis, not all do, and sometimes what is needed is just a change in perspective and a consideration of the wider system’

Understand the whole and align

It could be that a crucial step we need to take in order to start our systems thinking processes is to undertake a similar conversion to that which took place in astronomy in the 16th century. The prevailing thought at that time was that the universe was arranged according to the Ptolemaic, geocentric model, where the earth was at the centre of the universe. However, over time the inherent faults in this system became increasingly apparent and the model was slowly replaced by the Copernican, heliocentric, system where the earth was simply one of a number of planets orbiting around the Sun. It could be that a critical step towards systems thinking is for us to lose the notion that strength and conditioning exists as a geocentric entity, an all-powerful determinant of performance and assume a more realistic and humble, heliocentric standpoint, where we are but one player orbiting the ‘central theme of performance’. Our influence will never be fixed and will depend upon the characteristics of the universe in which we exist and how we interact with these factors. In some we may have a major effect, while in others our influence may be negligible, but ultimately, this influence must be judged against the effect on the central player – ie, performance.

As a result, any analysis must always take this heliocentric approach, understanding where we fit into the big picture and how we can best affect performance. Once this context is understood, we must avoid the rush to focus on the minutiae of our profession and instead gain a broader understanding of how the universe in which we find ourselves functions, the challenges we are facing and how our inputs can best facilitate performance. Our initial goal is to gain perspective: just as we would look at a piece of artwork as a coherent whole before considering some of the finer details, initially we need to take a similarly broad approach – ie, attempting to understand the whole before delving into the parts. Indeed, keeping the whole in mind actually helps us retain perspective as it is all too easy to fall into the rabbit holes of our ever more intricate analyses. As we delve deeper, just as artwork will consist of various components all layered over time, systems will always be playing out; it is always important to remember that the success of any S&C intervention is never solely dependent upon the intervention itself, but crucially depends upon how it is enacted – ie, does it align with the wider performance objectives, is it done





consistently, with the requisite intensity of effort and so on. Thus, this initial ‘whole’ approach helps us to determine which parts to focus on, and how they coalesce into the big picture. As a result, our initial analysis has to look so much wider than our current approach to needs analysis and consider all of the factors that will ultimately decide whether our interventions will translate into enhanced performance.

To maintain the astronomical perspective, the success of any system will be maximised when the stars align. A characteristic of a well-functioning system is that the goals and actions of as many of the working parts as possible are aligned. Understanding the overarching goal of the organisation and of the key individuals acting within the ecosystem is crucial; aligning our own actions and behaviours to these wider goals is more likely to facilitate success than acting against these powerful forces. Similarly, aligning our own objectives with those of the athletes will also increase the probability of success. Rarely will an athlete want to improve a fitness capacity for its own sake, instead it will typically be to achieve a performance-related goal. Where our practice can align with this goal, we can facilitate the likelihood of success. Of course, this is not always possible and there will undoubtedly be times where we have to consider the compatibility of our visions and beliefs and that of the organisation we are working in.

Use our zoom facilities to frame

One challenge to taking this wider systems approach is the harsh reality that it is unlikely that anyone will have a full understanding of the entirety of the factors that will ultimately affect the success of any programme.⁹ In the world of the system, developing a definitive and accurate representation of the system in its entirety will always remain elusive, and as a result, there will always be unknowns.

A lack of full understanding is not necessarily a barrier to action, but a lack of awareness is – unless we are aware of something it is impossible to actively change or affect it. Yet, as outlined in the first part of this series, changing our awareness and modes of thinking is extremely difficult, especially as we tend to frame information in terms of what we know, and as a result, our own biases, and the inbuilt biases of our discipline naturally act against developing wider or newer perspectives.^{2,8} Thus, in strength and conditioning, all too

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often we frame our analysis solely in terms of the characteristics of the intervention and the athlete’s physical qualities, just as the scientific method advises, looking for answers in this narrow realm and presuming that success or failure can be attributed solely to the intervention itself.

