

Syllabus for

Behavior Genetics

Psychology 450/650, section 6

Instructor: Geoffrey Miller, Assistant Professor of Psychology
Where: Logan Hall B15, Psychology Department, UNM Main Campus
When: Fridays 9:30 am to noon, August 27 – December 10
(except for Oct 15 Fall Break and Nov 26 Thanksgiving Break)

Overview

This graduate seminar will try to introduce behavior genetics by integrating its key methods, theories, and findings with perspectives from evolutionary genetics and evolutionary psychology.

Behavior genetics (BG) studies how genetic differences between individuals lead to behavioral differences between individuals.

Evolutionary genetics (EG) studies how evolutionary processes (e.g. natural selection, sexual selection, mutation, migration, drift) influence the genetic structure of populations.

Evolutionary psychology (EP) studies how the survival and reproductive challenges of prehistory shaped human psychological adaptations.

Until recently, these three research traditions have been surprisingly isolated – whereas BG studied individual differences, EP studied human universals; whereas EG tried to develop deep theories about how evolution shapes the genetic architecture of species, BG tried to understand the genetic architecture of human behavior without using any coherent predictive theory. My hope in this course is that we'll find some useful synergies between these three fields, that can deepen our understanding of human genetics, human behavior, and individual differences.

So, this course is very much an experiment, a venture into uncharted territory. I think it's the first course of this type that has ever been taught, which means there will be a lot of excitement and novelty (I hope), and some anxiety, confusion, and frustration (I'm afraid). There will be difficult questions and very few easy answers.

Who should take this course

The course will be intellectually demanding, and will require a substantial amount of reading, active in-class discussion, and attentive development of a serious term paper. The course readings will require about 3 hours per week outside class. Apart from the textbook, they will include some recent journal papers and book chapters. If you have any concerns about your preparedness for this course, please email or talk with

the instructor about what you have taken and how well you did.

For undergraduates: This is probably one of the hardest psychology courses open to undergraduates, but I hope also one of the most rewarding. It would be helpful for interested undergraduates to have some background in two or more of the following topics from Psychology, Biology, and/or Anthropology:

- Evolutionary psychology (e.g. Psych 342)
- Statistics (e.g. Psych 200, 300)
- Biology (e.g. Bio 110 or 121)
- Genetics (e.g. Bio 221, 437)
- Evolutionary theory (e.g. Bio 300)
- Human evolution (e.g. Anthro 150, 255, 350, 357, 360, 364).

These are not formal pre-requisites, just guides to help you decide whether this course is right for you. If you do not have this sort of background but are strongly interested in taking this course, please try to catch up by skimming some books such as:

- Mark Ridley (2003). *Evolution* (3rd Ed.). Oxford, UK: Blackwell.
- Douglas Futuyama (1997). *Evolutionary biology* (3rd Ed.). Sunderland, MA: Sinauer.
- John Maynard Smith (1998). *Evolutionary genetics* (2nd Ed.). Oxford, UK: Oxford U. Press.
- David Buss (2003). *Evolutionary psychology: The new science of mind* (2nd Ed.). New York: Allyn & Bacon.

For graduate students: This is also probably one of the hardest graduate courses, since most of our PhD students have very little background in evolutionary genetics or behavior genetics. It will require some dedication, some reading time, and some sustained work on the term paper.

Course mechanics

We will meet once a week for two and a half hours, 9:30 am to noon. I expect punctuality – allow plenty of time for parking! There will be a 10-15 minute break about half way through each meeting. I will try to end class a few minutes before noon so you have time to get to the Friday noon PAL lectures (weekly Psychology research meetings) if you wish. If you have to miss a class for any reason, please let me know by email as soon as you know you'll be absent. Unexplained absences will reduce your grade.

Instructors' contact details:

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Office hours: Tuesdays, 11 am to noon, Logan Hall 160
If you can't make office hours and you have a question, please call or email.

