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OR and systems—some comments on Checkland's reply to Eden and Ackerman

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In the *JORS* Special Issue on *Problem Structuring Methods*, Eden and Ackermann (2006) offer a *Viewpoint* and Checkland (2006) replies. This echoes a previous *JORS* Special Issue on 'Systems in OR', which featured full articles by both Eden and Checkland. In these earlier papers, Eden (with Graham) was sceptical about the usefulness of systems theory; Checkland emphasised the weaknesses of OR.

'Systems theory is seen as stressing the rational mind (what we think about) to the detriment of the transactional mind (which we use day-to-day). This stress can be harmful to practitioners who must work in practical, transactional worlds' (p 723). 'We believe that system theorizing is getting in the way of the practitioner better understanding how people like Ackoff and Checkland manage to conduct effective work' (p 728) (Eden and Graham, 1983).

'... well structured problems [which OR addresses] are extremely rare in human situations.' '... OR will face difficulties in principle if the problem cannot be expressed in terms of an objective to be achieved.' '... it is extremely unlikely that the real-world problem situation will map neatly the well-structured situations with which algorithms deal ... OR methodology has a weakness to the extent that it imagines that pure problem forms map real-world problems.' '... because OR is a putative science ie it seeks to establish testable public knowledge, and because the currency of science is rational thought, OR will be able to deal with real situations to the extent to which they exhibit rational behaviour or are susceptible to rational analysis. Idiosyncratic irrational behaviour will be difficult to bring within OR's universe of discourse.' 'In a sentence, the weakness of OR ... is that it is wedded to logic in situations in which logic is not necessarily paramount' (Checkland, 1983, pp 667–668).

Thus both sides of the argument accused the other of being overly rational, of not working with the practical realities of the situation. Time has moved on; OR continues to be valued by clients; soft systems methodology has successfully established a niche for itself within OR and elsewhere. However, while in the latest exchange Eden (with Ackermann) chooses to emphasise the similarities between the more

established PSMs, Checkland continues to promote his systems approach (and other favoured PSMs) at the expense of OR more generally. He harks back to his earlier views. I would like to comment on some of his statements.

On the history of OR

Checkland's admittedly somewhat drastically abbreviated history in his *Viewpoint* seems to imply that OR was born out of the systems approach. He talks about a general interest in the systematic appraisal of work tasks (a more scientific approach) whose upsurge after the Second World War was fed by a greater interest in ideas about systems as whole entities, and in the feedback mechanisms by which systems can maintain their viability (Checkland, 2006, p 769). Now this may be so of other innovations that he cites (systems engineering, RAND systems analysis, Beer's viable systems model, early computer systems analysis, and Systems Dynamics) but it hardly applies to what Checkland calls 'classic' OR itself, whose roots (in the UK at least) lay in the desire to improve system performance by whatever means were to hand and not in any theoretical framework, let alone the systems approach. In the US, Churchman and Ackoff did embrace systems ideas but it can hardly be said that operational research in the US followed their lead in this respect.

On the sociological theories of OR

Checkland also says that underlying OR's approach (which he describes as carefully defining goals or objectives and then creating a system to meet these objectives) is an unexamined sociology of functionalism (Checkland, 2006, p 769). Let us examine this proposition. According to Wallace and Wolf (2006), sociologists tend to make distinctions between theoretical sociological perspectives in terms of aspects of their *methodology*, their *subject matter*, the *assumptions* underlying their approach, and the *types of questions* they believe social theory can and should address. In their subject matter, theoretical perspectives divide rather neatly between those perspectives that are concerned with the large-scale characteristics of social structure and role, or *macrosociology*, and those concerned with person-to-person encounters and the details of human interaction and communication, or *microsociology*. There are two essentially macrosociological approaches. *Functionalism* (with intellectual roots in Durkheim and his forerunners, the key exponents are Parsons and Merton) studies society as a system of interrelated parts. *Conflict theory* (with intellectual roots in Marx and Weber, the key exponents are Dahrendorf, Coser and Collins) sees society as an arena in which groups fight for power; power's unequal distribution leads to conflict—power is essentially coercive. Power in society can either be critiqued or accepted and studied. One of the key difference is that functionalism sees social activity as motivated by *values* whereas conflict theory sees it as motivated by *interests*. There are three microsociological approaches. *Symbolic interactionism* (with intellectual

Table 1 Comparison of sociological perspectives (Wallace and Wolf, 2006, p 11)

