

COMMENTARY

Tinbergen's four questions, biologically useless behavior and humanistic ethology

Miloslav KRŠIAK

Department of Pharmacology, 3rd Faculty of Medicine, Charles University of Prague, Prague, Czech Republic.

Correspondence to: Prof. Miloslav Kršiak, MD., DSc., FCMA; Department of Pharmacology, 3rd Faculty of Medicine, Charles University in Prague, Ruská 87, 100 34 Prague, Czech Republic; TEL: +420-267-102-487; FAX: +420-267-102-461; E-MAIL: miloslav.kršiak@lf3.cuni.cz

Submitted: 2011-09-08 *Accepted:* 2011-09-17 *Published online:* 2011-10-03

Key words: **ethology; human ethology; evolution; origin of man; humanistic ethology; biologically useless behavior; Tinbergen's four questions; humanistic evolution**

Act Nerv Super Rediviva 2011; 53(3): 103–106 ANSR530311A01

© 2011 Act Nerv Super Rediviva

Abstract

The Tinbergen's four basic ethological questions (regarding the function of a behavior in survival or reproduction, what stimuli elicit it, its ontogeny and evolutionary history) when applied to man solely from biological point of view seem to be often inappropriate. For example, what is the survival function of behaviors that have emerged in modern man such as burial, artwork, and religious behavior? These behaviors seem not to be essential for survival or the spreading one's own genes; instead they seem to be biologically useless. It could be revealing to employ Tinbergen's four questions to man with respect to biological uselessness, especially to humanistic phenomena (e.g. non-biological needs, such as close personal relationships without clear biological or economic value, and behaviors linked to self-realization, freedom, and dignity), which seem to be as natural as biological ones, but are specifically human. This application might stimulate interest for example in the role of spontaneous internal non-biological stimuli in man, in ontogeny as well as phylogeny of positive interpersonal relationships, in humanistic aspects of non-biological evolution, its selection mechanism. Biologically useless phenomena are sometimes demeaned as by-products of biological evolution, like spandrels forming the spaces above arches, but they may be crucial in non-biological evolution of man. Combining ethological concepts with humanistic perspectives could help to rescue human ethology from its current stalemate. Such ethology of man could be called "Humanistic ethology" to put in on par with the already well-established discipline of "Humanistic psychology".

INTRODUCTION

One of principal founders of modern ethology, a Nobelist Niko Tinbergen has argued that ethology must always focus on providing answers to four very specific questions, regarding any instance of behavior (Tinbergen 1963):

1. Evolutionary (ultimate) causes: how does the behavior impact on the animal's chances of survival and reproduction?
2. Immediate (proximate) causes: what are the stimuli that elicit the response?
3. Development (ontogenesis): how does the behavior develop in the individual?
4. Evolutionary history (phylogenesis): how did the behavior arise in the species, and how does it compare with similar behavior in related species?

All of these contribute to a larger single question "Why animals behave as they do?"

Ethology originated as a biological discipline and is included in the subdiscipline of zoology. Tinbergen's four questions have historically been raised by biologists and so have been answered until now from a biological perspective. Certainly, this has proved to be useful in animals and in some cases, in man as well.

APPLYING TINBERGEN'S FOUR QUESTIONS TO MAN

Tinbergen's four questions, when applied to man solely from a biological point of view, often seem to be inappropriate and suggest the need for another (especially humanistic) perspective. For example, "What is the survival function of behaviors emerging in modern man such as burials, artwork, and religious behaviour"? One cannot resist feeling that these behaviors are not essential for survival or spreading of one's own genes, that they are biologically useless (meaningless). Intentional burials (sometimes with inclusion of grave goods), creation of art work, and the building of sanctuaries or monuments do not seem to occur in animals and thus might be used as behavioral criteria for taxonomy in the genus *Homo* – an approach similar to that introduced by an early founder of ethology, Oskar Heinroth, in his exhaustive study of the *Anatidae*.

As for the second question, "What are the proximate causes of these human-specific biologically useless behaviours"? The proximate causes are generally considered in terms of external stimuli. The role of external stimuli, for instance in artwork, may be important, but inspirational art or intellectual ideas can hardly be evoked on demand (e.g. experimentally produced). What are the stimuli (apparently internal and individual) that evoke such human-specific, biologically useless, behavior?

With respect to the third and fourth question (regarding ontogeny and phylogeny), there appears to be a transition from biologically essential to biologically useless behavior. For example, early forms of positive interpersonal relationships start as a purely biological unconscious grasping reflex in the newborn, later – relatively soon – these relationships are based on affectionate emotions and much later – in adulthood – can take the form of awareness of duty, and responsibility. The same sequence appears to occur during phylogenesis – from positive taxes (e.g. phototaxis) or reflexes during mating in simple organisms to affectionate emotions presumed to exist, for instance in dogs, to positive relationships and behaviors based on awareness of duty, responsibility (some of which occasionally take the form of 'commandments') which presumably occur only in humans.

