Facts and demonstrations: Exploring the effects of enrichment on data quality

Penny Hawkins BSc PhD, Research Animals Department
RSPCA (Royal Society for the Prevention of Cruelty to Animals), UK
www.rspca.org.uk/researchanimals

There is widespread support for the concept that ‘better welfare means better science’, and good acceptance that environmental enrichment can improve welfare. However, many publications in the literature describe animals housed in ‘standard’ conditions without enrichment, and enrichment is still sometimes not provided for fear that this will have an adverse effect on data quality.

These concerns tend to relate to:
- the potential for the addition of another variable (i.e. enrichment) to affect the validity of the science within the project;
- the risk that data obtained from animals provided with enrichment will not be comparable with data obtained from animals in 'standard' conditions;
- increased variability could create a requirement for increases in animal numbers, which is the opposite of reduction.

It is essential to evaluate each of these concerns critically and objectively – hence the title of this webinar, which is taken from the quote by John Ruskin: ‘the work of science is to substitute facts for appearances, and demonstrations for impressions’.

A growing number of published studies have evaluated the effects of refinements, such as environmental enrichment, on animal physiology and experimental design. Some have reported significant effects, whereas others have not, but this presentation will argue that the interpretation of these results is not always straightforward, yet is crucially important for both animal welfare and scientific quality. The latter is of particular relevance given the current climate of reflection within the scientific community with respect to the translatability and validity of animal experiments.

If there are implications for data and/or animal numbers, a constructive approach is to try to accommodate these, for example by altering experimental design or statistical analysis, as opposed to simply not providing refinement. Good communication about practical refinement is also vital, not only for better science and welfare, but also due to increasing requirements for openness and accountability with respect to animal research and testing.
1. Studies and reviews looking at effects of refinement, including enrichment, on variability/standardisation

These are just a few examples, both ‘classic’ and recent; an online search using keywords such as ‘environmental enrichment’ + ‘animal’ + ‘variability’ will yield many more ...

- Baldwin AL (2012) Does lack of enrichment invalidate scientific data obtained from rodents by compromising their welfare? Between the Species 15: 2-23
- Eskola S et al. (1999) Environmental enrichment may alter the number of rats needed to achieve statistical significance. Scand J Anim Sci 26: 134-144
- Hutchinson EK et al. (2012) Environmental enrichment during rearing alters corticosterone levels, thymocyte numbers, and aggression in female BALB/c mice. JAALAS 51: 18-24
- Toth LA et al. (2011) Environmental enrichment of laboratory rodents: the answer depends on the question. Comparative Medicine 61: 314-321 (see also http://enrichmentrecord.com/2012/01/22/viewpoints/)
- Würbel H (2001) Ideal homes? Housing effects on rodent brain and behaviour. TINS 24: 207-211
- Würbel H (2005) Environmental enrichment does not disrupt standardization. 3R-Info-Bulletin 30, ISSN 1421-6590
2. Useful enrichment-related books and online resources

*The Enrichment Record* is a free, quarterly online magazine that discusses and promotes enrichment for laboratory animals: [http://enrichmentrecord.com/](http://enrichmentrecord.com/)

The Animal Welfare Institute’s Laboratory Animal Refinement & Enrichment Forum (LAREF) is a very useful and active online discussion forum which is open to animal technologists and care staff, students, veterinarians and researchers. There is also an occasional series of publications that reproduce some of the discussions; see [http://www.awionline.org/ht/d/sp/i/11589/pid/11589](http://www.awionline.org/ht/d/sp/i/11589/pid/11589)


3. Journals that publish papers on laboratory animal science and welfare

- *Animal Technology and Welfare* - the journal of the UK Institute for Animal Technology ([http://www.iat.org.uk/journal.htm](http://www.iat.org.uk/journal.htm))
- *Applied Animal Behaviour Science* - the official journal of the International Society for Applied Ethology (ISAE). This reports mainly on farmed animal behaviour, but includes some papers on animals used in the laboratory or their wild equivalents ([http://www.applied-ethology.org/thejournalaabs.htm](http://www.applied-ethology.org/thejournalaabs.htm))
- *Lab Animal* - both the USA and European versions ([http://www.labanimal.com/](http://www.labanimal.com/))
- *Laboratory Animals* - not to be confused with the journals above; this is the official journal of a number of bodies including the Federation of European Laboratory Animal Science Associations ([http://www.lal.org.uk/](http://www.lal.org.uk/))

4. Relevant organisations

- The Animal Welfare Institute (AWI) searchable database on enrichment with summaries of many of the papers ([http://www.awionline.org/lab_animals/index.htm](http://www.awionline.org/lab_animals/index.htm))
- The Johns Hopkins Center for Alternatives to Animal Testing (CAAT) website includes details of news and events relating to refinement, as well as hosting Altweb, a Three Rs database ([http://caat.jhsph.edu/](http://caat.jhsph.edu/))
- The RSPCA Research Animals Department series of sheets setting out good practice for the housing and care of commonly used species ([http://www.rspca.org.uk/sciencegroup/researchanimals/ethicalreview/housingandcare](http://www.rspca.org.uk/sciencegroup/researchanimals/ethicalreview/housingandcare))
The UK National Centre for the Three Rs (NC3Rs) website includes an information portal that can be used to search for husbandry refinements and information on how to obtain NC3Rs funding for Three Rs studies such as enrichment evaluation (http://www.nc3rs.org.uk/)

The Shape of Enrichment is mainly zoo animal oriented but its journal of the same name includes many interesting ideas and is cheap to subscribe to. It also organises an annual international conference on enrichment (http://www.enrichment.org/)

5. Articles cited in the presentation (in order of appearance)

8. Ratlife DVD: www.ratlife.org
15. www.NC3Rs/ARRIVE/

All URLs last viewed 4 September 2013.