Levels of analysis	Macro	Micro
	Functionalism Conflict	Symbolic interactionism Phenomenology Rational choice
View of Human Beings	Predictable	Creative
	Functionalism Conflict Rational choice	Symbolic interactionism Phenomenology
Motivation for Human Social Action	Values	Interests
	Functionalism Phenomenology Symbolic interactionism	Conflict Rational choice
Scientific Approach	Deductive	Inductive
	Functionalism Conflict Rational choice	Symbolic interactionism Phenomenology

roots in Weber and Simmel, the key exponents are Mead, Blumer and Goffman; it also includes the grounded theory of Glaser and Strauss) is a social psychological approach, which studies how the individual develops socially as a result of participating in group life. *Phenomenological sociology* (with intellectual roots in Husserl and Schutz, the key exponents are Garfinkle, Berger, Smith; it includes ethnomethodology) studies how people define their social situation once they have suspended or 'bracketed' their learned cultural notions. *Rational choice* (with intellectual roots in the economics of 19th century philosophers and economists, the key exponents are Homans, Blau and Coleman; it includes 'exchange theory') assumes that people are rational and base their actions on what they perceive to be the most effective means to their goals. Some social psychology and much recent work in biology, particularly socio-biology starts from a rational choice perspective. The approaches under each of the five headings vary considerably. For instance, Talcott Parsons, the archetypal functionalist, looks at the whole of society in qualitative terms based on systems thinking; his pupil Robert K Merton, also a functionalist, examines in his 'theories of the middle range' disconnected parts of society in quantitative, empirical terms (Wallace and Wolf, 2006).

Table 1 summarises some of the characteristics of the five approaches. Certainly some OR approaches share some of the features of Merton's middle range functionalism (systems dynamics, strategic choice analysis, multi criteria decision analysis perhaps); but others reflect a conflict theory orientation (metagame analysis, drama theory, critical systems thinking); and others can perhaps be seen as exhibiting a rational choice perspective (simulation, mathematical programming, queuing, scheduling). Perhaps modern neofunctionalism, which incorporates *inter alia* an implicit democratic thrust and incorporates a conflict orientation, could underpin a wider

spectrum of OR approaches. However, 'soft' OR is now an accepted part of OR. Thus SSM gives OR a phenomenological component. Perhaps, cognitive mapping, given its psychological orientation, gives OR a symbolic interactionism component. As to the 'scientific approach' in Table 1, much of OR, both 'soft' and 'hard', is inductive in nature (engaging with the situation to try to form a view as to what it is all about) rather than deductive (develop hypotheses from theory and then testing them). Nor is SSM unequivocally phenomenological in nature: the inclusion of an evaluation step in SSM in which participants are asked to judge whether a proposed action is 'systemically desirable' and 'culturally feasible' aligns SSM very closely with more mainstream OR as practiced (Ormerod, 1995). Such judgemental activities, which imply predicting the consequences of the proposed action, are not consistent with a phenomenological orientation. The functionalist nature of SSM's conceptual model and its presumption of monitoring and controlling activity also give rise to doubts about SSMs phenomenological credentials. Prévost (cited in Checkland, 1981, p 237) and Probert (1998) provide further discussion of this issue.

Readers will make up their own mind, but I conclude that OR cannot easily be associated with any one particular sociological perspective. I would go further and argue that it would be undesirable to thus pigeon-hole OR; much better to leave open the possibility of new approaches utilising any sociological perspectives that seem relevant.

On the philosophy of OR

Checkland contrasts his own phenomenological/hermeneutic approach with the philosophy of positivism he associates with OR. As was the case with sociological perspectives, multiple philosophies can be seen to be at work in OR. At times a

practitioner exhibits a phenomenological orientation (observe and experience a situation to try and infer or ‘induce’ what is going on), at times an empirical one (gathering and analysing data), at other times a critical one (try to understand the interests of different actors and thus deduce how they might view a particular proposed action). Again it is undesirable to pigeon hole OR in terms of its philosophy. It is better to recognise that the OR practitioner switches between these different orientations in a pragmatic fashion: they exhibit what can be called ‘pragmatic pluralism’. Taket and White (1996) suggest that postmodernism should be invoked to support such a position; I prefer pragmatism (Ormerod, 2006). Most practitioners will, of course, just get on with it without reference to any philosophy at all.

Perhaps some of the confusion arises because (as quoted above) Checkland views OR as a ‘putative science’ which tries to establish universal rules that are then applied in practice. Most commentators agree with Keys that OR can be better described as technology rather than science (Keys, 1989). OR is defined by its practice; OR as practiced is about researching local, specific situations; it is not about developing a knowledge base of universal theories, such as queuing, optimisation, etc. These models are just convenient tools, as are statistical methods, spreadsheets and so on; OR existed before they were invented. Indeed, in the early days OR also existed without university OR departments; the activities of academia do not define OR even though they contribute to it. Actually, OR is much closer to the sort of grounded approach that Checkland advocates and has encapsulated in SSM.

