ZEBET Symposium – 50 years 3Rs
Berlin, 2009

Refinement 2009

Environmental Enrichment

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Refinement

“Reducing pain, suffering and harm in animals used in experiments.”

Animal Experiments

“Animal experiments are conducted to ensure that chemicals, drugs, cosmetics, pesticides and foods are safe.”

from: 20 Jahre ZEBET, BfR Pressestelle

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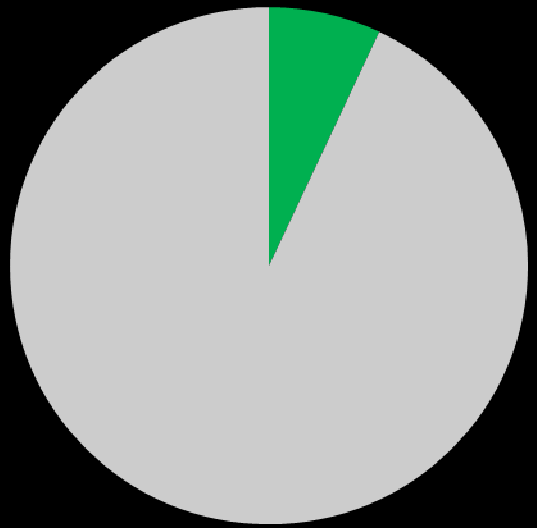
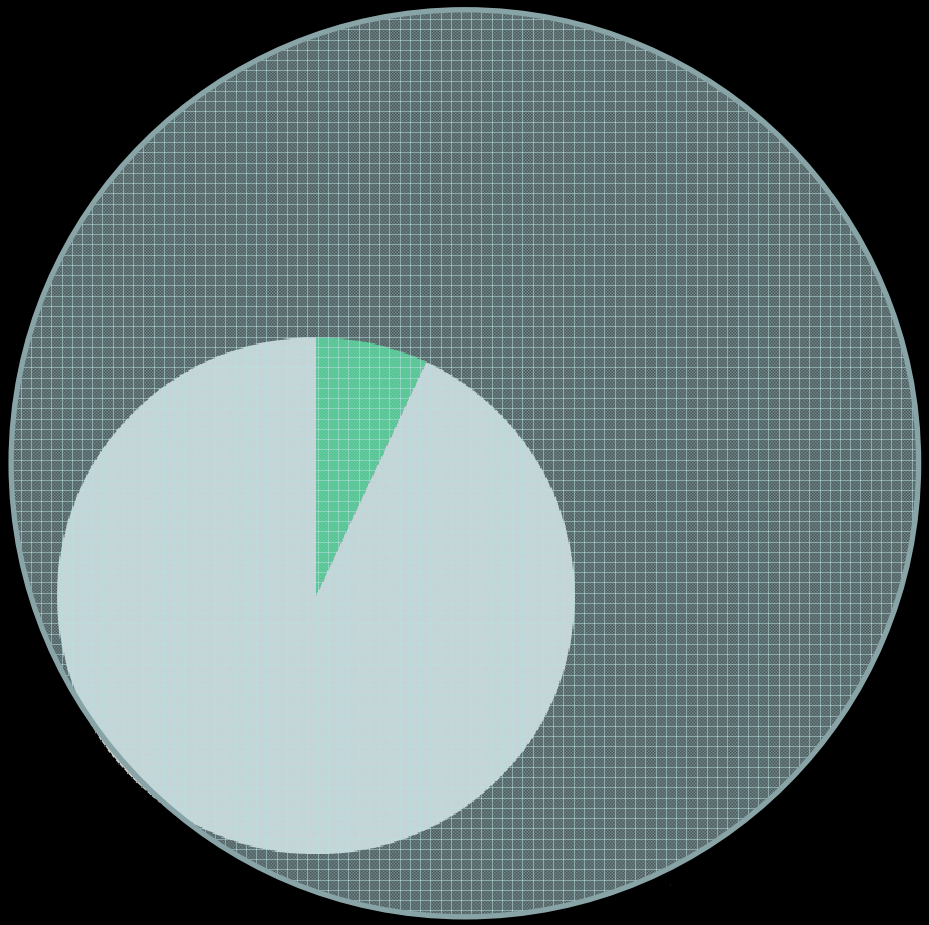


regulatory toxicology

Animal Use



Animal welfare

„The welfare of an individual is its state as regards its attempts to cope with its environment“

