Studyguide 1, Evolutionary Psychology

Evolutionary Theory

1. Understand how natural selection works. What are the three essential ingredients? (Buss and lecture)

2. Be able to describe the changes that took place in the Grant's study of the medium ground finch, and how this example illustrates natural selection (lecture).

3. Review sexual selection (Buss 6-7) – general idea only at this point.

4. Is natural selection the only cause of evolutionary change? (p. 7)

5. Mendel showed that inheritance is particulate. Why is this important for natural selection? (lecture)

6. Understand the concepts of kin selection and inclusive fitness (Buss and lecture). This will be discussed in more depth later in the course.

7. Why are altruistic traits unlikely to evolve through group selection? (this may not apply to cultural evolution). p. 13 and lecture

8. Understand the "common misunderstandings about evolutionary theory" (Buss 16-17) well enough that if someone makes such a claim, you would be able to refute it.

9. Natural selection does not produce perfect adaptation. Review the reasons why this is so (p. 17–18 and lecture on adaptation and maladaptation). Think of some examples for the following, discussed in lecture:
(a) it may be unpleasant, but still adaptive
(b) manipulation
(c) trade-offs
(d) historical constraints
(e) frequency-dependent selection
(f) traits adapted for another time/place

10. To a biologist, an altruistic trait is one that favors another individual at the expense of the altruist. We reviewed several ways seemingly altrustic traits could evolve. What are they? (lecture).

Reciprocity is one proposed explanation for generosity to non-kin, but the problem is ensuring that a favor will be reciprocated. Some people think that the social emotions, therefore, evolved to reinforce reciprocity. Explain.

11. Know what a "norm of reaction" is, and what it implies for the nature-nurture debate. (lecture). Give an example discussed in class. Now think of something not discussed that is likely to be an example of a norm of reaction, and draw it.

12. Be able to summarize how natural selection shaped the ability to respond to changing environmental conditions in soapberry bugs. Note that the responsiveness (the norm of reaction curve) is

itself heritable, and appears to be adaptive. What affects the shape of the curve? (lecture)

13. Garcia studied conditioning in rats by pairing a stimulus (lights or tasty water) with a punishment (electric shock or x-ray induced nausea). What were the rats able to learn? (lecture and text). Why general inference can you draw from the result (i.e., why did I bother to talk about this?). How does it refute the assumptions of early behaviorism? (lecture; also Buss p. 27).

14 What do studies of attention in newborns tell us about the interaction between "nature" and "nurture"? What do they attend to? Why might this be an evolved adaptation? (lecture).

15. The history described by Buss shows shifts between the view that much of human behavior is innate ('nature') to the opposite view that almost anything could be learned and culture was infinitely variable. Most scientists today acknowledge that nature and nurture interact.

Evolutionary theory, Reserve reading and video

Epigenetics - video

1. What is the epigenome? What made the genetically-identical brown and yellow agouti mice so different?

2. How does feeding pregnant mice dietary supplementation with methyl donors (like soy and folic acid) affect this result? The environmental toxin they refer to is BPA (bisphenol A), a substance found in polycarbonate plastics, cash register receipts, and can linings in the U.S.

3. The genes of identical twins are the same – how about their epigenomes? Does it change with age and experience?

4. Can maternal behavior cause epigenetic effects? (see posted lecture notes, I didn't cover this well in class)

Ridley: Genes are so liberating

1. Genes are not changed by the environment, but their expression is. That is how a norm of reaction works.

2. How do montane and prairie voles differ behaviorally, and what does this have to do with vasopressin receptors? (This is a very big behavioral difference from a single mutation!). But nothing happens to vasopressin production in the prairie vole unless he... what?

3. Variation in the promotor region of the MAOA gene affects the likelihood of becoming antisocial, but only under certain conditions. Explain this gene-environment interaction (also discussed in lecture).

4 Ridley explains heritability perhaps better than I did in class, but see also the notes below. It is a useful term to understand correctly. Ridley says, "Myopia is more 'heritable' in a literate than in an illiterate society, in the same way that IQ is more heritable in a well-educated than in a poorly educated society." Why is myopia more heritable in a literate society?

Explanation: The observed variation in a trait (the phenotypic variance) within a given population is due to both inherited factors (G= genetic variance) and environmental ones (E= environmental variance). Heritability refers to the proportion of observed variation among members of a population that is due to genetic factors. In other words, heritability $= G/G + E$. So if there is a lot of environmental variance, the fraction (heritability) is smaller. Myopia is more heritable in a literate than an illiterate population not because they differ genetically, but because environmental variation is smaller in the literate one (everyone reads, so the only source of variation left is genetic). Ok, so why does he say that IQ should be more heritable in a society with universal education vs one where it is only available to some?

Evolutionary psychology, ch. 2

1. What is the EEA?

2. Evolutionary Psychologists are sometimes accused of assuming that everything is an adaptation. Note Buss's distinction between adaptations, by-products, and noise. Give an example.

3. Do evolutionary psychologists assume evolutionary theory or do they test it? Buss gives examples of lower-level theories that are tested by EP, and points out that these can be falsified without it threatening the validity of the higher-level theories. Read the example, but you won't be tested on it.

4. Get the gist of his discussion of evolved psychological mechanisms, and in particular the claim that the mind consists solely of domain specific mechanisms. This was an early assertion by Leda Cosmides and John Tooby, two founders of the field, and I think Buss agrees with it. Others of us (see p. 51) think there are general mechanisms also. It is ultimately an empirical question.

5. The discussion of learning, culture, and evolved psychological mechanisms (pp 53-54) is important. Understand the examples he gives for evolved learning mechanisms. We discussed this in class.

6. The rest of the chapter is skimmable: get the gist and appreciate the wide range of methods and data sources used by Evolutionary Psychology. It is truly a multi-disciplinary field.