

## **Intelligence and Creativity**

Psychology 650, section 9 (3 credit hours), CRN 27307

Psychology 450, section 9 (3 credit hours), CRN 27278

Fall 2007, University of New Mexico

Instructor: Geoffrey Miller

Where: Logan Hall B15 (basement level)

When: Wednesdays 10:00 am – 12:30 pm

### Overview

This new graduate-level seminar considers human intelligence and creativity, both as human universals and as dimensions of individual variation. We will focus on psychometrically validated models of intelligence and creativity that have proven reliable and predictive in real-world settings.

Topics to be covered include:

- The nature of intelligence: the *g* factor, general cognitive ability, and IQ
- The real-life importance of intelligence in education, work, and relationships
- The behavioral and molecular genetics of intelligence
- Brains and the neural basis of intelligence
- General intelligence vs. domain-specific abilities
- The evolution and functions of intelligence
- Social intelligence in animals and humans
- Displaying and judging intelligence
- Mating intelligence
- Emotional intelligence
- Rational vs. adaptive intelligence
- The nature of creativity
- Cognitive and neural mechanisms of creativity
- Creativity, madness, and mating
- Creativity and intelligence

### Course mechanics

We will meet once a week for two and a half hours. I expect punctuality. There will be a 10-15 minute break about half way through each meeting. 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. The course readings will require about 3 hours per week outside class, and will include selections from the textbook, plus some recent journal papers.

Required textbooks:

Deary, I. J. (2001). *Intelligence: A very short introduction*. Oxford, UK: Oxford U. Press. (c. \$10 paperback). ISBN-13: 978-0192893215.

Geher, G., & Miller, G. F. (Eds.). (2007). *Mating intelligence: Sex, relationships, and the mind's reproductive system*. Mahwah, NJ: Erlbaum. (c. \$40 paperback). ISBN-13: 978-0805857498.

Instructors' contact details:

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Office hours: Tuesdays, 11 am to noon, Logan Hall 160

If you can't attend office hours and you have a question, please call or email.

Grading:

- 40%: class attendance, participation and preparation and presentation of xeroxed comments on the readings. I expect regular attendance, knowledge of assigned readings, active participation, intellectual engagement, and well-prepared presentations concerning the readings. Each week, one student will be assigned to lead the discussion of each reading for the following week. Those students will be expected to write one page of discussion-provoking ideas and issues, and to distribute copies to each student in the class. These one-page commentaries should not review the target article or commentaries. Instead, they should articulate the student's own thoughts, reactions, and questions in response to the readings.

60% of grade: one three-stage 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. The term paper is due in three stages:

- o 10% for provisional abstract, outline, and bibliography due Sept. 19
- o 20% for revised abstract, detailed outline, and revised bibliography due Nov. 7
- o 30% for final draft due Dec. 5 (last day of class)

no exams

Reading requirements

Each week we will read and discuss material from the textbooks, journal papers, and/or other book chapters. Please do not take this course if you cannot commit an average of three hours a week to the readings. The course's educational benefits depend on you completing the readings on time, so you can follow and participate in the class discussion. If you don't read them, you won't learn much; if you do read them attentively, you'll learn a lot. 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 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 is due to be discussed, I will ask for student volunteers to prepare a one-page set of notes, comments, and questions concerning each 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, which is 40% of your final course grade.

When it is your week to present a 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 thoroughly and attentively, and want to know what you think of it. These analyses will initiate class discussion of that reading.

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.

### Details on the term paper

This three-step writing assignment determines 60% of your course grade. You can choose any topic related to the course content and course readings. 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 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* (4<sup>th</sup> Edition) for more details.

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

1. Sept. 19: Provisional abstract, outline, and 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 10% of the course grade. Late submissions will be penalized. After I get this provisional abstract, I will write comments and suggestions on it and return it to you as soon as I can.

2. Nov. 7: Revised abstract, detailed outline, and revised, annotated bibliography due.

This should be a revised abstract that takes into account my feedback concerning your provisional abstract, plus a much more detailed outline of your term

paper, clearly showing its planned structure, and a revised, more complete bibliography. The outline should be a few pages long, and each outline entry should be a clear, detailed, specific statement, not just a short, vague phrase. The flow of your paper's argument should be apparent. Late submissions will be penalized.