Required Textbook:

***Behavior genetics* (4th Edition, 2003) by Robert Plomin, John C. DeFries, Gerald E. McClearn, and Peter McGuffin. New York: Worth Publishers. \$102.75 new; used copies available from amazon.com, etc. This is a comprehensive, well-written textbook by four of the leading scientists in behavior genetics, with some nice biographical profiles of other researchers.**

Grading: depends on three kinds of work for this course

60% of grade: one term paper. APA format, c. 5,000 words (20 pages double spaced), methodologically oriented, including a critical assessment of a research literature and an outline of a possible study. Extra credit will be given for submitting the paper for publication to a reputable journal (e.g. as a theoretical note, literature review, etc.). The term paper is due in three stages weighted equally:

20% for initial abstract and outline due October 1

20% for rough draft due November 5

20% for final draft due December 10 (last day of class)

40%: class participation and comments on the readings. I expect regular attendance, knowledge of assigned readings, active participation and intellectual engagement, and well-prepared presentations concerning the readings.

no exams

Details on the term paper

The term paper determines 60% of your course grade. You can choose any topic related to the course content and course readings, as long as I approve it. The final paper should be about 4,000 to 6,000 words, plus references. I care more about clarity, insight, research, and the flow of argument than about length per se.

Please plan to submit the rough draft and the final draft in standard APA (American Psychological Association) research paper format. This means computer-printed, double-spaced, single-sided, in 12 point Arial (preferably) or Times Roman font, with a proper title page, abstract, references, and page numbering. Consult the *APA Publication Manual* (4th Edition) for more details.

For graduate students, my goal is for you to produce a paper that you could turn around and submit to a decent journal as a review or commentary piece to improve your C.V., and that you would be proud to submit in an application for a post-doc, tenure-track job, or clinical internship.

You'll get extra credit if you actually submit the term paper for publication in a reputable journal. Please provide a copy of your submission cover letter.

To make sure that you are thinking, researching, and writing the paper on a good schedule throughout the semester, I require the following:

1. October 1: Provisional Abstract/outline/bibliography due. A provisional topic statement/abstract (one paragraph), provisional outline of paper (about a page), and provisional bibliography.

The bibliography should list about 10 to 20 references (not all from the syllabus here!), that you have actually read, with brief notes about their relevance to your paper. In the abstract, just let me know what you think you'll probably write about. If you change your mind, no problem, just tell me in an email later. But I want you to have some topic in mind by this date. Pick a topic that you feel passionate about – you'll have to live with it for several months! This topic statement/outline will determine 20% of the course grade. Late submissions will be penalized.

After you submit this outline and bibliography, come to our office hours at least once for my feedback. This is very important; I will try to make sure your paper looks viable and will try to give you some useful suggestions and references

2. November 5: Rough draft due.

This should be a full-length, APA format draft of your term paper – the sort of thing you would submit as your final draft in most other courses. After I get this rough draft, I will write comments and suggestions on it and return it to you as soon as I can. This should allow you to submit a really good final draft, and I hope it will help you improve your writing generally. This rough draft will determine 20% of the course grade. Late submissions will be penalized.

3. December 10: Final draft due.

This should be a highly polished document in correct format with no spelling or grammatical errors. It should represent the culmination of three months of research, thinking, and writing about a topic that passionately interests you. The final draft will determine 20% of your course grade. Late submissions will be penalized. I will try to grade final drafts by the last days of exams.

Structure of the term paper: The ideal paper would include the following elements:

Title page: a decent, descriptive, memorable title, and all other information required for APA format

Abstract page: a concise, punchy abstract that interests the reader in your paper

Introduction: Start with a bang. Pose the problem that interests you, and how you'll approach it. Say where you stand, and why the reader should care. Be specific and clear; mix the theoretical and methodological level of discourse with real-life examples and issues; know when to be funny and when to be serious.

Body of the paper: depending on what you're writing about, this could include a literature review, a series of arguments, an overview of relevant ideas and

research from a related area or field, a series of methodological analyses, criticism, and suggestions, or anything that advances your points. If you include literature reviews, don't do generic overviews – review the literature with a purpose, critically, as it pertains to your topic.

Research proposal: ideally, towards the end of your paper, you could sketch out a new empirical way to resolve one or more of the issues you've raised in your paper. This could be a brief outline of an experiment, an observational method, a meta-analysis or re-analysis of existing data, or any other method you think would be appropriate. If your proposal is good and you're still around UNM next semester, we could go ahead and do the work and publish it!

