

**PRINCIPLES OF ANIMAL, ENVIRONMENTAL, & ECOLOGICAL RESEARCH ETHICS:
PHILOSOPHICAL FOUNDATIONS AND EXTENSIONS OF THE THREE R'S**

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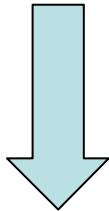
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Animal Research Ethics

Russell & Burch: 3 animal R's

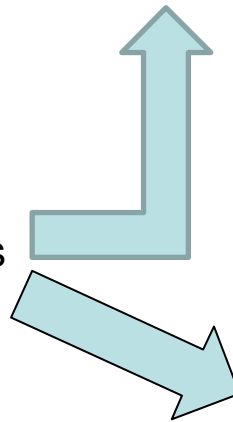


3 animal R's + 1 animal R = 4 animal R's



Environmental Research Ethics

4 environmental R's



Ecological Research Ethics

4 ecological R's



3 Animal R'S

1. Research that harms animals less is preferable to research that harms animals more.

Replacement

2. Research that does not harm animals is preferable to research that does harm animals.
3. Research which deprives animals of simple pleasures or inflicts simple pains is preferable to research which deprives animals of complex pleasures or inflicts complex pains.
4. Research which harms lower animals (less complex experiences) is preferable to research which harms higher animals (more complex experiences).

Reduction

5. Research which harms fewer animals is preferable to research that harms more animals.

6. Research which gains more knowledge is preferable to research which gains less knowledge.

7. If research program A harms animals only a bit more than research program B, and program A would yield much more knowledge than program B, then program A is preferable to program B.

8. If research program C yields only a bit more knowledge than research program D, and program C would harm animals much more than program D, then program D is preferable to program C.

Refinement

9. Research which harms certain animals less is preferable to research that harms the same animals more.
10. Research which has a lower probability of harming certain animals is preferable to research that has a higher probability of harming the same animals.

4th Animal R

Refusal

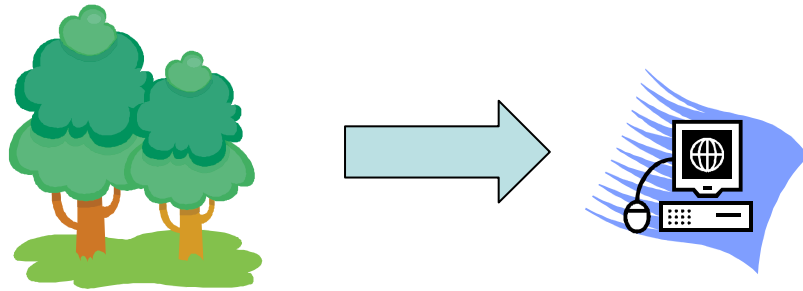
11. Research which would harm animals greatly, and which would yield only trivial gains in knowledge should not be pursued.
12. Research which would harm animals only trivially, and which would yield great gains in knowledge, may be pursued.



4 Environmental R's

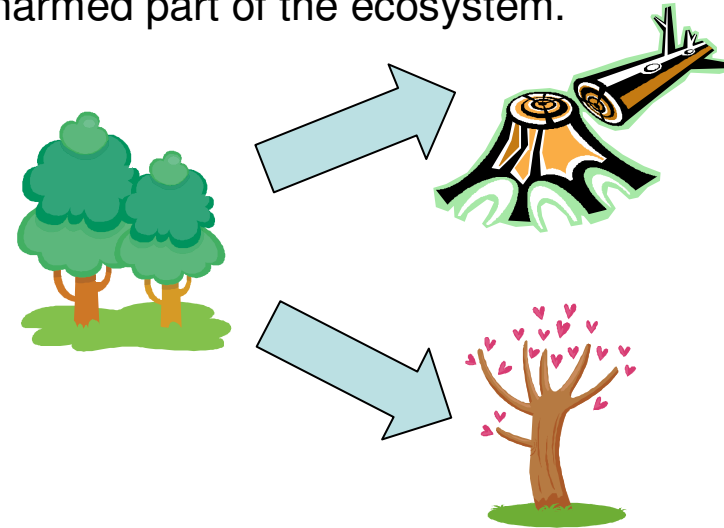
Replacement

Switch to entities that won't be harmed.