In the annotated bibliography, use standard APA reference format, and please note each reference's relevance to your topic. A good annotation would be "This critically reviews four recent emotional intelligence measures, emphasizing their weaknesses with respect to test-retest reliability, discriminant validity, and predictive validity." A bad outline entry would be "Reviews emotional intelligence".

After I get this outline, 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.

### 3. Dec. 5 (last day of class): Final term paper 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. I will try to grade final drafts by the last day 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.

Bibliography: Only include things you've read. If you haven't read them and have only seen them cited by others, then use this 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.

## **11. Course Schedule**

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No assignments before the first class

1: Aug. 22

**Introduction to the course**

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Read: [40 pp total]

Gottfredson, L. S. (1998). The general intelligence factor. *Scientific American*, 9 (4), 24-29, 51. [6 pp]

Deary, I. J. (2001). Chapter 1, pp. 1-18. In *Intelligence: A very short introduction*. Oxford, UK: Oxford U. Press. [18 pp]

Kuncel, N. R., Hezlett, S. A., & Ones, D. S. (2004). Academic performance, career potential, creativity, and job performance: Can one construct explain them all? *J. of Personality and Social Psychology*, 86(1), 148-161. [11 pp]

Lubinski, D., Benbow, C. P., Webb, R. M., & Bleske-Rechek, A. (2006). Tracking exceptional human capital over two decades. *Psychological Science*, 17(3), 194-199. [5 pp]

2: Aug. 29

**Introduction to intelligence**

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Read: [73 pp total]

Deary, I. J. (2001). Chapter 5, pp. 91-101. In *Intelligence: A very short introduction*. Oxford, UK: Oxford U. Press. [10 pp]

Gottfredson, L. S., & Deary, I. J. (2004). Intelligence predicts health and longevity, but why? *Current Directions in Psychological Science*, 13(1), 1-4. [3 pp]

Gottfredson, L. S. (1997). Why g matters: The complexity of everyday life. *Intelligence*, 24(1), 79-132. [47 pp]

Simonton, D. K. (2006). Presidential IQ, openness, intellectual brilliance, and leadership: Estimates and correlations for 42 U.S. chief executives. *Political Psychology*, 27(4), 511-526. [13 pp]

3: Sept. 5

**Real-life importance of intelligence**

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Read: [58 pp total]

Deary, I. J. (2001). Chapter 4, pp. 67-90. In *Intelligence: A very short introduction*. Oxford, UK: Oxford U. Press. [23 pp]

Deary, I.J., Spinath, F. & Bates, T. C. (2006). Genes and

intelligence. *European Journal of Human Genetics*, 14, 690-700. [9 pp]

Plomin, R., Kovas, Y., & Haworth, C. M. A. (2007). Generalist genes: Genetic links between brain, mind, and education. *Mind, Brain, and Education*, 1(1), 11-19. [9 pp]

Keller, M. (2007). The role of mutations in human mating. In G. Geher & G. F. Miller (Eds.), *Mating intelligence: Sex, relationships, and the mind's reproductive system*, pp. 173-189. Mahwah, NJ: Lawrence Erlbaum. [17 pp]

4: Sept. 12

### **Genetics of intelligence**

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Read: [50 pp total]

Deary, I. J. (2001). Chapter 3, pp. 43-66. In *Intelligence: A very short introduction*. Oxford, UK: Oxford U. Press. [23 pp]

Miller, G. F., & Penke, L. (2007). The evolution of human intelligence and the coefficient of additive genetic variance in human brain size. *Intelligence*, 35(2), 97-114. [12 pp]

Colom, R., Jung, R. E., & Haier, R. J. (2006). Distributed brain sites for the g-factor of intelligence. *NeuroImage*, 31(3), 1359-1365. [7 pp]

Pol, H. E. H., Schnack, H. G., Posthuma, D., et al. (2006). Genetic contributions to human brain morphology and intelligence. *J. of Neuroscience*, 26(40), 10235-10242. [8 pp]

**Term paper abstract due**

5: Sept. 19

### **Brains and intelligence**

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Read: [102 pp total]

Cosmides, L., & Tooby, J. (2002). Unraveling the enigma of human intelligence: Evolutionary psychology and the multimodular mind. In R. J. Sternberg & J. C. Kauman (Eds.), *The evolution of intelligence*, pp. 145-198. Mahwah, NJ: Erlbaum. [52 pp]

Kanazawa, S. (2004). General intelligence as a domain-specific adaptation. *Psychological Review*, 111, 512-523. [11 pp]

Chiappe, D., & MacDonald, K. (2005). The evolution of domain-general mechanisms in intelligence and learning. *J. of General Psychology*, 132(1), 5-40.

