Journal of Systems Thinking

Mixing Methods in Systems Practice

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1. Introduction

In recent years much has been said about the benefits of creatively combining research methodologies. The argument has been widely rehearsed especially in the behavioural and social sciences where the virtues of the so-called 'mixed methods' research are widely advocated [1–7]. In the humanities interdisciplinary studies have become popular currency; elsewhere it is possible to detect a shift towards pluralistic thinking where scholars are now more inclined than previously to explore beyond the boundaries of traditionally favoured theories and paradigms, to look at how they might work together, and occasionally to suggest how they might be integrated at the meta-level.

Simultaneously across a wide range of professional fields, combining techniques, tools, and standards for practical interventions and systems design has become commonplace. Examples may be found in agriculture, architecture, counselling, education, housing, information systems, environmental planning, management, organisation development, public health, and social policy to name but a few [8–12].

In the midst of all of this, there is ample anecdotal evidence to suggest that systems practitioners have routinely been combining and mixing methodologies for many decades. Moreover, there are literally hundreds of case accounts of mixed methodology interventions, and almost a forty-year history of academic debate on the topic that is well rehearsed through the literature.

Monomethodology

Despite the heightened interest that academic communities have shown in combining research methodologies, and in pluralism more generally, even a cursory glance at the content of most of their journals bears testimony to the resilience of the so-called 'reductionist' approach to knowledge advancement. This is hardly surprising since the overwhelming majority of universities, where most academics are trained and socialised, continue to mirror a fine graded division of labour. Here, heavily siloed faculties are very often populated by scholars whose work is narrowly constrained in the selection of topics, in the collection and analysis of data, and in theory development. And while 'systems' as an area of study and applied practice has avoided the worst excesses of this by seeking to operate more holistically and across disciplines, those who practice it are not immune to reductionist thinking. Historically many systems communities have emerged where members have a common interest in applying a particular methodology in the same problem situation type. Enduring communities of scholars in areas such as system dynamics, soft systems methodology, constraints management, and organizational cybernetics immediately spring to mind. This, of course, does have its benefits. Having a group of highly

focused scholars working collaboratively to accumulate experience in using a particular methodology significantly speeds up the learning process. Moreover, in some cases high level expertise developed out of many years experience in using a single methodology is not only advantageous, it can be a precondition for success. In classical operational research for example, it is imperative that someone who is seeking to design and/or optimise systems such as inventory control, scheduling, crew rostering, timetabling, queuing vehicle routing, and basically any form of production system that involves a flow of materials or information, has an appropriate high level of expertise in applied mathematical modelling. And while not all systems researchers will need to be as mathematically adept as those in areas such as these, there are other specialized domains of systems practice where demand is such that there is little need for the individual concerned to contemplate the need for broadening the range of methodological weaponry at his/her disposal.

Beyond Monomethodology

Nonetheless there will be times when the individual will feel the need to explore beyond the routine application of a familiar methodology or technique. There are a multitude of possible reasons for this. It might be a straightforward case of pure curiosity; the individual might just want to learn about different ways of approaching a certain problem, and/or extend their capabilities in handling new ones. It could be a matter of expediency, for example when the results of a 'tried and trusted' approach fail to meet expectations. It could be where there remains a degree of uncertainty about an initial assessment on what needs to happen and where the individual is looking for ways of 'triangulating' results. It could be that the individual, and/or the client wants to probe more deeply into a potential solution before taking action, as is very often the case in social science research where the results from an initial quantitative survey is followed up with a 'deep dive' qualitative investigation. Increasingly though, it could be that a hitherto intransigent problem, as initially configured, needs to be reconceptualised as part of a much larger and more complex 'system'. In this scenario, combining methodologies may be necessary to explore the boundaries and dynamics of this system, the relationships amongst its interacting components as well as the different perspectives that might exist within it. This is very much the situation in complex areas such as health, poverty, education, crime and global security.

It is scenarios such as these that might tempt individuals and/or teams to consider extending their capabilities with a view towards combining methodologies in which they already have expertise, with something different or new. And it is at this point, when thoughts turn towards the options that might be available, that it becomes necessary to scratch more deeply below the surface of the catch-all 'mixing methods' term.

