

# *Wicked problems revisited*

Richard Coyne, Department of Architecture, School of Arts, Culture and Environment, The University of Edinburgh, 20 Chambers Street EH1 1JZ, Scotland, UK

*I revisit Rittel and Weber's essay on the 'wicked problem,' and relate it to more recent theories about rationality and professionalism. Perhaps the most provocative challenge comes from Deleuze and Guattari's difficult commentary on 'the rhizome,' which has currency within much design studio culture. I posit the controversial conclusion that 'wickedness' is not aberrant. It is formulations of professionalism which pay homage to the idea of formal rules, goal setting, and calculation as representing the norm of rationality, that present as deviations.*

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Design tasks are commonly regarded as wicked or ill-structured, characterizations that pervade design research and practice (Kunz and Rittel, 1970; Rittel and Weber, 1973; Buchanan, 1995). The intractable nature of design is so accepted into the canon of design thinking that it is easy to lose sight of the radical edge of the original proposition, at least as presented by Rittel and Weber. Here I wish to revisit the concept of the wicked problem, positioning it within the context of contemporary phenomenological and postructuralist design thinking.

## *1 Wickedness defined*

It seems as though some problems are tame, such as factoring a quadratic equation, traversing a maze, and solving the tower of Hanoi puzzle. The latter consists of three rods mounted on a board onto which are stacked coloured disks of various sizes. The goal is to move the disks from one rod to another to achieve a pyramidal stack in the shortest number of moves. The problem is well defined, with a single goal and a set of well-defined rules: disks must be relocated on a rod one at a time, and a disk cannot be placed above a disk that is smaller (Newell and Simon, 1972). But problems of importance, such as



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designing a building or deciding on a transportation policy, are invariably 'wicked.' They are only loosely formulated. There is no 'stopping rule.' Wicked problems persist, and are subject to redefinition and resolution in different ways over time. Wicked problems are not objectively given but their formulation already depends on the viewpoint of those presenting them. There is no ultimate test of the validity of a solution to a wicked problem. The testing of solutions takes place in some practical context, and the solutions are not easily undone.

Rittel and Weber's (1973) article was an appropriate antidote to Herbert Simon's *The Sciences of the Artificial*, which appeared about four years earlier. Simon had followed the path of Bertalanffy (1969) and others in proposing a 'science of design, a body of intellectually tough, analytic, partly formalizable, partly empirical, teachable doctrine about the design process' (Simon, 1969, p. 58), with empirical science, mathematics, logic and algorithmic methods as the models (Meadows et al., 1972). Rittel and Webber joined a chorus of dissenters from such attempted rationalisation and argued persuasively, and in terms understandable to the systematisers, that the design process, and any other professional task, is only very poorly explained in terms of goal setting, constraints, rules and state-space search. The skill of the professional is better expressed in the actual framing of the problem to be addressed. Problems of any professional interest (wicked problems, such as deciding a public health policy) are already 'solved,' and the hard professional graft is already committed by the time the problem is identified, conjectured, and defined. Problem setting is a contingent, fraught, and sometimes consensual process for which there is no authoritative set of rules, criteria, or methods.

Simon subsequently advanced his own account of the problem of wicked problems, suggesting that some problems are after all ill-defined (Simon, 1973). Further arguments against a rigid systems view were advanced by Donald Schon (1963) and Polanyi (1967) at around the same time. In all, the focus was on the role of the professional and a looming crisis in the credibility of the professions. Where does the authority of the experts reside if not in their participation in rationality, best exemplified by a scientific approach to their discipline? There were similar machinations in science, well represented by Thomas Kuhn's (1962) *The Structure of Scientific Revolutions* (Kuhn, 1970) and Peter Winch's (1958) *The Idea of a Social Science* (Winch, 1988). Not only was the right of the professions to a foothold in science under question, but the authority of science itself. All disciplines, including those of the hard sciences, depend on modes of practice, tools, techniques, communities,

and histories. Such factors elude a coherent theory worthy of the name of ‘scientific rationality.’ There is no core to rationality.