Bibliography: Only include things you've read. If you haven't read them and have only seen them cited by others, then use the format (name, date; as cited in: name, date). If your bibliography includes good, relevant papers and books that I haven't seen before, I will be impressed.

The assigned readings

Readings for each week will be either from the textbook, or copied by the instructor and distributed at least a week ahead of time to each student.

For the non-textbook readings, I have tried very hard to find recent, theoretically interesting journal papers and book chapters. Most weeks, there are about 40 to 50 pages of actual reading to be done (not counting references sections of the papers.) This should take about three hours. My intention is for you to have a deep, focused exposure to the state of the art in behavior genetics. Some of the readings are harder than others; some weeks require more reading than other weeks.

Please do not take this course if you cannot commit an average of three hours a week to the readings. The major educational benefits of the course depend on you doing the readings on time; otherwise, the class discussions will mean very little to you. I expect all of each week's required readings to be completed well before class, so you have time to digest them, think about them, compare and contrast them, and prepare intelligent comments and questions about them. Last-minute reading on Thursday night will not result in good comprehension or good in-class discussion.

Preparing notes on the assigned readings for each class

One week before each reading, I will ask for a student volunteer to prepare a one-page set of notes, comments, and questions concerning that reading.

Please bring enough copies of your one-page analysis to distribute to everyone else in the class. Assume that the other students have read the paper fairly attentively, and want to know what you think of it. This analysis will serve to initiate class discussion of that reading.

I expect each student to volunteer for several such reading analyses throughout the semester. The quality of these analyses will form a substantial portion of your class

participation grade.

The one-page analyses should have your name at the top, the date, and the APA-format reference for each reading as the header for your comments on that reading. Use numbered lists to identify your specific notes, comments, and questions under each reading. Please make at least three or four substantive comments on each reading – not simply summarizing the reading’s main points, but offering some sort of critical analysis of the reading’s ideas, or comparison to other readings, etc. Assume that the other students have read each reading thoroughly and attentively.

Key Dates and Course Schedule

Fall Semester key dates:

Classes begin:	August 23, Monday
Registration ends:	Sept 3, Friday
Labor day holiday:	Sept 6, Monday
Last day to change grading options:	Sept 17, Friday
Last day to drop course w/o grade:	Oct 1, Friday
Fall Break holiday:	Oct 14-15, Thursday, Friday
Last day to withdraw from course:	Nov 12, Friday
Thanksgiving holiday:	Nov 25-28, Thursday, Friday
Last day of classes:	Dec 11, Friday
Final exams:	Dec 11-18, Saturday-Saturday

Course schedule: List of assignments, readings, and topics for each class

(No assignments before the first class)

1: Aug 27 Friday **Introduction to the course**

2: Sept 3 Friday **Introduction to behavior genetics**

Readings to be completed before class:

Plomin textbook. Chapter 5: Nature, Nurture, and Behavior
(just read from p. 72 ‘Summing up’ through p.
92).

Steven Pinker (2002). Chapter 19: Children. In *The blank slate: The modern denial of human nature*, pp.
372-399. New York: Viking.

3: Sept 10 Friday **Adaptive vs. maladaptive genetic variation**

John Tooby & Leda Cosmides (1990). On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. *Journal of Personality*, 58, 17-67.

David M. Buss & Heidi Greiling (1999). Adaptive individual differences. *Journal of Personality*, 67, 209-243.

4: Sept 17 Friday: **Mutational meltdown**

Mark Ridley (2000). Chapters 3 ('The mutational meltdown, pp. 56-79) and 4 ('The history of error', pp. 80-108) from *Mendel's demon: Gene justice and the complexity of life*. [US title: *The cooperative gene*.] London; Weidenfeld & Nicholson.

Lynch, M., Blanchard, J., Houle, D., Kibota, T., Shultz, S., Vasilieva, L., & Willis, J. (1999). Perspective: Spontaneous deleterious mutation. *Evolution*, 53, 645-663.