Some Key Definitions

In order to better appreciate the range of methodological options that might be available to someone who might be looking to explore the possibility of combining what they can already do well, with something new or different, more fine-graded distinctions are required. In the mixed methods systems literature, the terms most commonly used for this purpose are '*paradigm*', '*methodology*', '*technique*', and '*tool*'. Since these can be subject to multiple interpretations, here we largely defer to Mingers [11,13], who, as we shall see shortly, has been one of the more active contributors to the topic discussed here.

Beginning with the term '*methodology*', in the sciences and social sciences this is mostly used to describe a particular way of going about generating relevant information and knowledge about some aspect of the world (note that in order to avoid confusion, the distinction between '*methodology*' and '*method*' is not used here). This is also the case in the systems world; here however there is the added requirement that the knowledge so generated is usually geared towards taking action in the world. Hence, Linear Programming, System Dynamics, Soft Systems Methodology, Strategic Choice, the Theory of Constraints, Critical System Heuristics, would be regarded as ***methodologies***. All of these have a knowledge generating as well as an action component. Additionally they all advocate the use of particular *techniques*. Examples include mathematical and conceptual model building, constructing 'cognitive maps', developing current and future 'reality trees', formulating 'root definitions', drawing 'rich pictures', exploring 'variety engineering' and many more. To varying degrees generic systems concepts such as 'boundary', 'transformation process', 'monitoring and control', 'positive and negative feedback', and others are used. Beyond these there are often *tools* that are closely aligned with a particular technique. Very often these are software-related, such as the long established '*iThink*' with system dynamics, '*Decision Explorer*' with cognitive maps, and '*Viplan*' with viable systems.

Virtually all methodologies are based upon a set of one or more theoretical propositions which in turn make various assumptions about the nature of the world, what it is, how it works and how 'valid' knowledge about it should be developed. Particular configurations of these assumptions, theories and methodologies, are usually referred to as *paradigms*. These assumptions can cover ontology, i.e. what is presumed to exist in the world; *epistemology*, i.e. what constitutes valid knowledge of the world; *ethics*, i.e. what is considered valuable and/or 'right'; and praxeology i.e. how things should be 'properly' done, ie conventions and protocols for practice (see, for example, [13]).

These finer terminological distinctions bring into sharp focus the inherent limitations of the generic and potentially misleading term 'mixed methods'. While it provides a useful starting point, it is found seriously wanting when it comes to accounting for the wide range of possible ‘mixings’ that are potentially available. For example, at one extreme it might refer to a relatively straightforward combination of techniques within a single methodology, one that could be said to 'belong’ to the methodology', the other 'acquired' from elsewhere. Thus, ‘cognitive maps’ [14,15] could be used to augment and delve deeper into aspects portrayed in a ‘rich picture’ as part of a Soft Systems Methodology [16] intervention. It could mean a methodology being detached from its original paradigm and being used 'obliquely' [17], perhaps with some modifications, to support the logic of a different paradigm. In such a case the Viable System Model [18–20] could be employed to portray how complexity might be managed according to a particular conception of a system’s purpose. More complicated combinations would be when methodologies from two different paradigms are combined in the same intervention, or when an attempt is made to integrate them according to some higher-level logic. There are a multitude of possibilities here, some relatively easy, some more challenging (for a description of the more common ones see, [21]). The key point though, is that the generic term 'mixed methods' does not adequately capture the distinctive nature of these combinations, even less does it capture the issues that need to be addressed in constructing and using them.

Because of the varying levels of difficulty, some of these combinations are much more likely than others. This is particularly the case for the independent sole agent, somewhat less so for multi-skilled teams. From the perspective of the sole agent, some otherwise desirable combinations will simply not be feasible. For example, while it is not uncommon for mathematically-trained practitioners to graduate into using methodologies drawn from the social sciences, movement in the opposite direction is much less common. It would be very rare, for example, to come across a soft systems practitioner trained in the humanities or social sciences who has graduated into using complex statistics. And within particular paradigms, some combinations will be much easier than others. In one of the examples just discussed, once the basic techniques of producing rich pictures and cognitive maps have been mastered, the two could also be combined without too much difficulty. The foundational assumptions that, at the problem appreciation stage of interventions, acknowledges the importance of surfacing different viewpoints about the situation are the same in both cases. It would be an entirely different proposition however to simultaneously combine design-focused, so called 'hard' optimisation models, with 'soft' conceptual ones where the purpose is not to create something tangible that can be implemented but simply to promote learning more about a 'wicked' or 'messy' situation [16,22], hence to assist stakeholders with divergent viewpoints agree on a way forward.

