The author's sympathy will not save him from the ire of those with black-and-white attitudes. Vegetarians will not appreciate studies relating vegetarianism in teenage girls to eating disorders. He will get no thanks from the 70% of animal-rights activists who feel that avoiding animal products in clothing should be a top priority for their movement, yet wear leather themselves. Some biomedical scientists will be annoyed by Herzog's belief that the truth about the contribution of animal experimentation to medicine is "somewhere in between" the claims of anti-vivisectionists and animal experimenters.

Herzog contextualizes attitudes to research

using animals in the jaws of a Darwinian dilemma. On the one hand, lab animals are useful to science because shared descent with humans implies important similarities in biological function. On the other, this common ancestry carries with it the possibility of shared perceptions, emotions, intentions and — most worryingly — pain and suffering. In a chapter that covers the different moral status of mice in different locations in a research facility, and the inability of animal-ethics committees at different institutions to reach consistent conclusions about identical studies, Herzog ends up only partially endorsing animal research: "Yes, I would swap a million mice to wipe out dengue. But ... for a treatment for baldness? Or erectile dysfunction? Probably not."

The book's ending initially seemed disappointing — our attitudes, behaviour and relationships with the animals in our lives are "more complicated than we thought". But Herzog is right to hold back from offering glib solutions to complex issues. The troubled middle may be the best resting place we have. ■ **Clive Wynne** is a professor of psychology at the University of Florida, Gainesville, Florida 32601, USA, and professor as an international scholar at Kyung Hee University, South Korea. He is the author of *Do Animals Think*? e-mail: wynne@ufl.edu

## Solutions beyond systems analysis

Tackling Wicked Problems: Through the Transdisciplinary Imagination Edited by Valerie A. Brown, John A. Harris and Jacqueline Y. Russell Earthscan: 2010. 312 pp. \$59.95, £34.99

Scientific analysis has so far failed to tackle big environmental and social problems, such as biodiversity loss, global warming and overpopulation. Difficult to solve because of their inherent complexities, changes and contradictions, these tangled issues were termed 'wicked problems' in the 1960s by philosopher and systems scientist C. West Churchman and design theorists Horst Rittel and Melvin Webber. By contrast, 'tame problems' could be solved by technical, scientific and managerial experts.

Tackling Wicked Problems argues that we must transcend disciplines to address complex environmental issues. The volume's editors, environmental scientists Valerie Brown and John Harris and sociologist Jacqueline Russell, together with contributing authors from many fields, believe that this approach is necessary to secure a "just and ecologically sustainable future for the planet". Centuries-old assumptions about the nature of scientific inquiry and objective knowledge must be questioned and partially modified, they contend.

Tame social problems have for decades been the province of systems analysis. Such thinking holds that if a team of experts fails to solve a social problem, one can simply add more experts until a solution is found. That assumption lay behind, for example, the megaprojects that constituted former US president Lyndon Johnson's 'Great Society' of the mid-1960s, ranging from better urban housing to improved public education. This uncritical faith in the power of intellect to solve all social problems dates to the Enlightenment and was epitomized in Simon Ramo's *Cure for Chaos* (McKay, 1969).

Systems analysis peaked in the 1960s and 1970s but was no panacea, as revealed by countless environmental, political and urban crises then and since. The death of US defence secretary Robert McNamara last year reminded the world of the tragedy of his blind faith in systems analysis — the approach he took to try to win the war in Vietnam. Ida Hoos' *Systems Analysis in Public Policy* (University of California Press, 1972) demonstrated that

the enterprise was elitist and self-perpetuating. It was also inefficient, inadequate and unscientific. *Tackling Wicked Problems* extends Hoos' work. The book shows that systems analysis is still applied, but its

utopian aspirations have faded. It is increasingly used to identify and illuminate a range of possible solutions to certain problems.

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The contributors seek to tame intractable social problems by joining science with imagination, which has been wrongly deemed antiscience. Our concept of experts should, they say, be broadened beyond the technical professions, and we should exhibit humility and patience in considering both knowledge and ignorance, which are socially constructed. The historical hierarchies of both (male) gender and (white) race come to mind as prime examples of social construction. The book's contributors implicitly endorse historian and social critic Theodore Roszak's sarcastic criticism of "the good systems team" for excluding "poets, painters, holy men, or social revolutionaries". One contributor contrasts the science-based world view of industrialized countries towards climate change and

other issues with the locally based world view of developing countries, and calls for the equal appreciation of both. Another cautions that "systems of inquiry are never value free".

Tackling Wicked Problems includes philosophical analyses and anthropological, sociological, educational, environmental and psychological case studies. Two areas receive extended analysis: persistent organic pollutants in our drinking water, and public housing and public health. All case studies share a 'transdisciplinary' frame, aiming to dissolve conventional boundaries between disciplines.

> This differs from interdisciplinary approaches in which preexisting fields are joined, such as biochemistry, and multidisciplinary combinations of fields towards a purpose, such as a public-health project. For

a transdisciplinary approach to work, openmindedness is crucial. The idea of being an expert must be put aside to achieve a 'community of practice' that is always evolving.

Systems analysts of the old school assume that solutions will eventually be found, but these successors do not accept that certainty hence they write of tackling rather than solving problems. Nor do today's advocates take it for granted that all participants would be trained in rigorous natural sciences. However, as broad as the mix of the book's contributors is, the absence of historians is regrettable. History too can offer tough-minded analyses. Nevertheless, Tackling Wicked Problems is a timely volume that deserves a wide, global readership. Howard P. Segal is professor of the history of science and technology at the University of Maine, Orono, Maine 04469, USA. e-mail: howard segal@umit.maine.edu