Broom 1986 *Br Vet J* 142: 524-526

Coping with the environment

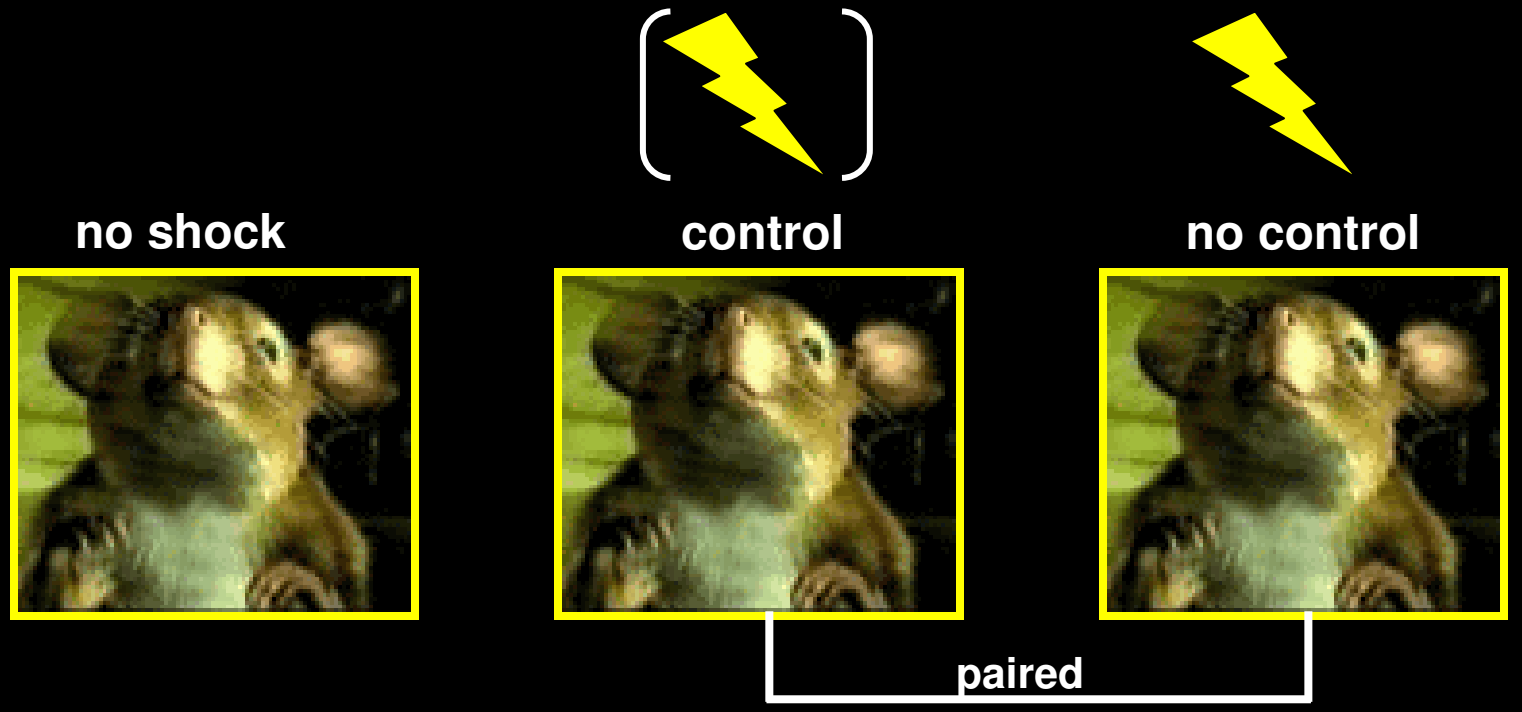
depends on:

External stressors *(climate, predators, social conflict, pathogens, etc.)*

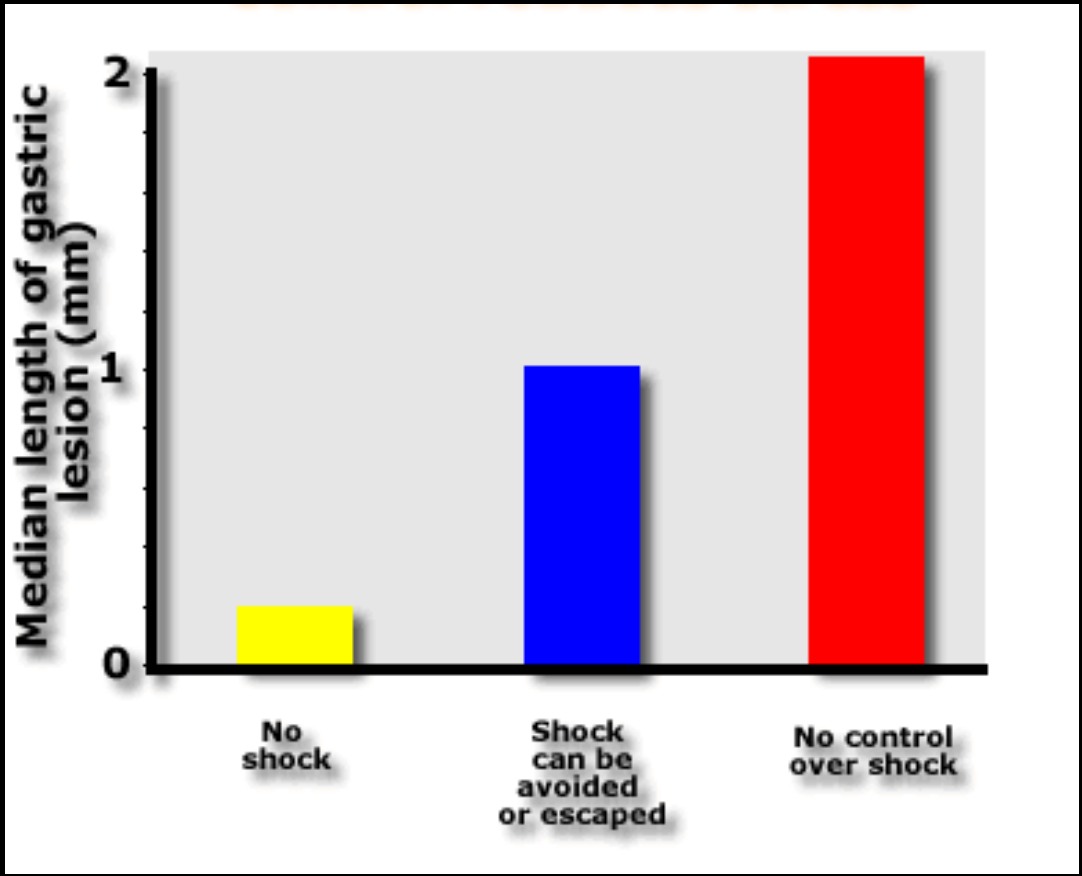
Internal factors (*capacity to cope with external stressors*)

…resources to control the stressors (*shelter, nesting material, etc.*)