Generally speaking, these propositions about the feasibility of the various combinations are reflected in the results of mixed method practitioner surveys [23,24]. Thus, in the Munro and Mingers' survey, across 163 interventions carried out by 64 respondents, it was discovered that while so-called 'hard systems' methods such as mathematical modelling, simulation and statistics were very frequently combined, mixing 'hard' and 'soft' was relatively rare. The same was found in the 'soft' regions of systems where Soft Systems Methodology (SSM) is frequently combined with Strategic Choice [25]; where, as above, cognitive maps are often used through SSM's 'finding out' phase; and where it can be used to 'front end', as well as guide the process of information systems development [26,27].

Exploring the possibilities

In most disciplines and professional fields, there are only a relatively small number of research and/or intervention paradigms, and the systems field is no different. Over the years, there have been various attempts made to categorise these. The most widely used of these is that which distinguishes between the so-called 'hard' paradigm that focuses on optimisation, efficiency and effectiveness of physical, and material processes in 'real world' systems; 'soft' systems that, in complex problem situations, uses problem structuring methods to transform divergent viewpoints into agreed agendas for action; and 'critical' systems that, in addition to promoting the complementary use of methodologies, has fundamentally addressed the issue of power, and explored ways of allowing higher levels of involvement from those who are excluded from debates about actions that may have a significant impact upon them. Other more recent attempts to carve up the systems community along paradigmatic lines have focussed on distinctions such as 'investigating boundary judgements', 'understanding complex relationships', 'exploring perspectives', and 'promoting organisational effectiveness' [28–30]. A similar categorisation is based upon 'exploring purposes', 'managing complexity', 'promoting viability', 'ensuring fairness', and 'promoting diversity' [31].

Irrespective of how one goes about delineating the various paradigms or identifying particular skill sets that various communities might rally around, the fact is that the systems field contains a potentially bewildering array of methodologies, techniques and tools. In principle, when put together in creative combinations, these can undoubtedly greatly enhance the ability of those with commensurate knowledge and expertise to respond to the myriad of purposes that might be pursued in an intervention. However, since knowing what combinations make sense in a particular situation is a different matter, the section below looks at some of the better known frameworks that purport to provide some basic guidelines that might be followed.

The System of Systems Methodologies

Essentially Jackson and Keys' [32] *'System of Systems Methodologies*' ('SOSM' hereafter) was a rallying cry for factions within the systems community to take a broader view of the discipline than had been evident previously. At the time, the SOSM did not explicitly argue the case for mixing methods or provide guidance for doing so. However its advocacy for the complementary use of methodologies based upon each one's distinctive strengths, undoubtedly paved the way for much of the debate on combining methods that occurred over the ensuing decades.

As Fig 1 shows, the SOSM is a two dimensional framework that draws attention to two sets of assumptions: the first that is being made about the nature of the problem situation being addressed; the second, about the social context within which it is located. With regard to the former, the so-called 'simple' category refers to situations where 'the system' is deemed to be comprised of predictably interacting components, and where the object of the exercise is to discover the nature of these in order to figure out ‘how the system might best work'. It is worth noting however, that the term 'simple' can be something of a misnomer; some of these systems and the interactions within them can be extremely complicated. For that reason, Jackson has recently incorporated into the SOSM this third category. For example, getting the right combination of aircraft crew members to the right airport at the right time, in the right condition, is obviously do-able, but it requires very complicated calculations and careful planning. A great deal of organisational problem solving that occurs in relation to material, physical, and mechanical systems, is of a similar vein.

In contrast, a 'complex system' is one in which the system components typically have a much wider range of characteristics and where there is much less predictability in terms of how they interact. Under such circumstances, for example in social and strategic settings, where the ‘system components’ are human beings and organisations, optimisation gives way to a more exploratory and iterative approach where interventions are based more upon on-going cycles of appreciation, action, reflection and gradual learning about ‘how the system works’.

The second dimension of the SOSM alludes to the relationship between participants and/or stakeholders who are involved in and/or affected by the intervention. Thus a so-called '*unitary*' situation assumes a degree of consensus on what the nature of the problem is; a '*pluralist*' one assumes divergent views; and a '*coercive*' one involves the privileging of a particular viewpoint, and where the powerful can act to protect its own interests at the expense of the weak.