So-called ‘second generation’ analytical methods shifted the ground to a consideration of communities and their means of communication ([Broadbent, 1973](#)). The objective was to make explicit the hidden processes of professional judgement and to expose them to scrutiny, through methods and diagrams. If professional methods defy some core in an idealisation of rationality then at least we can all play the role of empirical scientist in analysing the processes by which any judgement is made, and in an objective way. But this move from a rationality based on abstract logic to a more empiricist or experiential position merely shifted the problem of defining rationality and rational criteria to the broader arena of community consensus.

## *2 Responses to the problem of rationality*

Various responses have been proposed to ‘the problem with rationality,’ or rather, to use Rittel and Webber’s provocative language for posing problems: the problem with rationality has already been framed according to various agendas.

### *2.1 The dual knowledge response*

One response is to downplay the concept of rationality as the exclusive court of appeal. Rationality has to be balanced with human emotions and feelings. We have to be both scientist and poet. Theories of this unsatisfyingly bifurcated view of knowledge are generally mute on the subject of how the balance is to be accomplished. Rittel and Webber allude briefly to this problem ([Rittel and Weber, 1973](#), p. 158), and it has been well-aired in other contexts ([Coyne and Snodgrass, 1991](#)). A further response posits two modes of understanding, the theoretical and the practical, where designers explore ‘concrete integrations of knowledge that will combine theory with practice for new productive purposes’ ([Buchanan, 1995](#), p. 4). The theory–practice dichotomy is problematised by the pragmatists, to be considered below.

### *2.2 The pragmatic response*

A more satisfactory response to the problem of rationality is to shift the definition of rationality so that it embraces the ‘wicked’ factors alluded to by Rittel and Webber: value judgement, criticality, testing in context, uniqueness, inter-connectedness, authority of explanation, sociality, and the interplay of diverse value systems. This expansion of rationality was arguably inaugurated by John Dewey and the pragmatists to whom many North American theorists and thinkers are heir ([Rorty, 1980](#)). To

take one aspect of his argument, against any notion of the bifurcation between scientific rationality and the artistic impulse, Dewey argued cogently in *Art as Experience* (1934) that the scientific, and arguably the professional, enterprise is already imbued with aesthetic considerations (Dewey, 1980). We are beings who judge and evaluate, who cannot help project our likes, dislikes, preferences, wonders, intrigue, and disdain into a situation, whether we are inspecting the contents of a test tube, diagnosing faulty brickwork, or gazing at a sunset. Professional rationality cannot exist without the time-honed proclivities we sometimes dismiss simply as 'how we feel' about the matter in hand. The tacit qualities of professional judgements draw on the aesthetic dimension as much as that of any poet or painter, though arguably within different time frames, and using different modes of justification and explanation, and drawing on different authority structures.

The theory—practice duality too can be recast in practical terms as a dealing in different media. In this light theory can be cast as a process of textural production, the drafting or formulaic responses, generating discursive interventions, creating verbal explanations, and hand drawing, model making, building furniture, constitute further categories of production and intervention. Professionalism in design is accounted for by a raft of expert judgements grounded in contexts, practices and media, for which theory and practice constitute very crude descriptors. It is all practice.

Within this pragmatic orientation it is possible to proceed with even bolder steps than Rittel and Webber were prepared to advance in their tentative 1973 article. In fact *all* problems have the character of wicked problems, even maths problems or simple puzzles. This response effectively dissolves the distinction between tame and wicked problems. The fact that there is a socially-decided 'solution,' some neatly defined (socially-decided) legal moves, and a certain system of causalities to a simple 'problem' such as the Tower of Hanoi puzzle, is incidental to the entire context of motivations, commitments, and proclivities by which this portion of rods and coloured disks is partitioned out from the rest of our worldly experience as a game worthy of playing, by the rules. In other contexts the bits of wood or plastic are an irrelevance. The whole encounter with the puzzle already has the trappings of a wicked problem, though without the consequences. In other words a wicked problem is not a deviation from the well-understood world of puzzles, which have goals and solutions. Rather, puzzles are diminished versions of 'wickedness': applicable to highly constrained contexts in which we

sometimes choose to make up a formulation in terms of goals, constraints, rules, and structures.