[30 pp]

Prokosch, M., Yeo, R., & Miller, G. F. (2005). Intelligence tests with higher g-loadings show higher correlations with body symmetry: Evidence for a general fitness factor mediated by developmental stability. *Intelligence*, 33, 203-213. [9 pp]

6: Sept. 26

**General intelligence vs. domain-specific abilities**

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Read: [80 pp total]

Reader, S. M., & Laland, K. N. (2002). Social, intelligence, innovation, and enhanced brain size in primates. *Proc. National Academy of Sciences USA*, 99(7), 4436-4441. [6 pp]

Lee, J. J. (2007). A g beyond Homo sapiens? Some hints and suggestions. *Intelligence*, 35(3), 253-265. [11 pp]

Flinn, M. V., Geary, D. C., & Ward, C. V. (2005). Ecological dominance, social competition, and coalitionary arms races: Why humans evolved extraordinary intelligence. *Evolution and Human Behavior*, 26(1), 10-46. [28 pp]

Cochran, G., Hardy, J., & Harpending, H. (2007). Natural history of Ashkenazi intelligence. *J. of Biosocial Science*, 1-35.

7: Oct. 3

**Evolution of intelligence**

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(No class Oct. 10: instructor away in Boston)

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Read: [56 pp total]

Emery, N. J., Seed, A. M., von Bayern, A. M. P., & Clayton, N. S. (2007). Cognitive adaptations of social bonding in birds. *Phil. Transactions of the Royal Society B*, 362(1480), 489-505.

Connor, R. C. (2007). Dolphin social intelligence: Complex alliance relationships in bottlenose dolphins and a consideration of selective environments for extreme brain size evolution in mammals. *Phil. Transactions of the Royal Society B*, 362(1480), 587-602.

Borkenau, P., Mauer, N., Riemann, R., Spinath, F. M., & Angleitner, A. (2004). Thin slices of behavior as cues of personality and intelligence. *J.*

*Personality and Social Psychology*, 86(4), 599-614. [14 pp]

Murphy, N. A. (2007). Appearing smart: The impression management of intelligence, person perception accuracy, and behavior in social interaction. *Personality and Social Psychology Bulletin*, 33, 325-339. [14 pp]

8: Oct. 17

### **Social intelligence**

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Read: [70 pp total]

Geher, G., Miller, G. F., & Murhpy, J. (2007). Mating intelligence: Toward an evolutionarily informed construct. In G. Geher & G. F. Miller (Eds.), *Mating intelligence*, pp. 3-28. Mahwah, NJ: Lawrence Erlbaum. [25 pp]

Miller, G. F. (2007). Mating intelligence: Frequently asked questions. In G. Geher & G. F. Miller (Eds.), *Mating intelligence*, pp. 367-386. Mahwah, NJ: Lawrence Erlbaum. [20 pp]

Shaner, A., Miller, G. F., & Mintz, J. (2007). Mental disorders as catastrophic failures of mating intelligence. In G. Geher & G. F. Miller (Eds.), *Mating intelligence*, pp.193-218. Mahwah, NJ: Lawrence Erlbaum. [25 pp]

9: Oct. 24

### **Mating intelligence**

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Read: [54 pp total]

Brackett, M. A., Rivers, S. E., Shiffman, S., Lerner, N., & Salovey, P. (2006). Relating emotional abilities to social functioning: A comparison of self-report and performance measures of emotional intelligence. *J. of Personality and Social Psychology*, 91(4), 780-795. [12 pp]

Van Rooy, D. L., & Viswesvaran, C. (2004). Emotional intelligence: A meta-analytic investigation of predictive validity and nomological net. *J. of Vocational Behavior*, 65(1), 71-95. [21 pp]