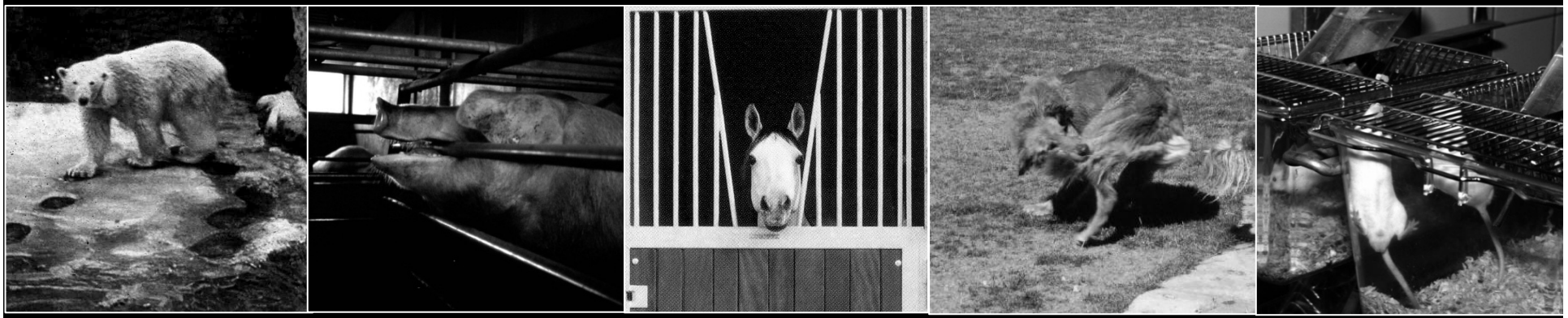
The significance of environmental control



The significance of environmental control



Failure to cope: Behavioural disorders



- Stereotypies: repetitive, invariant, goalless behavioural patterns
- Single most frequent behavioural disorder in captive animals

Cage-induced behavioural disorders: Stereotypies

Würbel *et al.* 1996 *Ethology* 102: 371-385

Human stereotypies:

Key signs of psychiatric disorders (e.g. schizophrenia, autism) and lesions associated with basal ganglia dysfunction

⟹ **recurrent perseveration**

Mouse stereotypies also correlate with recurrent perseveration

Garner *et al.* 2009 *Behav Brain Res,* under revision

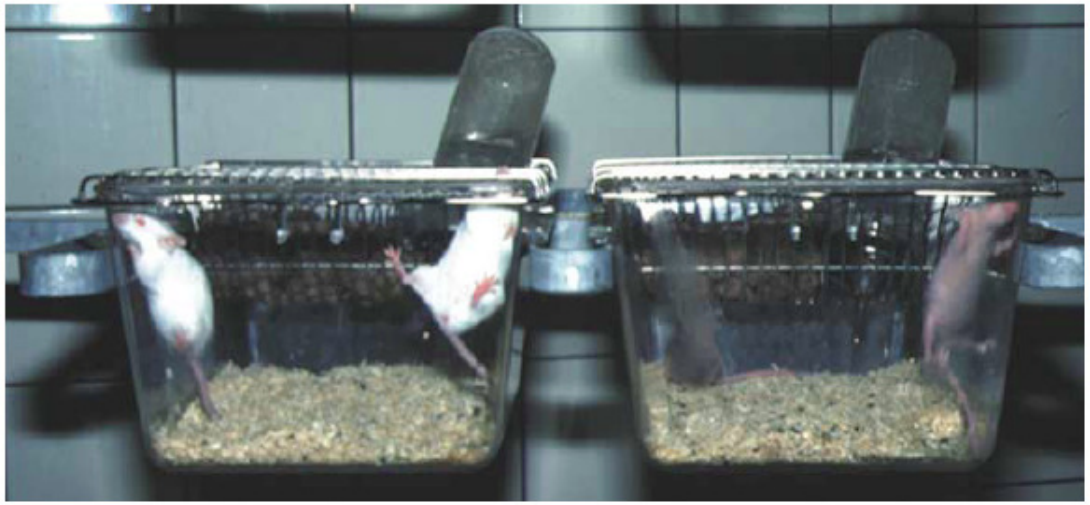
Animal data jeopardized by life behind bars

Jonathan Knight, San Francisco

Research animals raised in standard laboratory cages appear to develop a brain defect that could affect the outcome of experiments, according to behavioural scientists.

The findings, presented last week at the 35th Congress of the International Society for Applied Ethology at the University of California, Davis, are likely to spark debate among neuroscientists about the wisdom of keeping laboratory mice in austere, standard cages.