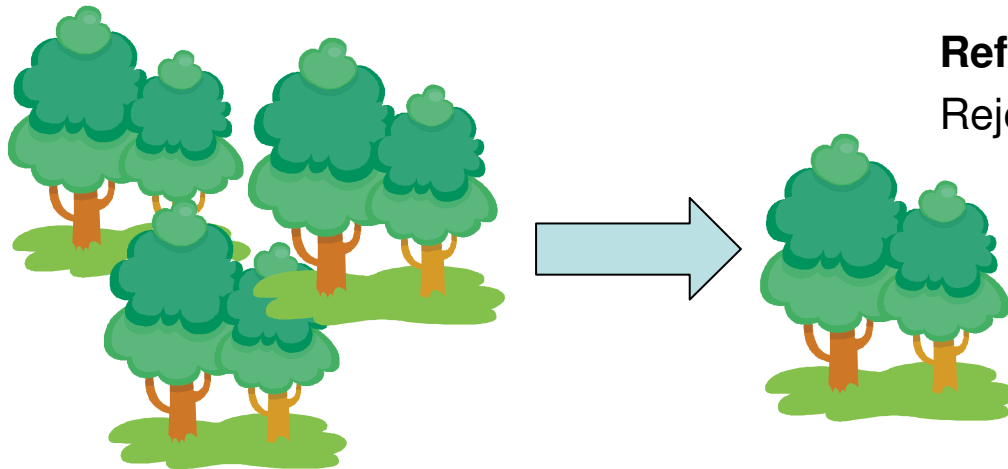
Refinement

Reduce the degree of harm on each harmed part of the ecosystem.



Reduction

Harm fewer parts of the ecosystem.



Refusal

Reject the research program.

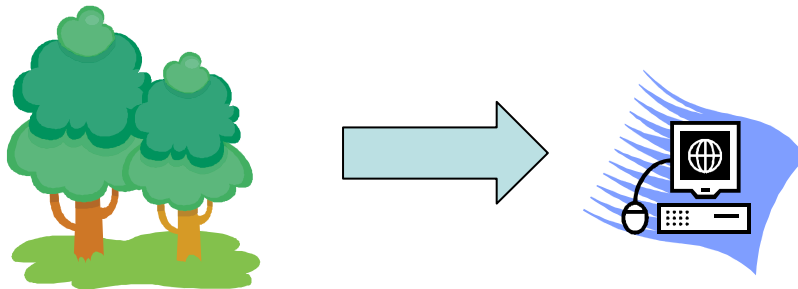


4 Environmental R'S

13. Research that harms an ecosystem less is preferable to research that harms that ecosystem (or a different ecosystem) more.