### *2.3 The phenomenological response*

A further version of this response to the problem of rationality is to invert the priority of the systematisers. The science-of-design model (Simon) takes formal mathematical models as the starting point, presenting problems we encounter in day-to-day life as tricky variants of these, and much less well defined. The pragmatic model inverts this. Instead of ‘wicked problems’ we may speak of ‘human practices,’ ‘contingency’ and ‘sociality.’ (It seems that no one word is sufficient to explain the whole that constitutes our time-honed, tacit, social practices, and ‘wickedness’ already suggests aberrance.) Mathematics is not the language of the universe but a finely developed technique (or *techné*) with its own social practices, not least including processes by which certain formulations and procedures are judged interesting, simple, complex and/or elegant, and for which applications are found in every day practice. ‘Tamed problems,’ such as mathematical problems are causal microworlds that we, through enormously inventive interpretive skills are at times able to use to ensure that trains run on time, computers calculate bank balances, and bridges do not sway out of line.

A further advance on the pragmatic game of inversion is presented through the German phenomenology of [Martin Heidegger \(1962\)](#), see also [Dreyfus \(1990\)](#), [Winograd and Flores \(1986\)](#), which dates back to the early 1900s, and with which the positivist legacy of the systems theorists had remarkably little interaction ([Snodgrass and Coyne, 1997](#)). Here it is a case of moving the ‘problem’ away from a consideration of rationality. For the phenomenologist, at our core we are interpreting (hermeneutical) beings ([Gadamer, 1975](#)). Our whole world is imbued with the imperative to interpret. Interpretation is the foundation of all being, and as such is an indeterminate, contingent, and varied foundation. Heidegger’s difficult philosophising exemplifies the lengths to which radical thinkers can go to explore a new language for giving expression to ways of thinking outside of a rationalistic, systems-oriented frame. Rather than dismissing the systems view, Heidegger’s language seems to put it in its place. The problem for Heidegger becomes one of questioning what it is about the human spirit (Being) that compels us to think in a causal way, when everything else about our experience cries out against such systematisation. He calls this proclivity to give causal accounts ‘technological thinking’ ([Heidegger, 1977](#)). Part of this technological imperative involves the quest for foundations,

underlying theories, the systematisers' attempts at discovering unifying theories of professional rationality.

## *2.4 The narrative response*

On a slightly different tack, the theorist Paul Ricoeur writes against the quest of the analyst to uncover deeper meaning structures (Ricoeur, 1970), that is, to peel back the layers of evidence or derivative meanings to uncover the deeper meaning or truth beneath. Here the target is not rationality as such but the metaphor of layering implied in the impulse to rationalise. Here, not only could we consider the diagnostic quest of any professional approach to a problem, but also the quest to discover the rational basis of professionalism. In Ricoeur's case the target is Freudian psychoanalysis and the relationship between the analyst and the patient, but we can extend his argument to professional expertise in general. From a position that endorses the primacy of interpretation (hermeneutics), Ricoeur argues that we can (or should) resist the imperative towards 'layers of meaning.' What we commonly call 'analysis' is explicable as a series of emerging narrative constructions on the part of the analyst in the context of rival propositions, a great deal of work in revising and adjusting these narratives to something mutually agreeable, and an inevitable resistance to one or other narrative. 'Getting to the truth' and the concept of a 'rational basis' draw on archaeological metaphors that sound like work (digging). But for Ricoeur this labour can be recast in terms of another kind of work: overcoming the resistances to narratives. The problem-solving process is characterised substantially by talk, rather than by bodily dissection, surgery and other diagnostic procedures that perhaps promote metaphors of surface and depth. For Ricoeur, professional expertise involves a trade in narratives. This is a hermeneutically-inspired position easily aligned with Rittel and Webber's sociological account of problem setting. Professionals are caught up in fields of negotiation and dialogue within which they are charged with formulating an intervention, the reception of which may be met with resistance, promoting further dialogue (Bucciarelli, 1994).