On the scope of OR

It would take more than this *Viewpoint* to unpick all the arguments that Checkland put forward in his 1983 paper (quoted above). However, in his 2006 *Viewpoint* he repeats one of them, namely that OR is limited to the analysis of aggregates which display regularities that can be analysed using the OR algorithms for queuing, depot location, etc; they express the logic of problem situations that recur. He continues: ‘Unfortunately, however, managers spend most of their time wrestling not with the logic of their situations, but with the specific idiosyncrasies which always render them unique’. It is true that much time is spent by managers dealing with idiosyncrasies but quite wrong to imply that the logic of situations is less important. It would in any case seem a reasonable use of their time for OR practitioners to concentrate on the logic which would leverage their time rather than on the idiosyncrasies which would dissipate it. It should also be recognised both that aggregates abound in practice and that OR is by no means limited to the analysis of aggregates. Industry, commerce and government contain many multiple entities—shops, bars, mines, planes, factories, hospitals, machines, lorries, tanks, customers, staff, soldiers, miners, pilots, doctors, etc. They can be looked at as aggregates, or broken down into relevant categories or looked

at individually. For instance, individuals can be allocated to flight crews based on personal availability and preferences; flight crews can be allocated to specific planes; planes can be allocated to specific routes; types of planes can be evaluated for performance and scheduled for maintenance and replacement and so on; and the performance of the whole fleet can be assessed.

On the relationship between OR and Systems

Checkland suggests that there is an asymmetrical complementarity between OR and soft methodologies: ‘hard approaches [which he associates with OR] being a special case, in particular circumstances, of an intervention using soft methodology’ (p 770). To examine this claim it is necessary to understand why he thinks the systems approach in general and SSM in particular should dominate OR. Checkland has high ambitions for the system movement. In *Systems thinking, Systems Practice* he says that not until the 20th century have significant challenges to reductionism (The scientific method of Descartes and Newton) been made and that in the book it will be argued that ‘the Systems Movement is the most serious of these challenges’ (Checkland, 1981, p 47). We thus must expect him to press the case—it is part of his *Weltanschauung*. However, he has to admit that: ‘This is not to say that systems thinking has made spectacular progress—indeed, on the whole the substantive results from the systems movement are still meagre—but the existence of the movement at all is a response to the inability of reductionist science to cope with various forms of complexity’ (p 74). Checkland continues ‘Systems thinking is an attempt, within the broad sweep of science, to retain much of that tradition but to supplement it by tackling the problem of irreducible complexity via a form of thinking based on wholes and their properties which complements scientific reductionism’ (p 74). In his subsequent *JORS* paper Checkland offers us a schema which ‘enables us to make sense of, or place, any example of systems thinking in the context of the [systems] movement as a whole’ (Checkland, 1983, p 669). In his schema he has at the highest level, level 1 ‘The systems movement’. Both OR and applications of soft systems methodology are accommodated in level 4. This is fine as an expression of Checkland’s *Weltanschauung*, his systems view. However, from an OR perspective the practice of OR would sit at level 1 with reductionist approaches, systems thinking, economic thinking, organisational behaviour thinking, philosophical thinking, strategic thinking, and so on, positioned lower down. This, of course, is no more or less valid than Checkland’s schema, it is simply a different *Weltanschauung*. The asymmetry in either direction is thus in the eye of the beholder.

Conclusion

I agree with Checkland that the PSMs are not management fads and that they will have a future because ‘they are ideas whose form and content have evolved through interaction

between the ideas and their practical use' (Checkland, 2006, p 769). The same, of course, could be said about OR in general both in 1983 and today. OR's great strength has been in the cauldron of practice (the swamp to use another metaphor) where ideas are both generated or brought in from elsewhere, where craft skills, organisational politics and theoretical ideas and perspectives rub shoulders, where proposals are made and tested in reality. The theories adopted have not generally been of a comprehensive kind but are an eclectic mixture based on statistical, mathematical, conceptual, economic, social, philosophical and other concepts. In an engagement (intervention) all the theories have to be embedded in a matrix of practice involving craft skills. Sometimes few or no explicit theories are used at all, reliance being placed on these craft skills to shape the issues through interaction with the people involved. OR practitioners provide the craft skills that enable systems, SSM and other ideas to be deployed.

I also agree with Checkland that it is by involvement in real situations that PSMs and other ideas have been honed. The new generation of intellectual leaders in the field which the PSM Special Issue heralds will similarly have to hone their ideas but I hope they will not feel constrained by inappropriate sociological and philosophical pigeon-holing, nor by Checkland's very particular take on what OR is and can do.

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