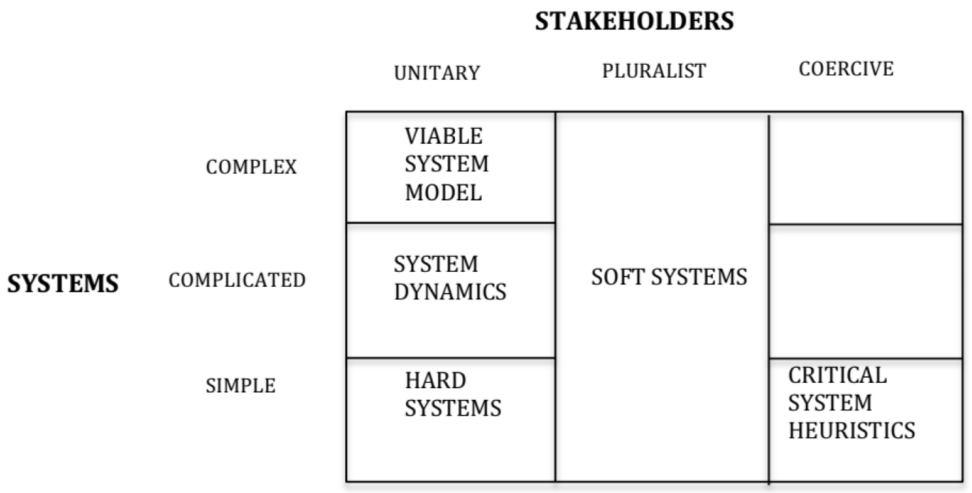

Fig 1 - A recent iteration of the 1984 'System of System Methodologies' showing the relative positioning of selected systems approaches (adapted from [33])

The resultant matrix of different problem contexts can then be populated with systems methodologies whose assumptions are congruent with each cell. To take three well known examples; according to the SOSM the 'best fit' for Systems Engineering is the 'simple-unitary' cell because it assumes establishing a clear purpose for the system is relatively unproblematic, and that it is technically possible to design it with scientific precision. Generating conceptual models that are based upon different and possibly competing 'worldviews' and leveraging the learning from these to establish a basis for action, places Soft Systems Methodology in the 'complex-pluralist' cell. And an intervention that seeks to elevate the perspectives of those who are affected by an intervention but excluded from debates about it, places Critical System Heuristics in the 'coercive' cell.

Given that it has only two - admittedly important - dimensions, the SOSM is clearly only a very rudimentary framework. And, with respect to one of these, Jackson and Keys have been at pains to reject the notion that there is such a thing as a single ‘correct’ interpretation of problem situations, hence that no ‘real world’ appreciation of a problem context would fit neatly into a single box. Moreover, strictly speaking, SOSM is not a framework for mixing methods. Its key purpose was to ensure that in using a methodology, the user was fully aware of the assumptions it makes about the situation of application. Yet when placed in its historical context, for the first time the SOSM did allow members of the hitherto largely independent systems communities to frame their contribution as part of a larger whole. In doing so it raised the prospect that complementary combinations of methods might be a way forward in adopting a broader and more holistic approach to interventions.

2. Total Systems Intervention

While the SOSM sowed the seed that mixing methods might be of benefit to systems practitioners, Flood and Jackson's [34] *'Total Systems Intervention'* (TSI) took the next logical step. This was to come up with a process that would allow those who were willing to enter a problem situation with a degree of open-mindedness about what it was and how it might be addressed, to make choices about an appropriate methodology and supporting methodologies might be chosen.

In simple terms, TSI proposes that different methodologies can be used in a complementary manner within a philosophy and set of principles, then known as 'Critical Systems Thinking'. The process itself traverses three iterative stages: 'creativity', 'choice', and 'implementation'. Borrowing from Morgan [35], the creativity phase draws upon different metaphors of organisation to gain a broad appreciation of the problem situation. It opens up the possibility that others might be used, but it specifically draws upon Morgan's metaphors that variously frames situations as resembling machines, organisms, brains, culture, and political systems amongst other things. The purpose of this is to encourage those involved to be open to the possibility that the problem as initially envisaged, might have multiple dimensions or be framed quite differently, For TSI, the insights from this creativity stage, combined with insights garnered from the SOSM, lead to an appropriate choice of dominant and dependent methodologies.