## *3 Radical professionalism and the rhizome*

A further example of theorising that seeks departure from systems thinking, and debates about professional rationality, is expressed in the writing of the French-language philosophers Giles Deleuze (1925–1995) and Felix Guattari (1930–1992). Their work, along with much other French writing, has been too easily dismissed by systematisers as jargonistic, anarchic, ludic, provocative, and generally difficult (Bricmont and Sokal, 1997). Amongst other projects, Deleuze and

Guattari rail against the authority of generalisation, and layers of meaning. Again, their argument is applicable to both the quest for the basis, underpinning and substrate of professional rationality, and the task of the expert analyst in putatively uncovering underlying problems and proposing solutions (Kendall and Michael, 1998).

For Deleuze and Guattari there is no meaning greater than the parts, no higher or deeper level of meaning, in any case. Their objection to levels of meaning is in part directed against Noam Chomsky's theory of deep structures in language (Chomsky, 2002), and the project of structuralism (another French theoretical tradition), which looks for meaning in the relationships that underlie any cultural or linguistic phenomenon, as though there are hidden codes to be deciphered and interpreted. Deleuze and Guattari's philosophy runs counter to a systems-theoretical approach which assumes underlying relationships, rules, goals, state-space search, and dynamic feedback loops. Deleuze and Guattari's sometimes tortuous (and torturous) linguistic project seeks alternative metaphors to those of levels, origins, derivations and meaning structures, against which they provocatively and enigmatically posit the 'techniques' or 'concepts' of rhizomatics, schizoanalysis, stratoanalysis, pragmatics, and micropolitics. For Deleuze and Guattari such 'concepts are lines, which is to say, number systems attached to a particular dimension of multiplicities (strata, molecular chains, lines of flight or rupture, circles of convergence, etc)' (Deleuze and Guattari, 1988, p. 22). Though their philosophy of 'concrete universals' apparently draws on complex theories about sets, non-Euclidean geometry and topology (De Landa, 2002), we should not think they are trying to develop a science (or a pseudo-science) in their references to sociology, psychology, geometry, mathematics and biology. Structuralism claimed to posit a science of language, systems theory claims the status of a meta-science, but in heroic mode, Deleuze and Guattari renounce any involvement or complicity with science: 'We are no more familiar with scientificity than we are with ideology; all we know are assemblages' (Deleuze and Guattari, 1988, p. 22).

In their particular language game of de-systematisation, and counter to the metaphor of layered meanings, they posit the concept of the plateau, which is 'any multiplicity connected to other multiplicities by superficial underground stems in such a way as to form or extend a rhizome' (Deleuze and Guattari, 1988, p. 22).

*This plane has nothing to do with a form or a figure, nor with a design or a function. Its unity has nothing to do with a ground buried deep within things, nor with an end or a project in the mind of God. Instead, it is*

*a plane upon which everything is laid out, and which is like the intersection of all forms, the machine of all functions... (Deleuze and Guattari, 1988, p. 254).*

In the philosophy of the rhizome everything is surface.

Theirs is also a philosophy of subversion. Deleuze and Guattari's rhizome is parasitic on established structures. It grows from within to subvert the edifice. Institutions are prone to disturbances to their own operations and authority, from within. For Deleuze and Guattari the human condition, politics, language, art, history, and institutions are best understood through the rhizome and the machine running amok, a self-destructive or intensely self-transforming movement without beginning or end.