Yet as soon as we frame, we exclude, and this level of framing too often excludes factors that are crucial to success. This is why looking at strength and conditioning from the more inclusive whole picture – the ‘ecosystem’ approach – is important. This does not come without a challenge as the sheer scale of the task is imposing; indeed, we could potentially extrapolate possible influences to a societal level. So, at some point framing is crucial, but this needs to happen not as an arbitrary choice but as a decision guided by the interaction of the actions outlined in this article. Framing needs to consider the information gleaned via the big picture perspective, from the premortem activities, the consideration of leverage factors and so on. It also needs to involve a realistic analysis of what can be controlled.⁹ Being aware of diverse factors is important, but what is just as important is to progressively narrow the focus and zoom in to the critical factors that can be controlled and influenced – but crucially we need to avoid the temptation to focus too narrowly too quickly. Similarly, we need to retain the capacity to zoom out as and when required to ensure that the wider context remains in our perspective.

Build a web of performance

Systems thinking requires that we let go of our search for singular cause and effect, and instead focus on identifying the web of factors that can potentially affect any intervention – factors that will exist at multiple levels. As we aim to frame our analysis at an appropriate level, one useful tool in considering the wider context of our interventions is the concept of the premortem.⁵ In essence, this is the reverse of a postmortem, where instead of looking back at an event we look forward and considers all of the factors that could scupper the success of the programme. Using two simple questions – what needs to happen for this intervention to be successful and what could happen to sink the programme – can throw light on to the factors that need to be addressed. All too often, this level of analysis is overlooked, with decisions made entirely through the narrow confines of the classic S&C process. As a result, many

interventions are too often doomed to failure, even before they are enacted. Again, asking key questions that focus on wider logistical issues, behavioural issues, alignment issues and so on, become crucial. There are key questions to ask, such as: is there sufficient time allocated to S&C, do the key decision makers believe in the programme, are my systems aligned to the wider performance goals of the individual and organisation, have I communicated what I’m trying to achieve, are the athletes performing the programme with consistency and intensity? Answers to these key questions can give a fuller picture on the potential barriers to success, and help guide actions that can facilitate the success of a programme, building a web of actions that supports our interventions. On the converse, a failure to address these issues will often leave the best planned programme on the scrapheap of ignominy and failure.

Work the leverage points

As outlined in part one, a critical feature of complex systems is that every decision and every action can never be viewed in isolation; ultimately, they have the capacity to impact upon every part of the system. A crucial feature of systems is that at any point in time they are potentially in flux and can be swayed by the myriad of activities occurring within them, some dictated in a top-down manner, but many emerging through bottom-up mechanisms. This could be at the individual level, where for example the athlete’s performance state will be affected by every activity and action they undertake both within and outside the training environment, or it could be the functioning of the entire ecosystem where decisions made at an executive level will affect the functioning of the programme; but importantly every interaction has the capacity to alter the delicate balance of performance.^{5,6} However, all things are not equal: all of these actions, interactions and inactions have the potential to impact function, but their effect will not be uniform, across either space or time.¹

Importantly, it is not always possible to assume impact from the scale of the action. Some seemingly large actions may have negligible effects while others, often seemingly innocuous at first, may set in motion a cascade of effects that dramatically change the system, especially when these factors exist at critical points.^{1,2} These points are the leverage points outlined in part one: actions which have, in the vernacular

of economics, a ‘multiplier’ effect, where actions have a cascade of effects which can produce a disproportionate impact from the scale of the initial action. They provide very powerful, but also potentially dangerous, opportunities to a coach. Positively impacting upon a key leverage point can set in motion a positive cascade of effects or a virtuous circle; however, on the reverse side, impacting negatively on a key leverage point can result in a vicious circle of despair. What is critical is that a coach is able to discern key leverage points and have in their repertoire methods to deploy to positively impact upon these and set up the virtuous circle of a positive feedback loop.

