

Evolution of Behavior

Readings, Bio 150/250, Human Behavioral Biology, Spring, 2008

Axelrod R, Hamilton WD 1981 The evolution of cooperation. *Science* 211, 1390-1396. Classic paper on the subject.

Pool, R 1995 Putting game theory to the test. *Science* 267, 1591-1593. Going from sociobiological theory to actual field data.

Morrell V 1996 Genes versus teams: Weighing group tactics in evolution. *Science* 273, 739. A consideration of the contemporary version of group selection.

Kerr B et al., 2002 Local dispersal promotes biodiversity in a real-life game of rock-paper-scissors. *Nature* 418 171. This shows game theory being played out in an unlikely species. Just read the abstract.

Semmann D et al., 2003 Volunteering leads to rock-paper-scissors dynamics in a public goods game. *Nature* 425 390. If you're really into game theory stuff, this paper shows the rock-paper-scissors in humans. It's pretty thick going thought, so not for the rookie (i.e., not required).

Final two are non-technical pieces:

Pennisi E 2009 On the origin of cooperation.

Science 325 1196.

Pennisi E 2008 Deciphering the genetics of evolution. Science 321, 760.

Molecular Genetics

Kerr 1995 Did Darwin get it all right? Science 267, 1421. Related to Gould's notions of punctuated equilibrium.

Sapolsky 1999 The war between men and women. Discover, May, 56. This is an overview of imprinted and intersexual gene competition.

Gilad Y et al., Expression profiling in primates reveals a rapid evolution of human transcription factors. 2006 Nature 440, 242. Read the abstract only. This supports the idea that changes in non-coding regions of DNA are more of a driving force of evolution than are changes in genes themselves, and that this is particularly pertinent to humans and chimps separating evolutionarily.

Behavioral Genetics

Francis et al., 1999 Nongenomic transmission across generations of maternal behavior and stress responses in the rat. Science 286, 1155. A striking example of non-Mendelian transmission. Abstract only.

Schwabl et al., 1997 A hormonal mechanism for

parental favouritism. Nature 386, 231. Another non-genetic phenomenon that could be mistaken for one. Abstract only.

Krieger M, Ross K 2002 Identification of a major gene regulating complex social behavior. Science 295 328. Just to show that sometimes, single genes can regulate behavior in a significant way. Abstract only.

Francis D et al., 2003 Epigenetic sources of behavioral differences in mice. Nat Neurosci 6, 445. Another version of some behaviors that seem to be genetically-controlled until you carry out some more subtle tests.

Diek D 2007 Identification of genes influencing a spectrum of externalizing psychopathology. Curr Direction Psych Sci 16, 331.

Rodrigues S, Saslow L, Garcia N, John O, Keltner D 2009 Oxytocin receptor genetic variation relates to empathy and stress reactivity in humans. Proc Nat Acad Sci USA 106, 21437.

Recognizing Relatives

Shingo T et al., 2003 Pregnancy-stimulated neurogenesis in the adult female forebrain mediated by prolactin. Science 299 117. Abstract only.

Buchan et al., 2003 True paternal care in a multi-male primate society. Nature 425 179. Evidence of primates using a cognitive strategy to detect relatives.

Fisher H, Hoekstra H 2010 Competition drives cooperation among closely related sperm of deer mice. Nature 463, 801. Just read the abstract. This is a nice demonstration of a case of inclusive fitness competition

among sperm, and sperm competition between males. Note that this requires sperm to recognize related sperm.

Ethology

Hare B et al., 2002 The domestication of social cognition in dogs. *Science* 298 1634. A demonstration of how humans have bred certain FAPs into domesticated dogs.

Sherman G, Visscher P 2002 Honey bee colonies achieve fitness through dancing. *Nature* 419, 920. A great demonstration of how ethologists go about testing the usefulness of some observed behavior; also has the greatest title I've ever seen in a paper.

Ghazanfar A, Santos L 2004 Primate brains in the wild: The sensory bases for social interactions. *Nature Review Neuroscience* 5, 603.

Neuroscience and Endocrinology

If you need a background in these subjects, besides going to the extra lectures, read chapters concerning the autonomic nervous system, the hypothalamus and hormones in one of these books on reserve in Falconer library:

Rosenzweig et al., 1998 *Biological Psychology*. Sinaur.