Deleuze and Guattari present a radical commentary on institutional structures such as those represented in the professions of planning (Gilmore and Camillus, 1995), architecture, engineering (Adams et al., 2003), diagnosis, law, education, research, and so on. In so far as the professions present coherent and authoritative knowledge structures they contain within themselves cracks, fissures, uncertainties, and strange, unaccountable practices. The radical professional doesn't necessarily dispense with the structures, but peers into the fissures and fingers through the crumbs. Against the assurances of the professional institutions Deleuze and Guattari seek out the risky, the transgressive, the deviant and the wicked. Though not initially to the taste of the professional seeking a means of persuading a clientele of competence, Deleuze and Guattari's approach presents a challenge to many of the tenets of professionalism, and their rich amalgam of metaphors drawn from many disciplines has found instant appeal in certain areas of design.

#### *4 Implications for design*

To summarise, we can go further than Rittel and Webber did in their 1973 article. Wickedness is the norm. It is tame formulations of professional analysis that stand out as a deviation.

Rittel and Webber highlight the sociality of problem formulation. It is surprising that the tradition of which they are a part seemed so aloof from contemporary thinking in continental Europe at the time, notably the long-lived traditions of phenomenology, the politically seditious writing of the Frankfurt School (Feenberg, 2002), and the more recent cultural theorising commonly labelled as structuralism and poststructuralism (Mathy, 1995). These are traditions from which Rittel and



Webber could have drawn (with much in a range of translations even then if needed) and against whom they could have evoked contrasts. But then perhaps their professional audience was already wedded to the quest for truth and relevance independent of any concept of the contingent authority of rival discourses.

The intellectual interest in many design schools now resides under the rubric of 'history and theory' that arguably draws on the canons of continental European philosophy (critical theory, structuralism, post-structuralism), as attested by anthologies (Leach, 1997), monographs (Tschumi, 1994) and the writing of prominent practitioners (Koolhaas and Mau, 1997). It is fair to say that the students in our architecture school are more familiar with Heidegger and Derrida than with Simon, and in the studio arguably draw more from the phenomenological language of the rhizome, disclosure (Newton, 2004), techné, making and enframing (Coyne et al., 2000), than the systematisers' language of problem, goal, rule, search, solution and hierarchy (Akin and Moustapha, 2004). The design methods movement with its advocacy of automation and the computer once defined the intellectual content of design schools. Within such a framework the questions commonly arose: How can we communicate better? How can we make design more efficient? How do we ameliorate error? What is the theoretical basis of design? (Friedman, 2003) How do we make better problem-solving tools? In some quarters, the methodologists have been usurped by the cultural theorists, by whom other questions are posed (or problems are formulated): What is the relationship between textual production and the making of artefacts? How is the authority of the professions negotiated? How are the boundaries between professional territories drawn? In what ways is the computer implicated in utopian narrative? (Coyne, 1999; Coyne, 2002) How is authority configured through technological networks? (Johnson-Eilola and Kimmheab, 2003).

The radical point of Rittel and Webber's characterisation of design as 'wicked problem solving,' is to instil a certain attitude and responsiveness to research questions. Questions of design do not exist as if issued from some source of eternal inquiry. Rittel and Webber suggest that certain questions can now simply go unanswered, or we may riposte with a volley of counter questions, or offer a challenge to the frame from which the problems are posed in the first place. This sceptical attitude accords with Kuhn's notions of how an intellectual field transforms itself across different frames (or paradigms). The problems of the last decade may seem unproductive, irrelevant, or even quaint now: Can computers think? Is there an algorithm for aesthetic judgement? How do

we make the design process more explicit? How do we put design knowledge into a computer? How do we improve the efficiency of design? In some cases we can counter a question with a question: 'What do you mean by thinking?' 'efficiency for whom?' 'by what criteria?'

