

# Nikolaas Tinbergen

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**Nikolaas "Niko" Tinbergen** FRS<sup>[1]</sup> (15 April 1907 – 21 December 1988) was a Dutch ethologist and ornithologist who shared the 1973 Nobel Prize in Physiology or Medicine with Karl von Frisch and Konrad Lorenz<sup>[2][3]</sup> for their discoveries concerning organization and elicitation of individual and social behaviour patterns in animals.

In the 1960s he collaborated with filmmaker Hugh Falkus on a series of wildlife films, including *The Riddle of the Rook* (1972) and *Signals for Survival* (1969), which won the Italia prize in that year and the American blue ribbon in 1971.

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## Origins

Born in The Hague, Netherlands, he was one of five children of Dirk Cornelis Tinbergen and his wife Jeannette van Eek. His brother, Jan Tinbergen, later who won the first Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel. Another brother, Luuk Tinbergen was also a noted biologist.

Tinbergen's interest in nature manifested itself when he was young. He studied biology at Leiden University and was a prisoner of war during World War II. Tinbergen's experience as a prisoner of the Nazis led to some friction with longtime intellectual collaborator Konrad Lorenz, and it was several years before the two reconciled. After the war, Tinbergen moved to England, where he taught at the University of Oxford. Several of his Oxford graduate students went on to become prominent biologists; these include Richard Dawkins, Marian Dawkins, Desmond Morris, and Iain Douglas Hamilton.

He married Elisabeth Rutten and they had five children. Later in life he suffered depression and feared he might, like his brother, commit suicide. He was treated by his friend, whose ideas he had greatly influenced, John Bowlby.<sup>[4]</sup> Tinbergen died on 21 December 1988, after suffering a stroke at his home in Oxford, England.

### Niko Tinbergen



Tinbergen in 1978

<b>Born</b>	15 April 1907 The Hague, Netherlands
<b>Died</b>	21 December 1988 (aged 81) Oxford, England
<b>Residence</b>	United Kingdom
<b>Nationality</b>	Dutch
<b>Fields</b>	Zoologist, ethologist
<b>Institutions</b>	Oxford University
<b>Alma mater</b>	Leiden University
<b>Doctoral advisor</b>	Hildebrand Boschma
<b>Doctoral students</b>	Richard Dawkins Aubrey Manning Desmond Morris
<b>Known for</b>	Hawk/goose effect Four questions
<b>Notable awards</b>	Nobel Prize in Physiology or Medicine (1973)

## Four questions

*Main article: Tinbergen's four questions*

He is well known for originating the four questions he believed should be asked of any animal behaviour, [5][6] which were:

### Proximate mechanisms:

- 1. **Causation** (Mechanism): what are the stimuli that elicit the response, and how has it been modified by recent learning? How do behaviour and psyche "function" on the molecular, physiological, neuro-ethological, cognitive and social level, and what do the relations between the levels look like? (compare: Nicolai Hartmann: "The laws about the levels of complexity")
- 2. **Development (Ontogeny)**: how does the behaviour change with age, and what early experiences are necessary for the behaviour to be shown? Which developmental steps (the ontogenesis follows an "inner plan") *and* which environmental factors play when / which role? (compare: Recapitulation theory)

### Ultimate mechanisms:

- 3. **Function (Adaptation)**: how does the behaviour impact on the animal's chances of survival and reproduction?
- 4. **Evolution (Phylogeny)**: how does the behaviour compare with similar behaviour in related species, and how might it have arisen through the process of phylogeny? Why did structural associations (behaviour can be seen as a "time space structure") evolve in this manner and not otherwise?\*

In ethology and sociobiology **causation** and **ontogeny** are summarized as the "proximate mechanisms" and adaptation and phylogeny as the "ultimate mechanisms". They are still considered as the cornerstone of modern ethology, sociobiology and transdisciplinarity in Human Sciences.