Kandel E, Schwartz J, Jessell T 2000 *Principles of Neural Science*.

The first book is much easier and is at a perfectly

adequate level for the class.

Readings for aggression, violence, empathy and altruism

There's a huge number of good readings in this area and I've been having a hard time choosing (and thus sorry for the delay in assigning this). I've very roughly bucketed readings into different categories below (not because they can be truly put into separate categories...hit Repeat to hear Lecture 1 all over again....). Just convenience.

*****NEURO RELATED PAPERS**

Haidt J, 2007 The new synthesis in moral psychology. Science 316, 998. This is an argument in favor of the idea that moral reasoning comes after affective processes have made a decision about a moral issue – emotion comes first. As you'll see, a lot of this is anchored in neuro. Read the whole thing.

Greene J, Paxon J 2009 Patterns of neural activity associated with honest and dishonest moral decisions. Proc Natl Acad Sci USA 106, 12506. Intensely cool paper.

Koenigs M, Young L, Adolphs R, Tranel D, Cushman F, Hauser M, Damasio A. 2007 Damage to the prefrontal cortex increases utilitarian moral judgements. Nature 446 908. Abstract only.

Wheeler M, Fiske S 2005 Controlling racial prejudice:

Social-cognitive goals affect amygdala and stereotype activation. Psych Sciences 16, 56. A great great study that can actually make one feel optimistic about the world.

Hariri et al., 2002 Serotonin transporter genetic variation and the response of the human amygdala. Science 297 400. Abstract only. Note – the effect size is very small in this paper and, commendably, the authors make this very clear in the paper itself.

Takahasi H, Kato M, Matsuura M, Mobbs D, Suhara T, Okubo Y 2009 When your gain is my pain and your pain is my gain: Neural correlates of envy and schadenfreude. 2009 Science 323 890.

***ZOOLOGY-RELATED PAPERS

de Waal F 2000 Primates – a natural heritage of conflict resolution. Science 289, 586.

Langford DJ, Crager S, Shehzad Z, Smith SB.....Mogil JS 2006 Social modulation of pain as evidence for empathy in mice. Science 312 1967. Abstract only.

And a commentary on Langford et al.: Miller G 2006 Signs of empathy seen in mice. Science 312, 1860.

***ENDOCRINE PAPERS

Eisenegger C, Naef M, Snozzi R, Heinrichs M, Fehr E 2010

Prejudice and truth about the effect of testosterone on human bargaining behaviour. Nature 463, 356. This is a really interesting and important paper, but hard. Broadly, these are the main points about it:

--A standard view (which has hopefully been trashed in class) is that testosterone = aggression, antisocial behavior, egoism.

--There is a much more subtle and insightful way that some people have been thinking about T; this has been called the "challenge" hypothesis of T effects on behavior. Basically, it says that T is not about causing or even amplifying pre-existing social tendencies towards aggression/anti social behavior/etc. Instead, what it does is cause or strengthen whatever behaviors are needed to maintain status when it is being challenged. In that model, it rises at those times, and is pretty irrelevant to behavior the rest of the time.

--It can be hard to distinguish between T = aggression and T = defending your position against challenge. The cool thing about this study is that they found a really clever way of doing it. As you'll see, they found a scenario where defending your dominance against threat requires you to be PRO-social, rather than anti-social.

--They show that in this circumstance, T makes you more pro-social. Conclusion: strong support for this challenge hypothesis.

Archer J 2006 Testosterone and human aggression: an evaluation of the challenge hypothesis. Neurosci Biobehavioral Rev 30, 319. This is not required – only for the stout-hearted who are really interested in this subject. Superb review, but very heavy going.

Hermans E, Ramsey N, van Honk J 2008 Exogenous testosterone enhances responsiveness to social threat in the neural circuitry of social aggression in humans. Biological Psychiatry 63, 263. Abstract only.

***PAPERS RELATED TO DEVELOPMENT/GENETICS

Bigler R, Liben L 2007 Developmental intergroup theory: Explaining and reducing children's social stereotyping and prejudice. *Curr Dir Psych Sci* 16, 162

Caspi A et al., 2002 Role of genotype in the cycle of violence in maltreated children. *Science* 297 851. Extremely important paper showing gene/environment interactions with respect to aggression. Abstract only.

