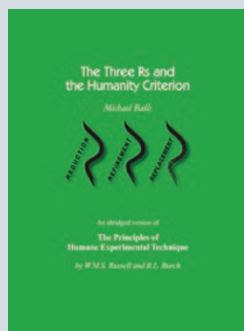


The 3Rs revisited

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THE THREE RS AND THE HUMANITY CRITERION
An abridged version of
The Principles of Humane Experimental Technique by
W.M.S. Russell and R.L. Burch

By Michael Balls

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Those, like me, who never read the original *The Principles of Humane Experimental Technique* by Russell and Burch (Methuen, London, 1959) will find this abridged version thought-provoking. Like many others in biomedical research, I came across the 3Rs in my day-to-day job, Institute of Animal Technology training, Home Office Licence courses and ethical review process meetings, but I never actually read the book. This abridged version is a useful update, focusing on animal experimentation rather than husbandry. The introduction presents a major theme, stating that “by now it is widely recognised that the humanist possible treatment of experimental animals, far from being an obstacle, is actually a prerequisite for successful animal experiments.”

The ‘concept of inhumanity’ chapter explains definitions of pain and distress and points out that we know more about these phenomena now than we did in 1959 when the *Principles* were published. Balls explains the measurement of pain and distress and states that “‘more humane than’ means simply ‘less inhumane’”. Next, he describes positive and negative aspects of human impact on the animal world and discusses the monitoring of animal experimentation, including Home Office returns and details of the 1952 Laboratory Animals Bureau survey. The next section reviews the sources, incidence and removal of inhumanity, explaining the differences between direct and coherent inhumanity. Balls recognizes the contribution of animal technologists to the well-being of animals. In this section, the concept of the 3Rs is introduced: replacement, reduction and refinement.

Differences between relative replacement (where animals are used but exposed to no distress) and absolute replacement (where animals are not required) are outlined to introduce

the replacement section. Alternatives are discussed, including tissue cultures and micro-organisms. Reduction is considered next. Balls suggests a more strategic approach to study design and touches on the issue of variance, highlighting the fact that if animals didn’t vary, then “very few animals would be needed for assay purposes.” The use and review of experimental design and statistics are cited as opportunities to determine and use the minimum number of animals needed in a study. The chapter finishes by looking at the effects of the animals’ proximate environment on their behavioral and physiological responses. Balls proposes that “in the study of laboratory animal behaviour lie the richest prospects for reduction.” Refinement, or reducing potential distress to the animals, offers diverse opportunities to improve. Some examples of refinement in techniques include anesthetic and surgery advancements, the choice of procedures to be used and matching of the species chosen to the study requirements. Balls questions the predominant use of mammals, whether for historical or ease-of-use reasons; he suggests that “freedom of choice of the experimenter is often very much wider than it first appears.”

Next, the book looks at the factors governing progress. It highlights personality types from authoritarian (hostile to animals) to revolutionary (antivivisectionists supporting no use of animals) and suggests that experimental biologists fall between these two extremes. The book is also factual about the time, cost and efficacy drivers of the 3Rs. It raises concern over inertia in response to improvements and calls attention to the importance of flexibility and communication between departments, organizations and research groups. It also highlights the need for education and regulations to be kept up to date. Several special organizations are cited: the Laboratory Animals Bureau (which later became the Laboratory Animals Centre), the Universities Federation for Animal Welfare and the Animal Technicians Association (now the Institute of Animal Technology). I was particularly interested in the statement that “a very large responsibility for the success of humane technique, especially in reduction and refinement, lies with the technician in charge of the experimental animals.”

The book concludes by asking us to actively look for opportunities for reduction, refinement and replacement; as a former animal technologist, I couldn’t agree more. This is a readable and thought-provoking book and, aside from a minor personal quibble about the distracting overuse of bold type, a useful addition for anybody involved in or considering a career in biomedical research.