3. Multimethodology

A further set of theoretical propositions on mixing methods came a few years later with Mingers and Brocklesby's [21] paper on '*Multimethodology: Towards a Framework for Mixing Methodologies*". This brought an additional set of factors into the methodology decision mix. Like the SOSM, the first such addition draws attention to the context of application, but this time focusing on the various 'dimensions' of the situation under investigation. Drawing primarily upon Habermas [36], but also Searle [37], the key distinctions here are between the so-called material, social and personal *'worlds'*. The 'material world' refers to real physical structures and processes that can be thought of as existing independently of human activity. Resonating strongly with Giddens' [38] well-known 'structuration theory', the proposition here is that these structures enable and constrain human activity, but can also be reconfigured by it. The distinction 'social world' refers to the shared intersubjective world of human meanings and social practices, a key aspect of which is power. The distinction 'personal world' refers to the individually experienced world of human thoughts and emotions. In organisational contexts, problem situations inevitably contain all three dimensions; however it would be rare for all to be addressed in a single intervention. If this were to happen then the proposition is that some combination of 'hard', 'soft' and 'critical' methods could be usefully drawn upon.

The second proposition of Multimethodology is that systemic interventions are hardly ever a one-point-in-time event; they almost always take the form of a process that occurs over time. Logically it follows that since different methods are more or less suited to particular stages of that process, various combinations may be required to negotiate effectively through the entire project. To help make these choices, four key stages are outlined: ′appreciation′ of the problem situation; ′analysis′ of it; ′assessment′ of the validity of different explanations and consideration of intervention options; and finally, ′action′ to

communicate the results and intervene in some manner or another to bring about improvement, as determined according to particular criteria.

When these two dimensions are combined, a grid (see Fig. 2) is produced that generates 12 possible issues that may need to be addressed through an intervention. In practice, some will always be more important than others. However the basic idea of Multimethodology is that it is the particular combination of issues that are to be addressed that informs the choice and combination of methodologies. This of course is constrained by the resources available which obviously includes the knowledge, competences and commitments of the people involved. Determining how to proceed is clearly not determined by the framework, neither is it a 'free choice'.

	APPRECIATION OF	ANALYSIS OF	ASSESSMENT OF	ACTION TO
SOCIAL	social practices, power relations	distortions, conflicts, interests	ways of altering existing structures	generate empowerment and enlightenment
PERSONAL	individual beliefs, meanings, emotions	differing perceptions and personal rationality	alternative conceptualisations and constructions	generate accommodation and agreement to act
MATERIAL	physical circumstances	underlying causal structure	alternative physical and structural arrangements	select and implement best alternative

Fig. 2 - A Framework for Mapping Methodologies [21].

In the context of the evolution of debate in systems about combining methodologies, the fourth proposition of Multimethodology is highly significant. To that particular point in time, most of the debate had been about choosing and combining whole methodologies. The claim now is that the same mapping exercise used to inform this particular choice can be extended to include methodologies' component parts. This opens up the possibility that methodologies might be decomposed into their component parts, and that various combinations of methodologies, techniques, and tools put together in a wide range of creative combinations.

Pragmatic Pluralism

The claim of ‘TSI’ and ‘Multimethodology’ then is that these approaches to systems interventions can be used to better inform both the choice, combination and implementation of methodologies. However the many accounts in the literature of ostensibly successful systemic interventions that draw upon one or other framework, needs to be balanced against the claim that they can be unnecessarily restrictive [39–42]. The main argument here is that the novelty of circumstances, ‘surprises’, and the inevitable

'twists and turns' that characterise many systemic interventions requires a good deal more flexibility than any design framework could possibly allow.

Inspired by post-structuralist, and particularly Foucauldian thinking, these critics are highly suspicious of any form of overarching 'grand narrative' as the basis for deciding what and how to use a particular individual or combination of methods. The antidote, when expressed in very simple terms, is to do *'what feels right*' according to the prevailing circumstances. Now this might conjure up an image of someone simply cobbling together various methods and techniques purely on the basis of 'gut feel'. And while there is a sense that this is indeed what Taket and White's [39] 'Pragmatic Pluralism', and Foucauldian approaches more generally [43], are saying, there clearly is more to it than that. Indeed Midgley's *'Theoretical Pluralism*', which we shall come to shortly, sheds further light on the issue. The next section however covers updates on the earlier contributions provided by Jackson and Mingers.