***PAPERS ABOUT EVOLUTION/GAME THEORY

Daly and Wilson 1988 Evolutionary social psychology and family homicide. *Science* 242, 519. Classic paper showing how sociobiologists/evolutionary psychologists approach the issue of violence in the family. Extremely controversial study that has not always been replicated.

Bowles S 2009 Did warfare among ancestral hunter-gatherers affect the evolution of human social behaviors? *Science* 324 1293.

Lim May, Metzler Richard, Bar-Yam Yaneer 2008 Global pattern formation and ethnic/cultural violence. *Science* 317, 1540.

Efferson C, Lalive R, Fehr E 2008 The coevolution of cultural groups and ingroup favoritism. *Science* 321 1844. Not required.

Only if particularly interested.

Pennisi E 2009 On the origin of cooperation. Science 325 1196.

Herrmann B, Thoni C, Gächter S 2008 Antisocial punishment across societies. Science 319, 1362.

Milinski M, Semmann D, Krambeck H 2002 Reputation helps solve the 'tragedy of the commons.' Nature 415, 424. Abstract only.

***AND SOME OTHER PAPERS:

Keizer K, Lindenberg S, Steg L 2008 The spreading of disorder. Science 322 1681. Abstract only.
Commentary about this: Holden C 2008. Science 322 1175.

Atran S et al., 2007 Sacred barriers to conflict resolution. Science 317, 1039.

Zhong C, Liljenquist K 2006 Washing away your sins: Threatened morality and physical cleansing. Science 313 1451. Abstract only. This was the study discussed in class.

Williams L, Bargh J 2008 Experiencing physical warmth promotes interpersonal warmth. Science 322 606. Abstract only. Mentioned in class.

***AND AN ADDITIONAL DEVELOPMENT PAPER:

Hamlin K, Wynn K, Bloom P 2007 Social evaluation by preverbal infants. Nature 450, 557. Abstract only and, following that, a short piece about the paper from New Scientist:

Babies are good judges of character long before they learn to speak, according to a new study. Infants as young as six months preferred characters which helped rather than hindered others in a simple puppet show.

Researchers say the findings reveal that humans begin making social evaluations far earlier than previously thought.

"This is the very first experiment in anywhere near this age that shows babies develop preferences for individuals based on their actions," says Karen Wynn at Yale University in New Haven, Connecticut, US, who led the study.

Wynn and her colleagues studied the reactions of infants to a sketch in which a brightly coloured wooden block with goggle eyes attempts to climb up a hill. Much like in a puppet show, the infant could not see the person behind a curtain who controlled the character's movement with a wooden stick.

Understood intent

Along with the wooden character attempting to climb the hill in tiny increments, a helper block was also involved at the bottom of the slope, which pushed the main character up the track from time to time.

Additionally, another wooden block positioned at the top of the hill occasionally came down to hinder the upward movement of the first block.

The blocks had different shapes and colours to help the babies distinguish one piece from another. But the scientists controlled for these attributes by varying them from trial to trial.

After the show, the researchers brought out the helper block and the hinderer block on a platter and placed it in front of the infants. A colleague who did not see the skit, and did not know the role of each block in the performance, recorded how the babies interacted with the objects.

Wynn says that the infants are very willing to reach out for one of the blocks, an action that indicated their preference: "They're very cooperative in grabbing things." She says that all 12 of the six-month-olds preferred the helper block. Similarly, 14 out of the 16 infants aged 10 months reached for the helper

block.

The researchers believe that the babies understand the intent of the middle block to climb the mountain because of its small incremental movements in that direction. Wynn adds, though, that it is not clear how the babies pick up on this. "We don't know exactly which micro-cues the babies pick up on," she explains.

Early preference

Her team conducted a control experiment in which the main character - a small ball - was pushed up and down by the helper and hinderer blocks, but did not move independently. In this case the babies showed no preference for the helpful character that provided an uphill push.

Wynn notes that earlier studies have shown that babies have shown a preference for beautiful faces.

She believes the results from her study indicate that babies have a preference for helpful individuals about a year earlier than previously thought. "They are an unbiased third party and they are not at all shy about rendering a judgement on social actions," she says, adding that this tendency appears early in development because it is a strongly advantageous trait later in

life.

Maria Legerstee, a child development expert at York University in Toronto, Canada, says the results of the study are "very interesting" but is not certain whether babies evaluate the actions of people the same way they judge the actions of wooden blocks.