In some cases we encounter what Kuhn describes as an incommensurability between frames. This is perhaps most obvious where researchers operating in one frame do not recognise or even hear the questions posed by researchers operating in another. This is a condition steeped in asymmetries, sometimes accountable in historical terms. A systems view, of the kind Rittel and Weber argued against, constituted the intellectual rudiments of a generation of design researchers, who were familiar with the ideas of goals, constraints, and rules, and now resist being pulled back to account for their renewed thinking in systems terms. On the other hand, certain systematisers may not hear the questions being posed within contemporary theory, and respond by asking for an indication of relevance: what is the relevance of Deleuze and Guattari for design practice? Questions and answers from one frame can appear irrelevant to another. The question of authority provides a good example. In his seminal book *The Postmodern Condition*, Lyotard asserts that the pressing question is 'who decides what knowledge is, and who knows what needs to be decided?' (Lyotard, 1986, p. 9). If a researcher is wedded to the authority inherent within a particularly instrumental view of rationality, as resident in a common sense logic, then the contingent and contested nature of professional authority may appear irrelevant. For such a researcher the question of how authority is derived or promulgated in design is not a matter for discussion.

Conversely, contemporary theorists do not always hear questions insisting on the operationalisation of an intellectual position. Perhaps we can see how to turn Herbert Simon's theory of the artificial into a plan of action, but how do you operationalise Rittel and Webber on wicked problems? A discourse that recognises the inadequacies of the impetus to operationalise, as a professional conceit, would find it doubly difficult to do the same for Rittel and Webber, or Deleuze and Guattari. It is rather the case that such writings point to a mode of inquiry. Rather than questions of operationalising theories, the question might be: how do these modes of inquiry relate to other modes of action? Clearly there can be no straightforward causal connection between design texts (theories) and design artefacts (buildings, products), except that certain problem settings provoke the continuation of discussion and inquiry more than others, in a particular intellectual context. My defence of

‘contemporary theory’ in the context of architectural education is that it provides a language and accords authority to ways of talking about issues in the design studio about which one might otherwise be silent: the gap, the space between, the trickster, borderlands, transgression, non-place, the digital uncanny, the sublime. Are these concepts waiting to be identified in language, or are they created through the discourse? In so far as such questions tax design theorists they constitute a linguistic turn to design research and practice. How we talk about what we do is as worthy of investigation as what we do. In fact talking is a mode of action.

A further response to the problem of rival discourses is to subsume the discourse of the other into one’s own. For example, one may assert that Deleuze and Guattari’s rhizome simply offers a variant on Alexander’s network model in *A City is Not a Tree* (Alexander, 1988), or Rittel and Webber’s advocacy of dialogue is simply a variant of the design methodologist’s exhortation to make design processes explicit in a way that facilitates communication, or the hermeneutical circle of question and answer is simply the feedback loop of systems theory. This response is too easy, already de-privileges the rival discourse, and in seeking ‘common ground’ glosses over differences. But it is a strategy that is hard to resist.

A similar response from the rival frame is to look into the questions being posed, to transform them in terms of one’s own frame. From the perspective of Deleuze and Guattari, we may assert that to operationalise is simply to expand the discourse, or pose the question of how texts relate to other actions, how designers bring what they read and discuss to bear on what they create. Constructing a plan is imagining and documenting a scenario. Setting goals can be recast as formulating rubrics, slogans or provocations that stimulate further responses. Rules are like laws, in that their use requires judgement, interpretation and application, or, in radical mode, that define the territory of transgression, or contain within themselves the seeds of their own subversion. Much work is directed to ‘rehabilitating,’ or ‘reclaiming,’ the terminology of one discourse in terms of the language of another. Rival ‘problem formulations’ and research paradigms are not exclusive or fixed, nor reconcilable through some concept of ‘a unitary public welfare’ (Rittel and Webbers, 1973, p. 168). Their working out exercises every faculty of research, education and professional action.

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