BIOLOGICALLY USELESS BEHAVIOR AND THE ORIGIN OF MAN

Focusing on the occurrence of *biologically useless* behaviors such as burials, artwork, and sanctuaries could be used not only for taxonomy for the genus *Homo*, as mentioned above, but also in assessment relative to the origin of modern man and evolution of human behavior. According to this criterion, modern man appeared much later than the date supported by morphological criteria (e.g. according to skeletal remains). The estimated age of oldest-known fossils of anatomically-modern humans (Omo skulls, Omo National Park, Ethiopia) is about 200 thousand years old (McDougall 2005) while evidence of biologically useless behavior are considerably more recent. A sequence and perhaps even a 'progress' can be traced in evolutionary history relative to these biologically useless behavioral/ethological attributes. The first human burials appeared about 100 thousand years ago (en.wikipedia.org), art work (e.g. paintings in Altamira cave) date back about 14–35 thousand years (en.wikipedia.org), while presumed sanctuaries (e.g. Hagar Quim or Stonehenge) appear no older than 5 or 4 thousand years (en.wikipedia.org). Does this sequence reflect an ascending evolutionary scale of spirituality (in a broader sense, as an expression of internal stimuli absent from biological function)?

BIOLOGICAL USELESSNESS AND NON-BIOLOGICAL EVOLUTIONS IN MAN

Turning our attention to biological uselessness (an approach used by Hans Jonas as an example of how to identify a man-like creature on another planet – Jonas, (2001) in employing Tinbergen's four questions regarding the ethology of man, might enable us to see specific non-biological evolutions in modern man which differ from biological (Darwinian) evolution in several respects (e.g. by 'inheritance' of acquired characteristics, as well as other selection mechanisms). Whereas

selection in biological evolution takes place according to the criterion of reproductive success, selection in non-biological evolutions appears to take place based on success or fitness in responding to non-biological stimuli. Some of these non-biological stimuli are external, clear-cut, obvious, and public (e.g. clothing, language, customs, and formulated beliefs) and can be classified as “memes”, others are internal, less clear, hidden, and private (e.g. artistic or intellectual inspiration, humanistic feelings regarding human rights, dignity, duty, responsibility, ethical feelings). The external or memetic stimuli mentioned above may shape many phenomena in the process termed cultural evolution, while the internal, primarily private ones, may be decisive in shaping a process that might best be called “humanistic evolution”.

It may be useful to distinguish between cultural and humanistic evolution, although this is very difficult because both types of evolution are closely-knitted and mutually interacting. The major differences seem to be in their origins, trends and selection mechanisms.

Whereas cultural evolution appears to be a multidirectional process with questionable progress (it stems from and selects many arbitrary phenomena) humanistic evolution (involving evolution of ethical and scientific knowledge) appears to be unidirectional with definable progress (it depends on finding humanistic, ethical, scientific ‘truths’, i.e. phenomena that may not be arbitrary). Progress in scientific knowledge is generally acknowledged, but it is often questioned in areas such as ethics. Nevertheless, over the long term, some progress might be detectable even there. For example human sacrifices, slavery, burning “witches”, and other various behaviors were once considered correct and represented a particular culture. Later these same behaviors were abandoned because they had become ethically indefensible, inhumane and wrong.

LIMITS OF BIOLOGICAL PERSPECTIVE IN THE ETHOLOGY OF MAN

An exclusively biological perspective regarding ethology in man can sometimes produce clumsy explanations. The conclusion that human promiscuity is adaptive because it increases the chances propagating one's own genes and thus increases reproductive success is a good example of one of these clumsy explanations. Although it could be correct from a biological perspective, it may very well be questionable from humanistic point of view. Applying only biological measures to humans remind us of the story regarding the inappropriate use of a samovar: while samovars can be used instead of hammers to drive nails, it was not their intended purpose, nor is it the most productive way to employ them (Glad 2006, citing the Russian formalist critic Viktor Shklovsky).