Cages that provide more stimulating environments for animals could help solve the problem, researchers say. But space constraints and concerns about standardization of experiments have so far kept such innovations out of most animal research facilities.



HANNO WÜRBEL

Stir crazy: mice housed in standard lab cages exhibit a range of abnormal repetitive behaviours.

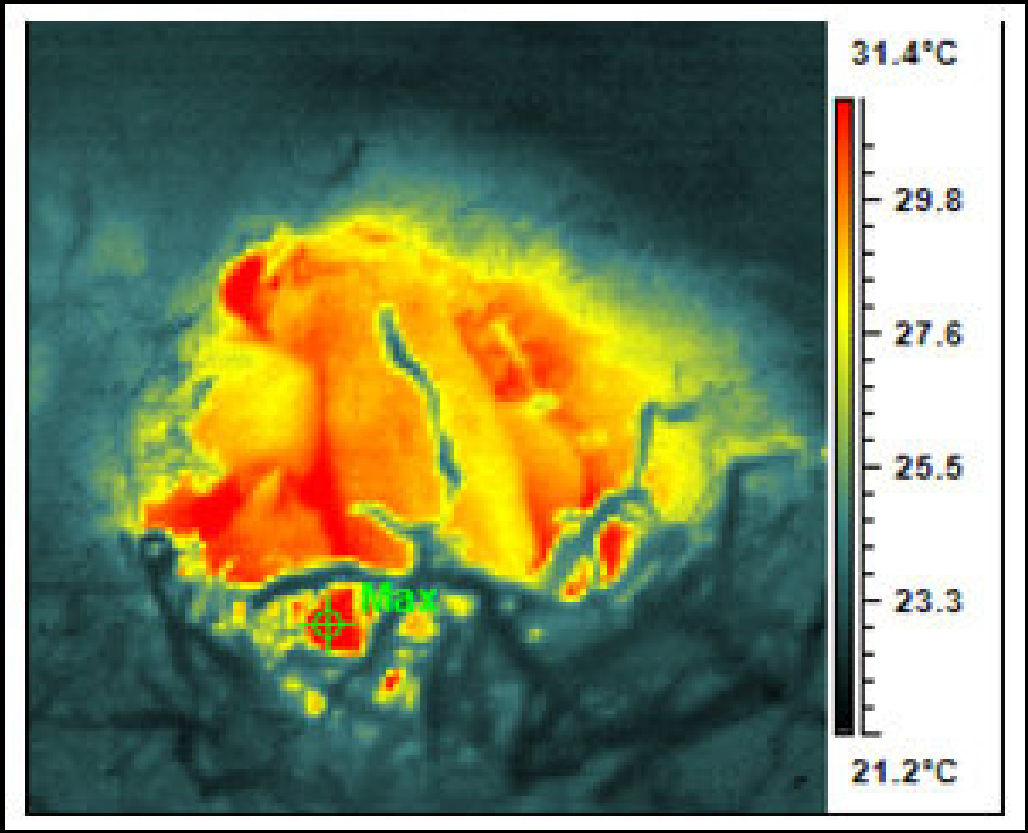
Environmental enrichment

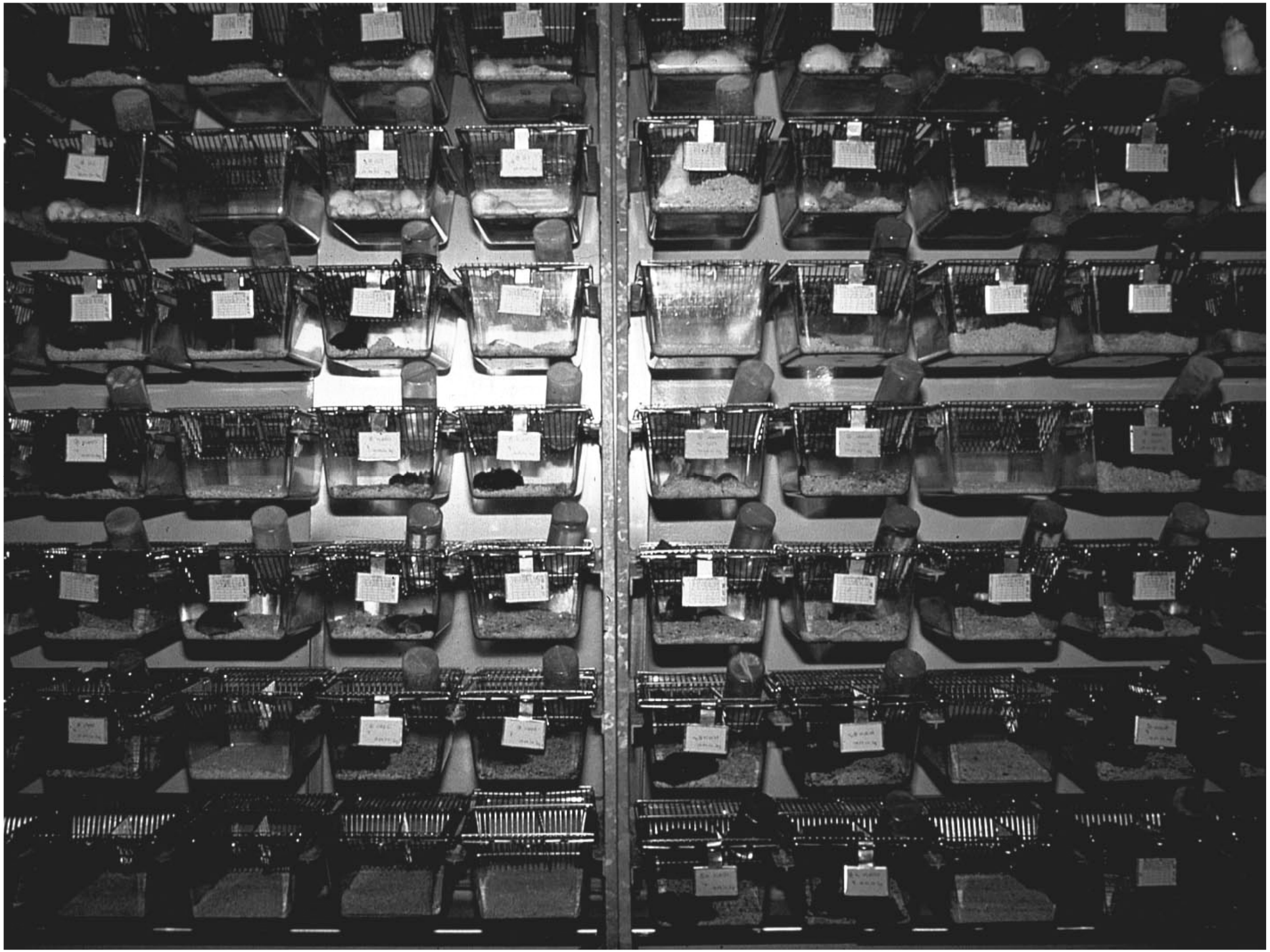
"Any change in husbandry or caging intended *to benefit the animal's wellbeing"*

Enrichment may fail, because it…

- …is not perceived as meaningful (e.g. toys)
- …is aversive (e.g. marbles)
- …creates social conflict (e.g. defensible resources such as a shelter)