She notes that infants interact differently with people compared with objects such as dolls: "The babies will always respond more to a person with smiles and vocalisations than to the doll."

Legerstee hopes the experiment will be repeated using another skit involving human actors rather than wooden blocks. By altering the people who play the role of helpers and hinderers the scientists can control for confounding factors, such as babies preferences for attractive people.

Sex

Donaldson Z, Young L 2008 Oxytocin, vasopressin, and the neurogenetics of sociality. *Science* 322 900.

Cahill L 2005 His brain, her brain. *Scientific American* 292, 40.

Shckelford T, Goetz A 2007 Adaptation to sperm competition in humans. *Curr Dir Psych Res* 16, 47.

Cowley 1996 The biology of beauty. *Newsweek*, June 3. Surprisingly good overview of what goes into mate choice in humans.

Yu and Shepard 1998 Is beauty in the eye of the beholder? *Nature* 396, 321. More on the subject.

Dugatkin and Godin 1998 How females choose their mates. *Scientific American* April, 56.

Kampe et al., 2001 Reward value of attractiveness and gaze. *Nature* 413, 589.

Chaos and Complexity

Sapolsky 1997 The solace of patterns. From; Sapolsky 'The Trouble With Testosterone' and Other Essays on the Biology of the Human Predicament. Scribner. Speculative ideas about how chaos and cellular automata might apply to human behavior.

Visscher P 2003 How self-organization evolves. Nature 421 799. Emergent complexity in bees.

Language

Petitto et al., 2001 Language rhythms in baby hand movements. Nature 413, 35. Is babbling in infants practice for language? This suggests that it is.

Kim et al., 1997 Distinct cortical areas associated with native and second languages. Nature 388, 171. Brief look at localization within the brain of different languages. Abstract only.

Poremba et al., 2004 Species-specific calls evoke asymmetric activity in the monkey's temporal poles. Nature 427 448. Abstract only.

Sutherland W Parallel extinction risk and global distribution of languages and species. Nature 423 276. Really fascinating paper showing possible ecological influences on language. Abstract only.

Schizophrenia

Egan et al., 2001 Effect of COMT Val108/158 Met genotype on frontal lobe function and risk for schizophrenia. Proc Natl Acad Sci U S A. 98 6917. Abstract only.

Blakemore et al., Why can't you tickle yourself?

NeuroReport 11, R11. As you'll see, this paper has something to do with schizophrenia, but I've mostly put it in because of its sheer charm and eccentricity.

Depression

Caspi et al, 2003 Influence of life stress on depression: moderation by a polymorphism in the 5-HTT gene. Science 301 386. An immensely important paper showing a gene/environment interaction with respect to depression.

Individual Differences

Damasio et al., 1990 Individuals with sociopathic behavior caused by frontal damage fail to respond autonomically to social stimuli. Behav Brain Res 41, 81, abstract only.

Levenson R, Miller B 2007 Loss of cells, loss of self: Frontotemporal lobar degeneration and human emotion. Curr Directions Psych Sci 16, 289.

Wenner M 2008 Disease for Darwinism – More kids, less cancer: Huntington's may confer survival benefits. Scientific American 298, 20. In the reader.

Rapoport J Excerpt from her book, The Boy Who Couldn't Stop Washing. This gives a sense of what OCD is like. In the reader. 21-24; 67-68; 82-87.

Borges J The library of Babel. From: Borges, Labyrinths. New Directions Books. I'm not quite sure why I included this, but it somehow makes sense at the end of this course. As I noted in a piece I had you read in the Chaos section, as an atheist, I get an almost religious sense of comfort from this story and its exploration of the implications of patterns in life. Borges was an Argentine writer who died a few years ago. Of possible relevance to

the cerebral nature of this (and virtually all his writings), he was a mathematician by training, and was blind. In the reader.

Plus:

Sapolsky, Zebras: Chapters 1, 2, 13 to the end.

В русском переводе книга называется Психология стресса. В оригинале она Почему у зебр не бывает язвы желудка?

Gleick, Chaos: The assigned chapters are:

The Butterfly Effect (pp9-31)

Life's Ups and Downs (pp57-80)

A Geometry of Nature (pp81-118)

Universality (pp155-187)

Inner Rhythms (pp273-300)