

Environmental Enrichment – the Good, the Bad and the Ugly?

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Abstract:

The concept of enriching the environment of farm animals to minimise stress and improve welfare dates back over 50 years. The UK Brambell Committee included “freedom to express normal behaviour” as one of the Five Freedoms in its report in 1965. These were subsequently adopted by the UK Farm Animal Welfare Council, requiring sufficient complexity in the environment in which animals were housed to avoid barren spaces with little opportunity to express normal behaviour.

However the world of research animal welfare was addressing the importance of environmental complexity and enrichment significantly earlier. The 3Rs of Replacement, Reduction and Refinement were first described by William Russell and Rex Burch in their book “The Principles of Human Experimental Technique” in 1959. This pivotal work was sponsored by the Universities Federation for Animal Welfare (UFAW) as a systematic study of laboratory techniques and their ethical aspects.

Nevertheless, the 3Rs attracted little attention beyond academic interest for over 20 years until, in the 1980s, there was an awakening of appreciation that these principles offered a rational framework for advancing our ethical use of animals in a science led manner which could contribute significantly to animal welfare. They unify concerns for better science with causing less harm to animals and underpin the supposition that good welfare enables good science. In 1993, the First World Congress on Alternatives and Animal Use in the Life Sciences was held in Baltimore, USA followed by a second conference in 1996 in Utrecht. Now a regular event, the tenth conference (affectionately known as WC10) will take place in Seattle in 2017.

A common misconception of the 3Rs is that they refer only to Replacement – what may commonly be called “alternatives” to animals. However their meaning is more far-reaching and this presentation will consider the wider implications of promoting the other 2Rs in relation to environmental enrichment.

The scientific community is coming under increasing attack for the lack of reproducibility of published studies, often due either to poor experimental design or inadequate reporting. The tradition of peer-review is being widely criticised, including by well-respected experts in statistics and experimental design. Where animals are involved, the ethical consequences are magnified. This may be a much-needed wake-up call for improved science which thoroughly applies the principle of Reduction. This means that, in a well-designed experiment, the optimal number of animals is used to obtain the scientific result sought – neither too many nor too few. However it is also important that a single-minded pursuit of reproducibility is not used as a reason to standardise to an environment devoid of enrichment. Arguments have been made that enrichment creates uncontrolled variables. The strengths and weaknesses of these arguments will be considered.

An oft-quoted barrier to implementing environmental enrichment is the imbalance of risk through applying the “precautionary principle”. In regulatory safety assessment, it is commonly perceived as a lower risk to adhere to the traditional methodologies (animal-based and devoid of features which may impact the results) rather than to make an active decision to accept an

approach which provides for better welfare. Likewise, conservative peer-reviewing may have rejected research proposals or submitted papers which were based on enriched methods or may have required non-enriched data to be generated in parallel.

Refinement applies to methods which alleviate or minimise potential pain, suffering, distress or lasting harm. But Refinement also refers to ways of enhancing the welfare of animals used through improved housing and environmental enrichment, including appropriate socialisation, all of which will have a significant impact on well-being. Training animals to undergo procedures can significantly reduce their stress by enabling them to voluntarily co-operate. Positive reinforcement techniques are well-developed for many species and can rapidly result in benefits both for the animals and their handlers.

Nevertheless, it is important that enrichments does not become simply a matter of “throwing in a few toys” to occupy the animals. The best enrichment methods have been studied carefully to develop an evidence base for their application. Some of these study methods and outcomes will be considered in relation to their real contribution to enrichment of the animals’ environment.

The last quarter century has seen an almost exponential increase in interest in environmental enrichment and proliferation of valid and validated examples. Regulatory systems protecting research animals throughout the world are embracing the concept of ethical review of all research proposals based, at least in part, upon providing enrichment as part of a protocol. It can be expected that this trend will continue – and both the quality of science and the welfare of animals will benefit as a consequence.