The current adaptationist approach (considering all manifestations of life in man as only products of natu-

ral, i.e. biological, selection), which is now common in fields such as evolutionary psychology, has created a universal and simplistic answer to all questions regarding the origin and function of any behavior which does not increase [biological] evolutionary fitness. For example, the likely adaptationist answer to a question like “What is an origin and function of behaviors such as artwork or religious behavior neither of which are necessary for survival and reproductive success?” might be that: “These feckless products are little more than the spandrels above the arches of [biological] evolution”. Although these behaviors were not necessary (i.e. adaptive) for biological evolution of humans they might have been essential with regard to cultural and humanistic evolution; and furthermore these phenomena and processes (including the often ignored adaptations to pressures from internal stimuli) may *prove to be* necessary and decisive to the continuation of humanistic evolution.

Many problems mentioned here or present in disputes over the origin of life (Ruse 2005) are due to a reductive view of life in the modern age (Jonas 2001), implicitly meaning only a biological form of life and ignoring the possibility that biological life might be only one form of manifestation of life.

HUMANISTIC ETHOLOGY

It could be revealing to employ Tinbergen's four questions to man with respect to humanistic phenomena that appear devoid of biologic necessity, or economic gain; phenomena such as close personal relationships, self-realization, freedom, and dignity. These phenomena seem to be as genuine, powerful and natural as biological ones but also appear to be quintessentially human. Such an assessment might stimulate a reevaluation of many aspects of human behavior and phenomena that have been largely ignored by the greater biological community; for instance the role and importance of spontaneous internal non-biological stimuli in man, ontogeny as well as phylogeny of positive interpersonal relationships (which have been and undoubtedly will continue to be critical in the non-biological evolution of man), to humanistic evolution, its selection mechanism (Krsiak 2006), and humanistic fitness.

The reduction of human ethology to purely biological aspects such as adaptations to external pressures related to survival and reproductive success may ultimately force us into a blind alley. I believe using ethological concepts with humanistic perspectives could be the key or at least a key, to breaking the human ethology from its stalemate. The result could make the ethology of man a very attractive and fruitful discipline. Such ethology of man I would call “Humanistic ethology” and put it on par with the already well-established discipline of “Humanistic psychology.” As I approach the end of my professional career, which has, in part, been devoted to the application of ethology in pharmacology (Kršiak & Šulcová 1990), I can now only hope and wish

that new scholars will be inspired to pick of the gauntlet of humanistic ethology and take it, and the new way of thinking it represents, to the next level.

ACKNOWLEDGEMENT

I would like to thank Prof. Peter Fedor-Freybergh, Editor-in-Chief, for his encouragement to write this paper.

Supported by research grant MSM0021620816 from the Czech Ministry of Education.

REFERENCES

- 1 Cave of Altamira (2011) Cited from http://en.wikipedia.org/wiki/Cave_of_Altamira.
- 2 Glad J (2006) Three Books on Sociobiology and the Arts. *The Mankind Quarterly*. **57**: 95–105.
- 3 Hagar Quim (2011) Cited from http://en.wikipedia.org/wiki/Hagar_Qim.
- 4 Jonas H (2001) *The Phenomenon of Life*. Evanston, Illinois: Northwestern University Press.
- 5 Kršiak M, Šulcová A (1990) Differential effects of six structurally related benzodiazepines on some ethological measures of timidity, aggression and locomotion in mice. *Psychopharmacology*. **101**: 396–402.
- 6 Kršiak M (2006) Human evolution: humanistic selection and looking to the future. *Neuroendocrinology Letters*. **27**: 563–567.
- 7 McDougall I, Brown FH, Fleagle JG (2005) Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature*. **433**: 733–736.
- 8 Paleolithic burial (2011) Cited from http://en.wikipedia.org/wiki/Paleolithic_burial.
- 9 Ruse M (2005) *The Evolution-Creation Struggle*. Cambridge, Massachusetts: Harvard University Press.
- 10 Stonehenge (2011) Cited from <http://en.wikipedia.org/wiki/Stonehenge>.
- 11 Tinbergen N (1963) On aims and methods in ethology. [reprinted in *Anim.Biol.* 55 (4), 297–321, 2005]. *Zeitschrift für Tierpsychologie*. **20**: 410–433.

The four central questions of biological research using ethology as an example. Questions Concerning Proximate Causes. Questions Concerning Ultimate Causes. Behavior and the psyche cannot be understood from the point of view of a single focus of inquiry since the areas in questions are, in reality, closely intertwined with one another. When certain scientific relationships are not considered, (established) knowledge is neglected (see paragraph C, cf. columns 1 - 4). The "Theory of Human Sciences" is a framework of reference, which demonstrates the associations between disciplines. Tinbergen's four "questions". Animal behavior can be explained in terms of a. causation b. development c. evolution d. function. Why do cephalopods ink? Causation. Ink production tyrosine melanin. Development. Evolution. Modern animal behavior. Dichotomy between comparative psychology and ethology now blurred.