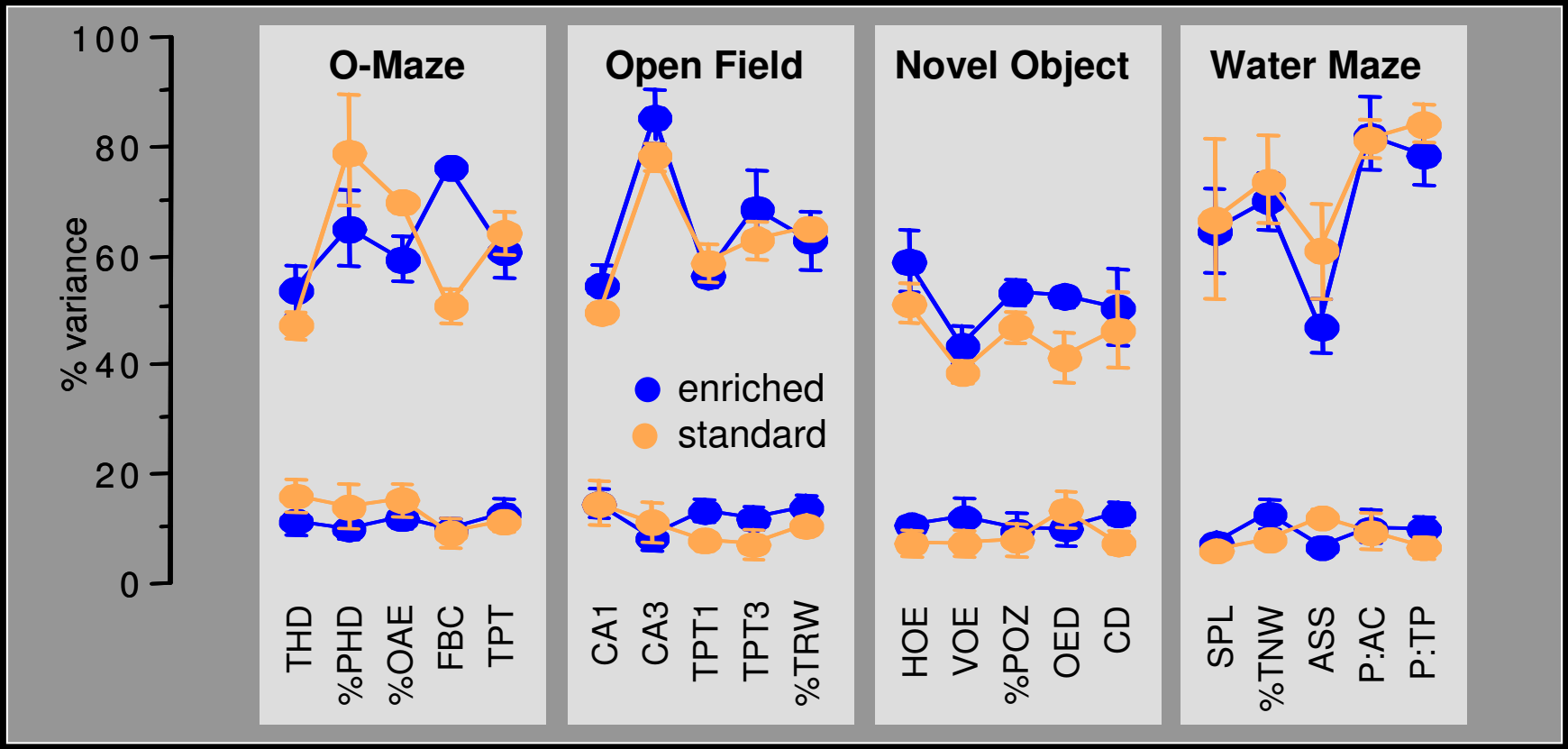
Effective enrichment: adequate nesting material for mice





Enrichment and standardization

No effect on variability and reproducibility



Wolfer *et al.* 2004 *Nature* 432: 821-822

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This article elsewhere

Blogs linking to this article

Published online 16 December 2004 | Nature | doi:10.1038/news041213-9

News

Hope for bored lab mice

Stimulating cages do not affect reliability of experiments.

Roxanne Khamsi

Mice living in exciting environments still produce reliable and reproducible results when used in scientific experiments, according to a new study. The finding suggests that researchers could offer their lab animals more interesting surroundings.

Previous work has shown that mice living in standard, barren cages may suffer greater stress or exhibit abnormal

Conclusions

Adequate environmental enrichment has the potential to improve

- *animal welfare*
- *the public perception of animal experiments*
- *the validity of experimental results*