Of course, this may be easier said than done and although some leverage points may be clear, others are less obvious and exist at multiple points and levels within the system. For example, at the level of the fitness variable, for a rugby player who has great strength but lacks the ability to maintain function and fades badly towards the middle of games, developing appropriate endurance capacities is likely to be a greater leverage point than developing even more strength. This may at first seem self-evident and something we would obviously do, yet sometimes, our systems of operation actually work against this type of agile action. However, once again, this level of analysis only highlights one route to success. An important consideration is that many crucial leverage points, especially in environments where S&C practices are only emerging, have little to do with S&C practice considerations, but much more to do with attitudes, beliefs and ultimately behaviours. If, for example, key decision-makers have little faith in strength and conditioning and only pay lip service to it, then no matter how sophisticated our planning and delivery there will always be an upper limit to any success. In many ecosystems, it is this type of factor that is the most crucial leverage point.^{5,6} Yet all too often these types of features are omitted from any analysis, and worryingly, means by which to deal with these challenges are rarely covered in any education provision.

Focus on the information that matters

Effective systems thinking is facilitated by accessing information which can help the framing process – ie, the identification of leverage points – and subsequently guide practice. However, information comes in many forms and must not be confused with data: access to ever more accurate data has





revolutionised strength and conditioning, but it also has potential downsides. Our industry is full of quotes such as ‘if you’re not measuring, you’re only guessing’: although this has a large element of truth when considered in relation to the narrow construct of strength and conditioning, it misses some of the key points required for systems thinking and sets up two dangerous precedents. These are firstly, a belief that data are always superior to other forms of information and secondly, that what we are measuring always matters. We must remember that a key to systems thinking is not collecting more data but identifying the information which has the biggest impact – and we must not confuse sophistication for impact.

To start to understand this, we have to differentiate between data and information. Data are simply raw material and always need to be processed before it becomes useful – data without context and analysis are just noise.¹⁰ It is only through analysis and evaluation that data become information, and only when this information is put into action consistently, in context, to achieve a given objective, can it be considered

knowledge.⁵ We must always remember that information itself does not solely consist of numbers, it relies on a range of sources some quantitative, some qualitative, and some even intuitive, all combined into structured formats which can help guide action. In our data-obsessed incarnation of strength and conditioning, we often ignore these qualitative and intuitive sources in the belief that quantitative data are vastly superior and have all the answers. But experienced coaches instinctively know that some of their actions are as driven by their hunches and intuitions as by hard data. They will recount that they can often ascertain a better understanding of an athlete’s feelings through a conversation than through an app. The key to systems thinking is to let go of these prejudices and access as many sources of information as are needed to facilitate the systems approach and to ensure that these can be processed to provide an effective picture of the ecosystem so that effective plans can be enacted, and potential problems anticipated and dealt with.⁵ In reality, quality information will take many forms and no one form is universally superior. What counts is not how complicated or sophisticated the information is, but how it is used to facilitate practice and get results.

The fact that we can measure an ever-increasing range of variables opens up opportunities, but is also a potential rabbit hole into which we can inadvertently be drawn. We know that many things change in a system, but that everything does not have an equal influence. It could be that in our quest to collect data, we are sacrificing breadth for depth, and framing problems too narrowly too early. As a result, our focus is often drawn inexorably onto the details and results of interventions, but we are far less effective at recording the state of the system that produced these results.¹⁰ We often overlook information that can help us make important adjustments and only focus on recording ever increasing quantities of data. As a result, simple and often relatively easy to remedy issues hide in plain sight. Much of the research we accept as evidence similarly lacks this wider perspective and much of the rich discussion that should emanate from the interventions is left in the field of the ‘noise which must be controlled for’. Yet it could be that in this noise lies information crucial to effective practice. We need to remember that there will often be key leverage points that cannot be measured quantitatively, whereas much of what we can measure may be largely irrelevant in the wider context. Our focus should never revolve around simply collecting more data,

but should also involve trying to better understand what we have and using this information to enhance our practice.⁸ We need to be far more judicious and holistic in terms of identifying the information that we truly need in order to guide our practice.

Look for options not universal single solutions

As outlined in part one, we are naturally drawn into the search for a single reason, a single best solution and this will guide our thought processes and practices. It could be that our focus on the traditional scientific method, the search for cause and effect, further pulls us in this direction to the point that we can believe that when we do X, we 'will' get Y. However, although this has benefits in the more linear aspects of science, systems don't work like this and rather than working with isolated variables a range of variables will be interacting – all impacting on the functioning of the system at any one time. So, while we may not see any impact of X on Y, this may not be a failure of the intervention itself but simply that the necessary 'web' conditions for success may not have been present or that other factors may have masked any potential change.

