



*Behaviour* publishes original research pursuing Tinbergen's four questions and questions resulting from the interrelationship among the four. In addition, the editorial board encourages reviews of behavioural biology that illuminate emergent trends and new directions in behavioural research.

Niko Tinbergen (1907–1988) defined 4 questions for research in behavioural biology:

*Proximate causation of behaviour:*

1. How does an animal use its sensory and motor abilities to activate and modify its behaviour patterns? (*physiological mechanisms*)
2. How does an animal's behaviour change during its growth, especially in response to the experiences that it has while maturing? (*ontogeny of development*)

*Ultimate causation of behaviour:*

3. How does the behaviour promote an animal's ability to survive and reproduce? (*adaptation*)
4. How does an animal's behaviour compare with that of other closely related species, and what does this tell us about the origins of its behaviour and the changes that have occurred during the history of the species? (*phylogeny*)

Niko Tinbergen shared, with Konrad Lorenz and Karl von Frisch, the 1973 Nobel Prize for Medicine or Physiology for contributions to the study of behavioural biology. Tinbergen was at heart an experimentalist who, more than Lorenz and von Frisch, applied the scientific method to the field of animal and human behaviour. It is his experimental approach to the study of behaviour that lasts to this day. That is why Tinbergen listed questions and not answers (theorems or laws). The answers (or at least some of them) are published monthly in *BEHAVIOUR*, the journal Tinbergen co-founded with W.H. Thorpe in 1948.

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#### Examples:

Bekoff, M. (1974). Social play soliciting by infant canids. – *Amer. Zool.* 14: 303-315.

Bekoff, M. & Byers, J.A., eds (1998). *Animal play: Evolutionary, comparative and ecological perspectives.* – Cambridge University Press, Cambridge.

Loizos, C. (1967). Play behaviour in higher primates: a review. – In: *Primate ethology* (Morris, D., ed.). Aldine, Chicago, p. 176-218.

Nowicki, S., Searcy, W.A., Hughes, M. & Podos, J. (2001). The evolution of bird song: male and female response to song innovation in swamp sparrows. – *Anim. Behav.* 62: 33-39.



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