4. Critical Systems Practice and Creative Holism

In the light of his further experience in using TSI, and in response to the various issues that had been traversed through the literature since its introduction, Jackson's *'Systems Approaches to Management'* [44], and *'Creative Holism*' [31], provide interesting updates on his position. While now seemingly comfortable with the idea that whole methodologies can be broken down and recombined in creative ways, Jackson strongly rejects the post-structural argument that methodology choice can be made simply on the basis of what might 'feel right' at the time. Critical systems practice, he argues, "*is all for pluralism but it must be a genuine one".* To promote this, he comes up with four sets of *'constitutive rules*', for *'generic methodologies*', each one of which is aligned with key systems paradigms that he identifies. These rules, Jackson argues, provide a strong antidote to unreflective pragmatism; they protect paradigm diversity; and they go some way towards preventing a single paradigm, unwittingly or otherwise, achieving domination over the others.

For Jackson, having more than a single dominant paradigm and seeking to protect each one by having constructive cross-paradigm dialogue at all stages of an intervention is important. Mingers [13] however, believes that this is both overly complicated and unnecessary. In a further twist to the debate, he claims that a better approach is to extract the most useful aspects of the existing paradigms and unify them at a meta level. Drawing heavily upon *'Critical Realism'* philosophy [45], Mingers' *'Critical Pluralism*' seeks to do this. This, he claims, can accommodate the most useful aspects of the already recognised paradigms, and hence can be used to accommodate maximum flexibility in the deployment of methods. There is insufficient space here to delve into the details of Mingers application of Bhaskar's ideas; suffice to say that these are discussed extensively across the literature (see, [13,46], in particular).

Beyond that, Mingers also provides a useful elaboration of what a practitioner might take from the mapping framework shown in figure 2. To recap, the various cells contain a rudimentary description of issues captured in relation to the various dimensions of problem situations as well as the stages through which interventions proceed. As has already been said, the basic idea is to then construct single or multimethodology designs by mapping the distinctive capabilities of systems methodologies against the issues being addressed and the overall purpose of the intervention. However he adds other design issues

into the mix including the need to take account of what exactly is to be modelled, what results are to be expected, the type of the information that might be required in the project, how one would go about collecting it, and the kind of role enacted by the primary agent.

Theoretical Pluralism

The final contribution covered here is Midgley's *Theoretical Pluralism* [47–49] which is located somewhere between explicit design and less constrained approaches to methodology choice.

In relation to design approaches such as TSI and Multimethodology, since one of the main tenets of Theoretical Pluralism is that it is critical of any action that is based upon some foundational epistemology, Midgley clearly shares the concerns expressed by post-structuralists towards anything that might even remotely resemble some form of 'grand narrative'. His argument is that when someone, or indeed a team, fully embraces any foundational epistemology, then it can make it very difficult to accept others, especially any that might contradict it. This he argues can create a form of 'pattern blindness'. Midgley further asserts that even when the foundational epistemology commits to pluralism, as it does in TSI and Multimethodology mapping frameworks, when someone's understanding of a situation is both constructed and evaluated through the same framework, disconfirming evidence of its utility is unlikely to be seen. The likely result is that the strength of the initial commitment to pluralism is weakened.

At the same time, when it comes to methodology choice and design, Midgley does not advocate unfettered pragmatism. Indeed he shares with both Mingers and Jackson the view that it is important to ground decisions about methodology choices, and about how to conduct interventions more generally, in particular understandings about the nature of the world, about how to generate valid knowledge about it, and about how to intervene in an 'appropriate' way. In other words the paradigm that is governing the intervention remains important. However using the term in this context requires us to rethink what it means and where it comes from. Conventionally a paradigm is considered to be a generic concept; most disciplines having only a few, and its locus is at the level of the whole discipline or at least a sizable proportion of scholars within one. On this Midgley's account it is a more localised phenomenon the locus of which shifts strongly in the direction of the individual.

So the argument seems to be that when someone is designing and conducting interventions that creatively combine methodologies, they are not operating across paradigms or creating some new meta-paradigm. Instead they are being guided by, and continually in the process of constructing and reconstructing a 'virtual' paradigm [50]. In time, these virtual paradigms may come to have more generic shared relevance, for example within a particular research group, university department, consulting organisation or the like. This does not always happen however and it is likely that most remain at the level of the individual.