So, our analysis must necessarily involve the wider canvas and assess the diverse range of factors that need to be considered when attempting to enhance performance – we must be contextual in our analysis. As a result, we must move away from searching for a universally applicable solution and look for those solutions which are optimal in any given situation – contextually applicable solutions will always be the key to effective strength and conditioning delivery, no matter how attached we may be to a given method or dogma. In any situation, there is likely to be a range of options available to us, each with potential advantages and disadvantages. Our role is to weigh these options up using as many viewpoints as we can, and to make an educated choice. Many a time, the preferred option will depend upon the perspective taken and understanding the leverage points of the ecosystem concerned. We pride ourselves on our evidence-based approach, but the reality is that the same action will not have the same effect in different contexts and it is likely that it won't even have the same effect in the same context at a different time. In the words of the Greek philosopher Heraclitus: 'No man ever steps in the same river twice, for it's not the same river and he's not the same man'.

Work in probabilities, not in absolutes

Given the range of factors that must play out in determining the results of any intervention, the likelihood of any degree of certainty is necessarily low and so we must move away from thinking in absolutes. There will never be a guarantee that a given method will result in a given change and we must be comfortable in letting go of the idea that science will give a single, universal, and definitive answer. Systems do not work this way and the 'sensitive dependence on initial conditions' means that context must be a foremost consideration in any decision. Whether we acknowledge these factors or not, the fact is that they are all interacting and affecting our outcomes and, as a result, prediction becomes extremely hazardous – strength and conditioning will always have a stochastic element to it.

However, this is not to say that we cannot make educated choices – of course we can, and our science and theories help us make these decisions.⁸ We can never work in absolutes, but we can work in probabilities and this is how best to think of the likely impact of any training method. Interventions grounded on established principles and with a history of success will always be a key cornerstone of practice and increase the probability of success. The better our models and thought processes can reflect the stochastic nature of what we do, the more likely they are to generate realistic options and further enhance success probability. It can also be helpful to consider our training theories themselves in terms of probabilities rather than absolutes



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– as rules which apply generally, but not as templates cast in stone: it is our role to create the conditions which maximise the probability of success. But we must be aware that every system, every programme, and even our theories have their Achilles heel and part of systems thinking is to identify this and where possible mitigate against it.¹

Systems thinking requires us to move away from absolutes and to incorporate conjectures – the ‘coulds’ and ‘mights’ that are essential thinking in probabilities.³ Success requires more than just a great programme: we need to stack the odds in our favour by addressing as many of the potentially mitigating factors as possible and building our web of support for any intervention. We must also keep in mind that success can never be guaranteed as there will always be factors ready to trip us up. Yet all too often the antiseptic language of our profession pours scorn on this type of approach, and as a result these complex factors tend to be the very features that people want to leave out in an attempt to achieve a certainty of understanding.

Play devils’s advocate – consider all consequences

Given that no action ever works in isolation, an important feature of systems thinking is to consider the wider impact of any decision. Once again this is often easier said than done – some effects will be relatively easy to predict but there will always be those that confound us. In many instances, these effects are termed unintended effects. For example, a decision to drop a test from a testing battery may make total sense from the perspective of the validity of that test, but it could give athletes the impression that that fitness variable is no longer considered important and result in a lower level of compliance when that variable is trained at a later stage.

However, it could be that unintended effects are a misnomer, as any effect is simply an effect. The unintended part comes from the fact that we were unable to predict it, and this may be as much an issue with our framing as with the effect itself. Our challenge is to ensure that our framing is wide enough to help us predict as many of the effects as possible and also diverse, looking at the potential consequences from as many perspectives as possible. Devil’s advocate thinking can be especially useful here, where throwing up as many potential challenges and consequences as possible can unearth

previously unanticipated downstream effects. Again, this clearly emphasises that there will rarely be a universally ‘right’ answer to any training conundrum, and that there is always likely to be a value judgment element to any decision. Once these judgments are made, and using devil’s advocate thinking, the addition of what if/then thinking is especially powerful. The potential consequences of a decision can be kept in mind and actions taken if, and when, these are seen to be playing out.