Adam Eyre-Walker & Peter D. Keightley (1999). High genomic deleterious mutation rates in hominids. *Nature*, 397, 344-346.

5: Sept 24 Friday **The heritability of intelligence debate**

Francis Galton (1865). Hereditary talent and character. *Macmillan's Magazine*, XII, 157-166, 318-327. [Reprinted in R. Jacoby & N. Galuberman (Eds.). (1995). *The bell curve debate: History, documents, opinions*, pp. 393-409. New York: Random House.]

Richard J. Herrnstein (1971). I.Q. *Atlantic Monthly*, Sept., 43-64. [Reprinted in R. Jacoby & N. Galuberman (Eds.). (1995). *The bell curve debate: History, documents, opinions*, pp. 599-616. New York: Random House.]

Arthur Jensen (1973). The differences are real. *Psychology Today*. [Reprinted in R. Jacoby & N. Galuberman (Eds.). (1995). *The bell curve debate: History, documents, opinions*, pp. 617-629. New York: Random House.]

6: Oct 1 Friday

The evolutionary genetics of general intelligence

Plomin textbook. Chapter 9: General Cognitive Ability (pp. 156-183)

Geoffrey F. Miller (2000). Sexual selection for indicators of intelligence (pp. 260-270). In Bock, G.R., Goode, J.A., & Webb, K. (Eds.), *The nature of intelligence*. (Novartis Foundation Symposium 233). New York: Wiley.

Brett Anderson (2001). *g* as a consequence of shared genes. *Intelligence*, 29, 367-371.

Scott J. Steppan, Patrick C. Phillips, & David Houle (2002). Comparative quantitative genetics: Evolution of the G matrix. *Trends in Ecology and Evolution*, 17, 320-327.

Term paper: Abstract, outline, bibliography due

7: Oct 8 Friday

Genetic influences on brain structure and function

P. M. Thompson, T. D. Cannon, K. L. Narr, T. van Erp, V. P. Poutanen, M. Huttunen, J. Lonnqvist, C. G. Standertskjold-Nordenstam, J. Kaprio, M. Khaledy, R. Dail, C. I. Zoumalan, A. W. Toga (2001). Genetic influences on brain structure. *Nature Neuroscience*, 4(12), 1253-1258.

Danielle Postuma, William F. C. Baare, Hilleke E. Hulshoff Pol, Rene S. Kahn, Dorret I. Boomsma, & Eco J. C. De Geus (2003). Genetic correlations between brain volumes and the WAIS-III dimensions of verbal comprehension, working memory, perceptual organization, and processing speed. *Twin Research*, 6(2), 131-139.

William F. C. Baare, Hilleke E. Hulshoff Pol, Dorret I. Boomsma, Danielle Posthuma, Eco J. C. de Geus, Hugo G. Schnack, Neeltje E. M. van Haren, Clarine J. van Oel, & Rene S. Kahn (2001). Quantitative genetic modeling of variation in human brain morphology. *Cerebral Cortex*, 11, 816-824.

(no class October 15: fall break)

8: Oct 22 Friday

Human personality

Plomin textbook. Chapter 12: Personality and Personality Disorders (pp. 234-257) [24 pp]

K. L. Jang, R. R. McCrae, A. Angleitner, R. Riemann, & W. L. Livesley (1998). Heritability of facet-level traits in a cross-cultural twin sample: Support for a hierarchical model of personality. *J. of Personality and Social Psychology*, 74(6), 1556-1565.

J. Kuntsi, T. C. Eley, A. Taylor, C. Hughes, P. Asherson, A. Caspi, & T. E. Moffitt (2004). Co-occurrence of ADHD and low IQ has genetic origins. *American J. of Medical Genetics B: Neuropsychiatric Genetics*, 124B(1), 41-47.

9: Oct 29 Friday

Non-human personality

A. Weiss, J. E. King, & R. M. Enns (2002). Subjective well-being is heritable and genetically correlated with dominance in chimpanzees (*Pan troglodytes*). *J. of Personality and Social Psychology*, 83(5), 1141-1149.