Developing the raw material for these virtual paradigms requires that the individual concerned adopts what is described as a 'critical stance'; one that rejects the possibility of universal truths and universal standards for making methodological choices. It acknowledges that there are always multiple possible ways of experiencing, explaining and hence acting in relation to situations. As a result, an openness to learning not only from accumulated personal experiences, but also from that of others - either directly or

as reported on through the literature. The particular filter that Midgley places on such learning, aligns with one of his wider contributions to the systems field, namely that which conceptualises interventions as a process of 'boundary' decision making. This decision making determines which problem framings, variables, viewpoints, stakeholders, levels of analysis, and the multitude of other components that constitute a systemic intervention are either 'ruled in' or 'out'. It sees methodology-related decisions as a very important, but just one, of many boundary decisions that are made before, during and, through reflection, after an intervention. And for Midgley, it is the continually evolving theorising about these that constitutes an evolving paradigm, one that he argues results in maximum flexibility by encouraging the widest possible use of the range of methodologies, techniques and tools to which systems practitioners have access.

Conclusion

Whilst the philosophical and theoretical nuances of mixed methods systems practice continue to be debated through the pages of the academic literature, the general take up from members of the systems community strongly reaffirms the view that it has significant merit. As was said at the outset, the great majority of systems-based interventions will almost certainly continue to occur within the boundaries of particular organisations, and more often than not will involve the use of a single ‘tried and trusted’ methodology. Yet the case for mixing methods in some manner or other is compelling. There are, for example, hard systems practitioners who might benefit by augmenting their high level analytical and optimisation skills with those in problem framing and/or implementation. On the ‘softer’ problem structuring side of the field, there are those who might usefully add ‘nuts and bolts’ problem solving capabilities to their resumes. The strongest element of the case however might be in relation to the role that systems practitioners can and do play in addressing problem situations that occur across, and often way beyond, the boundaries of particular organisations. Here there seems to be increasing global recognition that systems thinking is pivotal in framing and addressing the myriad of issues that arise in complex areas of global concern: health, security, climate change, poverty, to mention but a few.

While arguments about the desirability for combining methods in systems practice are relatively straightforward, there are all sorts of individual, cognitive, cultural, institutional and philosophical obstacles that might stand in the way of actually doing it. Many of these have been widely discussed over the years [21,51–53], so there is no need to rehearse the details here. Let us just say that there are difficulties, but it is not impossible. The logistics of putting together methodologically eclectic teams can be challenging but it can be done. For the sole agent, it is true that most systems practitioners continue to be acculturated in and are likely to and/or work in environments that predispose them to doing certain types of systems work. Technically most are highly proficient in one or two methodologies; they may be aware of others, but ordinarily would not be immediately comfortable in using them.

On the other side of the ledger, it is worth recalling the ‘DSRP’ argument put forward by Cabrera et. al [28,29], which suggests that the very basic foundation for mixed methods systems practice is not only embodied in the very idea of ‘systems thinking’, but is also reflected in the way we human beings go about making sense of our existence in daily lives. On this account, the basic cognitive infrastructure is there, all that is required is a willingness to make use of it. There is ample evidence that individuals have been successfully doing this for many years.

Finally what about those who contribute to the literature; how might they advance the debate beyond where it currently is? I offer three thoughts on this topic. Firstly, even a cursory glance through the systems literature shows that there is no shortage of case studies that recount the user's experience of combining systems methodologies in some manner or other. Such accounts have undoubtedly raised the profile of mixed methods practice, they have added to accumulated wisdom as to how it might best be practiced, and - compared with a few decades ago – they have massively expanded the range of creative possibilities that might usefully be employed. It is worth noting however that these case accounts are drawn almost exclusively from the successes; not much is said about the failures. Without speculating on the reasons why this is the case, it does not make much sense. Practitioners, particularly neophyte ones, certainly need to hear about what combination of methods worked well together under what kinds of circumstances. But surely they could also benefit by hearing about the combinations that did not work well, as well as reflections by those involved as to the reasons why.

Secondly, it would be useful to hear more about mixed methods research conducted within the 'virtual paradigms' that Midgley speaks about. The literature is replete with accounts of systems practice conducted using the various methodology mapping frameworks identified in the chapter. Very little is said however about how, in concrete settings, experienced practitioners put together their own creative combinations based upon their own 'logics' that have emerged from accumulated experiences.

Thirdly, the discussion in this chapter has focused exclusively upon mixing systems methodologies that have traditionally been recognised as such through the mainstream systems and associated literatures. This being the case, it is important to acknowledge there are many individuals who draw upon methods, techniques, and tools from a myriad of other sources, and are doing so from a 'systems thinking' perspective. In further advancing our knowledge about mixed methods systems practice, it would be highly beneficial to hear more about this in the relevant literature.

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