Focus on excision, not just addition

A feature of any system is that it is constantly in flux and the state of a system (the stocks) depends upon the actions and interactions of elements within the system (the flows). In any system there will be positive flows – actions that cause positive changes and reinforce positive courses of action. However, at the same time there will be a number of actions that are taking place that mitigate against success, resulting in suboptimal results. Again, these will act at multiple levels: issues such as poor sleeping or nutritional habits, lifestyle stress, a lack of time provision for strength and conditioning and so on, will all affect the outcome of any training intervention. We are naturally drawn to instigating positive flow-based actions, but some of the most important actions in any system are to restrict and remove as many balancing flows as possible. In many instances, this can be a more powerful leverage point, and simply removing these from the system can have a positive impact on the likelihood of success. In this way the ‘via negativa’ – subtracting as many negative influences as possible – is often a very powerful way of enhancing practice.⁴

Anticipate problems – focus on strategy

With so many working parts, the likelihood of things going wrong is extremely high. The academic version of strength and conditioning, where the design of the programme is the high-water mark and the only determinant of success, is quaint but quixotic. Many a challenge will present itself between the programme and the execution. Indeed, as in the military vernacular, few plans survive beyond their initial meeting with reality.⁷ There will be problems and our task is to anticipate these and, where possible, mitigate against them. This is why multiple sources of different types of information are crucial. Our sophisticated, but bounded, metrics may be useful in some

areas of our practice but often are ineffectual in anticipating many key problems.

The ability to anticipate problems is one thing, but the ability to deal with them is quite another thing, and in some instances mitigation itself may not always be possible. As a result, we must be able to develop alternate plans: these plans may not be optimal in the classic sense, but they avoid the potential catastrophic problems that may not only prevent success, but set in motion effects that prevent the strength and conditioning provision ever being successful. We need to move away from looking at strength and conditioning purely from our current narrow programming perspective and instead utilise a strategy-based approach, where the entire gamut of systems-based considerations is taken into account, and where our practice is organic, constantly adjusting and evolving to the ebbs and flows of the ecosystem.^{5,6}

Conclusion

Thinking in systems brings us closer to the realities of our ecosystems than more traditional, linear approaches, where emphasis is almost entirely on the construction and delivery of the programme. With systems thinking, we start to develop a more encompassing and broader understanding of our practice and discipline. Additionally, our wider analysis will often throw up some quite simple actions that will have a great effect in our practice, simple factors that our increasingly academic view of strength and conditioning very often misses. Nicholas Taleb, in his book 'Antifragile', suggests that many disciplines suffer from a similar obsession with the search for overly complicated solutions: 'People with complicated tricks

and methods in their brains start missing elementary, very elementary things'.¹¹ Although there are undoubtedly areas in our practice that necessitate complicated analysis, not all do, and sometimes what is needed is just a change in perspective and a consideration of the wider system. However, this is not to say that these steps will be easy, as systems thinking requires a far greater breadth of awareness and analysis and also necessitates a step into the unknown. To some extent it requires us to become humble and comfortable with our ignorance. In many instances we will have to furrow our own path, take decisions that may have no precedent.

We can never assume that we can march forward into a world of certainty, but instead we must be comfortable that there will be surprises waiting for us, some pleasant, some less pleasant, some even grotesque but all that we can learn from. The potential rewards are great, allowing us to respond in a context-specific manner, accounting for, and mitigating against, many of the pitfalls that scupper many a programme and providing the contexts for our actions to thrive. Over time, despite the fact that we can never control systems, we can design them and redesign them in a way that increases the probability of success.⁹ Hopefully, the 10 tools outlined in this article will help coaches take the first steps to becoming systems thinkers and increase the accessibility of this powerful mode of thought. However, the tools outlined here must be considered no more than a primer. The list is necessarily incomplete and as we move forward new tools will emerge. Importantly, coaches will also develop their own tools, and we must be happy in the knowledge that if something works for us, we are at liberty to use it whether or not it has universal application or research validation.

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