L. A. Fairbanks, T. K. Newman, J. N. Bailey, M. J. Jorgensen, S. E. Breidenthal, R. A. Ophoff, A. G. Comuzzie, L. J. Martin, & J. Rogers. (2004). Genetic contributions to social impulsivity and aggressiveness in vervet monkeys. *Biological Psychiatry*, 55(6), 642-647.

S. D. Gosling, V. S. Y. Kwan, O. P. John (2003). Dog's got personality: A cross-species comparative approach to personality judgments in dogs and humans. *J. of Personality and Social Psychology*, 85(6), 1161-1169.

D. L. Sinn, N. A. Perrin, J. A. Mather, & R. C. Anderson (2001). Early temperamental traits in an octopus (*Octopus bimaculoides*). *J. of Comparative Psychology*, 115(4), 351-364.

10: Nov 5 Friday

Behavior genetics of psychopathology

Plomin textbook. Chapter 11: Psychopathology (pp. 204-223).

Shaner, A., Miler, G. F., & Mintz, J. (2004). Schizophrenia as one extreme of a sexually selected fitness indicator. *Schizophrenia Research*, 70(1), 101-109.

Keller, M., & Miller, G. F. (draft paper). The evolutionary genetics of psychopathology: Mutation-selection balance explains why psychiatric genetics has failed for thirty years.

Term paper: rough draft due

11: Nov 12 Friday

Behavior genetics of sexuality and reproduction

Bailey, J. M., Kirk, K. M., Zhu, G., Dunne, M. P., Martin, N. G. (2000). Do individual differences in sociosexuality represent genetic or environmentally contingent strategies? Evidence from the Australian Twin Registry. *J. of Personality and Social Psychology*, 78(3), 537-545.

Katherine M. Kirk, Simon P. Blomberg, David L. Duffy, Andrew C. Heath, Ian P. F. Owens, & Nick G. Martin (2001). Natural selection and quantitative genetics of life-history traits in Western women: A twin study. *Evolution*, 55(2), 423-435.

Lyons, M. J., Koenen, K. C., Buchting, F, Meyer, J. M., Eaves, L., Toomey, R., Eisen, S. A., Goldberg, J., Faraone, S. V., Ban, R. J., Jerskey, B. A., & Tsuang, M. T. (2004). A twin study of sexual behavior in men. *Archives of Sexual Behavior*, 33(2), 129-136.

12: Nov 19 Friday

Assortative mating and its genetic effects

Reynolds, C. A., Baker, L. A., & Pedersen, N. L. (2000). Multivariate models of mixed assortment: Phenotypic assortment and social homogamy for education and fluid ability. *Behavior Genetics*, 30(6), 455-476.

K. Silventoinen, J. Kaprio, E. Lahelma, R. J. Viken, & R. J. Rose (2003). Assortative mating by body height

and BMI: Finnish twins and their spouses.
American J. of Human Biology, - 15(5), 620-627.
Satoshi Kanazawa & Jody L. Kovar (2004). Why beautiful
people are more intelligent. *Intelligence*, 32,
227-243.

(no class November 26: Thanksgiving holiday)

13: Dec 3 Friday **Molecular behavior genetics**

Plomin textbook. Chapter 6: Identifying genes (pp. 93-115)
Gregory Carey (2003). Chapter 7: The new genetics:
Techniques for DNA analysis (pp. 109-130). In
Human genetics for the social sciences.
Thousand Oaks, CA: Sage Publications.
Hill, L., Chorney, M. J., Lubinski, D., Thompson, L. A., &
Plomin, R. (2002). A quantitative trait locus not
associated with cognitive ability in children: A
failure to replicate. *Psychological Science*, 13(6),
561-562.

(Optional for students without much biology background:
Plomin Chapter 4: DNA: The Basis of Heredity (pp. 41-60)

14: Dec 10 Friday **The nature of environments**

Plomin textbook. Chapter 15: Environment (pp. 296-318)
Sandra Scarr (1996). How people make their own
environments: Implications for parents and policy
makers. *Psychology, Public Policy, and Law*,
2(2), 204-228.

Term paper: Final draft due

(Final exams Dec 15-19: No final exam in this course)