

Questions for the Master's Exam in Human Evolutionary Ecology

General

1. Discuss the post-modern critique of scientific positivism. What are the most important questions raised by this critique? What are their implications for scientifically-oriented anthropology in general, evolutionary ecology in particular?

Theory and Evolutionary Ecology

2. What is natural selection? How does it work? Give some examples?
3. What is Galton's problem? How does it affect comparisons among populations and species? What methods have been developed to deal with this problem? Give respective strengths and weaknesses.
4. Behavioral ecologists make explicit use of the theory of natural selection and of optimization, but neither of these is under test in any particular empirical study. What is under test? What does this have to do with natural selection and optimization? Provide a good example of the appropriate use of optimality models for studying human behavior.
5. Data on clutch size in great tits, sex ratio in common guppies, and copulation times in dung flies show individuals adjusting their strategies to the circumstances in which they find themselves. If the phenotypic variation in these cases is not heritable how can natural selection explain it?
6. Most of the models used in evolutionary ecology make use of what Alan Grafen has called the "phenotypic gambit." Marc Feldman and others have argued that this enterprise is bankrupt, that erroneous conclusions are reached when genetics are ignored. Discuss this debate.
7. Game theory is a valuable tool in evaluating the economics of behavior. Where is game theory most effectively employed in the study of behavior, and where is it not? Using examples, summarize the assumptions, the limitations, and the outcomes of simple evolutionary models based on game theory.
8. What is Hamilton's Rule and why is it important? Illustrate using specific examples.
9. How can the investigation of proximate mechanisms help in our understanding of ultimate questions?
10. Currently three different approaches apply evolutionary tools to the study of human behavior (1) cultural evolution (cultural transmission), (2) human behavioral ecology, and (3) evolutionary psychology. Characterize each, using examples, and summarize their similarities and differences.

Life History Theory

11. Is menopause an adaptation?
12. What are Charnov's "life-history invariants"? How have they been applied to humans and other primates?
13. What do we know about the ecology and life history of "archaic" Homo sapiens? What are some potentially interesting points of contrast with the ecology and life history of modern human hunter-gatherers?
14. Discuss the trade-off between quality of offspring and quantity of offspring. Summarize theoretical and empirical work on variables that affect the optima.

Prehistory

15. Increasingly, models from evolutionary ecology are being applied to address questions involving human behavior in archaeological settings. Discuss the key successes of this approach as well as the difficulties involved in applying evolutionary ecology in archaeological contexts.
16. Many archaeologists argue that there is a strong connection between increased meat eating and increased brain size in human evolution. Summarize the issues and evidence.

Social Dynamics

17. Evolutionary theory predicts both altruism and conflicts of interest among close kin. Explain the relevant theory and the relationship between these two ideas.
18. Primatologists find that both within-group and between-group competition affects social patterns among female primates. Explain the models that have developed around this variation and summarize the relevant data.
19. Isaac and others have promoted the idea that food sharing within the nuclear family was a critical development in the evolution of humans. Evaluate the support for this proposition with data from modern hunter-gathers.

Foraging Theory

20. Discuss the currency, decision, and constraint assumptions incorporated into the prey (optimal diet) model. Explain the circumstances in which it is an appropriate tool for studying variation in human foraging and provide an example.
21. Discuss the currency, decision, and constraint assumptions incorporated into the patch model and marginal value theorem. What are the differences between the two models? When are they appropriate for studying variation in human foraging?
22. Blurton Jone's Tolerated Theft model is based on the assumption that individuals claim resources according to the cost-benefit logic of economic defendability. Explain this model. This model points to a resource characteristic that is independent of those used to calculate "profitability" in the prey (optimal diet) model, but one that could/should sometimes play an important role in resource choice. What is it? When might it be expected to affect resource choice?
23. Sharing can be very effective at reducing the risk of a consumption shortfall among a small number of foragers when the variance in their nutrient acquisition rates is not positively correlated. Noting this, many anthropologists have concluded that this explains the occurrence of sharing. Some are skeptical of such a conclusion. Explain the issues.
24. Males and females may have different foraging goals. List evolutionary reasons why this might be so and discuss how these reasons might apply to the human sexual division of labor. Provide ethnographic illustrations.

Table 1: Data on three hypothetical prey species.

Prey	λ_i	e_i	h_i
1	0.1	20	10
2	1.0	3	2
3	2.0	10	15

For each prey species, λ_i is the rate at which prey items are encountered, e_i is the energy acquired per prey item, and h_i is the handling time per prey item. On the test, the numbers given in the table will be different.

25. Table 1 presents data describing the costs and benefits of wild resources taken by a hypothetical population of foragers. Use these data to determine the optimal diet for this population. Are any of the resources in the table excluded from the optimal diet? (Note: On the test, the numbers given in the table will be different.)

Mating and Parenting

26. According to Bateman's principle, the number of copulations makes a difference to a male's reproductive success but not to a female's reproductive success. Why? What are the implications of Bateman's principle for morphological and behavioral differences between women and men?
27. Females in many primate societies actively solicit copulations from several males. Recent research has suggested that the usual evolutionary emphasis on "coy females" may be overdrawn for human females as well, and that short-term matings with several males may at times be advantageous. When and why might this be the case? Discuss the arguments and their possible relevance to humans and other primates. Things to consider would include arguments by Hrdy, "good genes" arguments, and direct exchange of resources for sex.
28. Trivers suggested that the extent of parental investment by males and females was an important determinant of animal mating patterns. Discuss and consider the relevance of this argument in reference to humans.
29. Discuss the conflicts between parents and offspring. How have these issues affected morphological and behavioral adaptations.
30. Infanticide has been observed among human populations and in non-human primates. If individual reproductive success is measured in the number of successful offspring, why should infanticide be practiced at all? Discuss current ideas about the role of male infanticide in shaping primate social organizations.
31. How do resources and status affect fertility in traditional and modern societies?
32. Why and under what circumstances do people marry polygynously? Discuss the costs and benefits of polygyny for women and men. Include in your answer a discussion of the polygyny threshold model and evidence bearing on its relevance to people.

Methods

33. Be able to solve a simple constrained optimization problem that you have never seen before.