Replacement

14. Research that does not harm ecosystems is preferable to research that does harm ecosystems.



Ecological Integrity

Stability

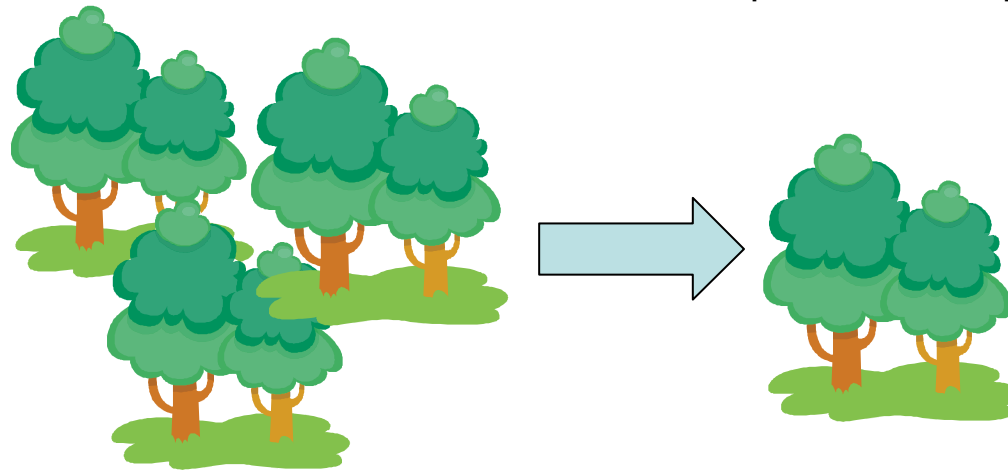
Resilience

Robustness

4 Environmental R'S

Reduction

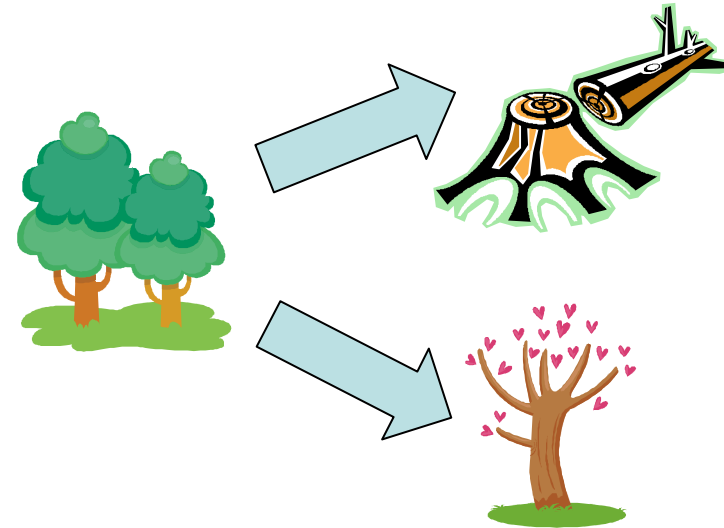
15. Research which harms fewer ecosystem parts is preferable to research that harms more ecosystem parts.
6. Research which gains more knowledge is preferable to research which gains less knowledge.
16. If research program E harms an ecosystem only a bit more than research program F, and program E would yield much more knowledge than program F, then program E is preferable to program F.
17. If research program G yields only a bit more knowledge than research program H, and program G would harm an ecosystem much more than program H, then program H is preferable to program G.



4 Environmental R'S

Refinement

- 18. Research which harms ecosystem parts less is preferable to research that harms these same ecosystem parts more.
- 19. Research which has a lower probability of harming a certain number of parts is preferable to research that has a higher probability of harming the same parts.
- 20. Research which harms less valuable ecosystem parts is preferable to research that harms more valuable ecosystem parts.
- 21. Research which harms populations of non-endangered species is generally preferable to research which harms populations of endangered species.



Keystone species
Endangered species

4 Environmental R'S

Refusal

22. Research which would harm an ecosystem greatly, and which would yield only trivial gains in knowledge should not be pursued.



23. Research which would harm an ecosystem only trivially, and which would yield great gains in knowledge, may be pursued.



4 Ecological R'S

1. Research that harms animals less is preferable to research that harms animals more.
13. Research that harms ecosystems less is preferable to research that harms ecosystems more.

Replacement

2. Research that does not harm animals is preferable to research that does harm animals.
14. Research that does not harm ecosystems is preferable to research that does harm ecosystems.

Reduction

5. Research which harms fewer animals is preferable to research that harms more animals.
15. Research which harms fewer ecosystem parts is preferable to research that harms more ecosystem parts.
6. Research which gains more knowledge is preferable to research which gains less knowledge.
24. If research program I harms an ecosystem by harming its animal parts, and research program J harms the ecosystem the same amount by harming some of its inanimate parts, instead, then research program J is preferable to research program I.

4 Environmental R'S

Refinement

3. Research which harms lower animals is preferable to research which harms higher animals.
20. Research which harms less valuable ecosystem parts is preferable to research that harms more valuable ecosystem parts.
21. Research which harms populations of non-endangered species is generally preferable to research which harms populations of endangered species.

Refusal

25. Research which would harm animals and ecosystem parts only trivially, and which would yield great gains in knowledge, may be pursued.
11. Research which would harm animals greatly, and which would yield only trivial gains in knowledge should not be pursued.
23. Research which would harm an ecosystem only trivially, and which would yield great gains in knowledge, may be pursued.

Incommensurable values

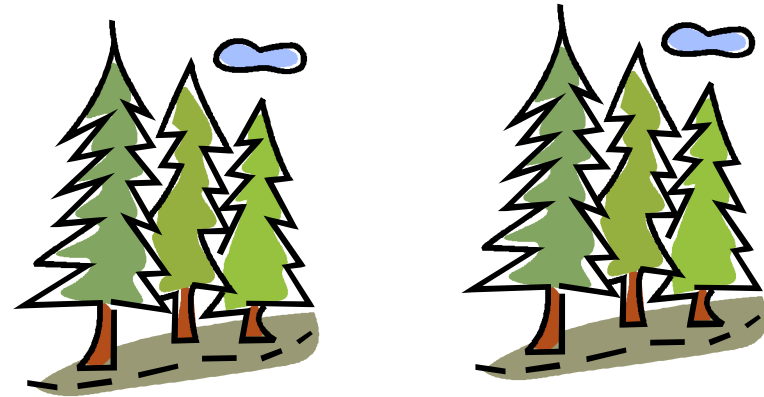


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Environmental Research Ethics



Ecological Research Ethics