## Supernormal Stimuli

*Main article: Supernormal Stimuli*

A major body of Tinbergen's research focused on what he termed Supernormal Stimuli. This was the concept that one could build an artificial object which was a stronger stimulus or releaser for an instinct than the object for which the instinct originally evolved. He constructed plaster eggs to see which a bird preferred to sit on, finding that they would select those that were larger, had more defined markings, or more saturated color—and a dayglo-bright one with black polka dots would be selected over the bird's own pale, dappled eggs.

Tinbergen found that territorial male stickleback fish would attack a wooden fish model more vigorously than a real male if its underside was redder. He constructed cardboard dummy butterflies with more defined markings that male butterflies would try to mate with in preference to real females. The superstimulus, by its exaggerations, clearly delineated what characteristics were eliciting the instinctual response.

Among the modern works calling attention to Tinbergen's classic work in the field of Supernormal Stimuli has been the Deirdre Barrett book of 2010, "Supernormal Stimuli".

## Autism

Tinbergen applied his observational methods to the problems of children with autism. He recommended a "holding therapy" in which parents hold their autistic children for long periods of time while attempting to

establish eye contact, even when a child resists the embrace.<sup>[7]</sup> However, his interpretations of autistic behavior, and the holding therapy that he recommended, lacked scientific support<sup>[8]</sup> and the therapy is described as controversial and potentially abusive.<sup>[9]</sup>

## Other interests and views

He was a member of the advisory committee to the Anti-Concorde Project.

On Tinbergen's religious views, he was an atheist.<sup>[10]</sup>

## References

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- ↑ Tinbergen N, Tinbergen EA (1986). *Autistic Children: New Hope for a Cure* (new ed.). Routledge. ISBN 0-04-157011-1.
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- ↑ Betty Fry Williams; Randy Lee Williams (2011). *Effective programs for treating autism spectrum disorder: applied behavior analysis models* (http://books.google.com/books?id=5lpLze3Hcm8C&pg=PA53). Taylor & Francis. pp. 53–. ISBN 978-0-415-99931-1. Retrieved 4 February 2012.
- ↑ Deirdre Barrett (2010). *Supernormal Stimuli: How Primal Urges Overran Their Evolutionary Purpose*. W. W. Norton & Company. pp. 21–22. ISBN 978-0-393-06848-1. "Tinbergen had never been a religious man. Wartime atrocities, however, had highlighted the absence of a deity for him while both sides invoked one aligned with themselves, and this turned him into a militant atheist."

## Further reading

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- Tinbergen, Niko (1953). *The Herring Gull's World*. London, Collins.
- Kruuk, Hans (2003). *Niko's Nature: The Life of Niko Tinbergen and His Science of Animal Behaviour*. Oxford, Oxford University Press. ISBN 0-19-851558-8
- Dawkins, Marian Stamp; Halliday, TR; Dawkins, Richard (1991). *The Tinbergen Legacy*. London, Chapman & Hall. ISBN 0-412-39120-1
- Burkhardt Jr., Richard W (2005). *Patterns of Behavior : Konrad Lorenz, Niko Tinbergen, and the Founding of Ethology*. ISBN 0-226-08090-0

## External links

- Autobiography (<http://nobelprize.org/medicine/laureates/1973/tinbergen-autobio.html>)
- The Nobel Prize in Physiology or Medicine 1973: von Frisch, Lorenz and Tinbergen (<http://nobelprize.org/medicine/laureates/1973/index.html>)
- Nobel Lecture ([http://nobelprize.org/nobel\\_prizes/medicine/laureates/1973/tinbergen-lecture.pdf](http://nobelprize.org/nobel_prizes/medicine/laureates/1973/tinbergen-lecture.pdf))
- Diagram on The Four Areas of Biology (<http://www-personal.umich.edu/~nesse/Nesse-Tinbergen4Q.PDF>)
- Further Diagrams on The Four Areas of Biology (Documents No. 5, 6 and 7 in English) (<http://homepage.uibk.ac.at/~c720126/humanethologie/ws/medicus/block1/inhalt.html>)

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