

Lorenz, Konrad (Zacharias) (b. November 7, 1903; d. February 27, 1989), Austrian psychologist. Lorenz's research laid the foundations for a new scientific discipline called ethology, the systematic observation, recording, and analysis of animal behavior. Ethology emphasizes the role of objective and quantifiable observations of behavior and the need to integrate the study of its multiple aspects: physiological or cognitive mechanisms regulating it, changes related to age, its contribution to an individual's survival and reproduction, and its evolutionary history. Although ethology is often equated with the study of animal behavior, it has made many important contributions to understandings of human behavior and development.

Lorenz shared the Nobel Prize in 1973 for elucidating the importance of critical periods. A critical period is a restricted time window in the life of an individual during which specific events must occur to ensure normal development. The same events occurring before or after the critical period will have little or no effect on development. Lorenz observed that young birds exposed to a human being shortly after hatching become "imprinted": they will follow this individual everywhere and later in life will direct sexual behavior toward this individual instead of members of their own species. Later work showed that young birds can be imprinted not only on humans but also on other animals or even inanimate objects, that imprinting is stronger in some species of birds than in others, and that the process is not as irreversible as Lorenz had originally thought. The notion of critical periods has since been replaced with that of sensitive periods, which are viewed as periods of time with relatively flexible boundaries in which developing organisms are most responsive to certain environmental stimuli and most

likely to be affected by them. Sensitive periods have also been recognized for language learning and other aspects of cognitive development.

Lorenz's research on imprinting led to the hypothesis that human infants need to be in close physical contact with their mothers early in life during a critical period in order to develop a strong bond with them, and that disruption of the bonding process might have a negative impact on the mother's behavior, the relationship between mother and child, and the child's psychological and social development. This research was instrumental in the formulation of attachment theory, according to which human infants and children possess a biologically based motivational system that urges them to maintain proximity to their caregivers and solicit help and protection at times of need. Although this hypothesis remains controversial, the importance of extended contact and interaction between an infant and her caregivers is generally appreciated by pediatricians and developmental psychologists.

Lorenz's approach also affected observational studies of child behavior conducted by anthropologists across the globe. Such studies have documented both similarities and differences in parental practices and child development in a wide range of human societies. Although Lorenz's scientific legacy is stronger in Europe than in the United States and many of his theories did not withstand the test of time (for example, his theories of motivation), he deserves credit for launching the biological study of behavior as a legitimate scientific discipline and providing the conceptual and methodological tools that allowed for its growth and success.

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Further Reading

Hinde, R. A. (1987). *Individuals, Relationships, and Culture: Links between Ethology and the Social Sciences*. Cambridge: Cambridge University Press.

Burkhardt, R. W. (2005). *Patterns of Behavior: Konrad Lorenz, Niko Tinbergen, and the Founding of Ethology*. Chicago: The University of Chicago Press.