Reis, D. L., Brackett, M. A., Shamosh, N. A., et al. (2007). Emotional Intelligence predicts individual differences in social exchange reasoning. *NeuroImage*, 35, 1385-1391. [6 pp]

Casey, J. J., Garrett, J., Brackett, M. A., & Rivers, S. (2007). Emotional intelligence, relationship quality, and partner selection. In G. Geher & G. F. Miller (Eds.), *Mating intelligence*, pp. 263-

278. Mahwah, NJ: Lawrence Erlbaum. [15 pp]

10: Oct. 31

**Emotional intelligence**

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Read: [52 pp total]

Todd, P. M., & Gigerenzer, G. (2000). Précis of *Simple heuristics that make us smart*. *Behavioral and Brain Sciences*, 23(5), 727-780. [Read only pp. 727-741: 15 pp]

Haselton, M. G., & Nettle, D. (2006). The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review*, 10(1), 47-66. [17 pp]

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, 24(2), 311-322. [11 pp]

Miller, G. F. (2007). Reconciling evolutionary psychology and ecological psychology: How to perceive fitness affordances. *Acta Psychologica Sinica*, 39(3), 546-555. [8 pp]

**Term paper outline due**

11: Nov. 7

**Rational vs. adaptive intelligence**

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Read: [56 pp total]

Simonton DK. (2000). Creativity: Cognitive, personal, developmental, and social aspects. *American Psychologist*, 55(1), 151-158. [6 pp]

Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*, 18(1), 87-98. [11 pp]

Mumford, M. D. (2003). Where have we been, where are we going? Taking stock in creativity research. *Creativity Research Journal*, 15(2-3), 107-120. [12 pp]

Kaufman, S. B., Kozbelt, A., Bromley, M. L., & Miller, G. F. (2007). The role of creativity and humor in mate selection. In G. Geher & G. F. Miller (Eds.), *Mating intelligence*, pp. 227-254. Mahwah, NJ: Lawrence Erlbaum. [27 pp]

12: Nov. 14

**Introduction to creativity**

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Read: [51 pp total]

Simonton, D. K. (2003). Scientific creativity as

constrained stochastic behavior: The integration of product, person, and process perspectives.

*Psychological Bulletin*, 129(4), 475-494. [15 pp]

Ward, T. B. (2007). Creative cognition as a window on creativity. *Methods*, 42(1), 28-37. [8 pp]

Fink, A., Benedek, M., Grabner, R. H., Staudt, B., & Neubauer, A. C. (2007). Creativity meets neuroscience: Experimental tasks for the neuroscientific study of creative thinking. *Methods*, 42, 68-76. [9 pp]

Dietrich, A. (2007). Who's afraid of a cognitive neuroscience of creativity? *Methods*, 42(1), 22-27. [5 pp]

13: Nov. 21

**Creativity mechanisms**

(day before Thanksgiving break)

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Read: [40 pp total]

Haselton, M., & Miller, G. F. (2006). Women's fertility across the cycle increases the short-term attractiveness of creative intelligence compared to wealth. *Human Nature*, 17(1), 50-73. [16 pp]

Griskevicius, V., Cialdini, R. B., & Kenrick, D. T. (2006). Peacocks, Picasso, and parental investment: The effects of romantic motives on creativity. *J. Personality and Social Psychology*, 91(1), 63-76. [13 pp]

Nettle, D., & Clegg, H. (2006). Schizotypy, creativity, and mating success in humans. *Proc. Royal Soc. London B*, 273(1586), 611-615. [4 pp]

Miller, G. F., & Tal, I. (2007). Schizotypy versus intelligence and openness as predictors of creativity. *Schizophrenia Research*, 93(1-3), 317-324.

14: Nov. 28

**Creativity, madness, and mating**

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Read: [51 pp total]

Vincent, A. S., Decker, B. P., & Mumford, M. D. (2002). Divergent thinking, intelligence, and expertise: A test of alternative models. *Creativity Research Journal*, 14(2), 163-178. [15 pp]

Geake, J. G., & Hansen, P. C. (2005). Neural correlates of intelligence as revealed by fMRI of fluid analogies. *NeuroImage*, 26(2), 555-564. [9 pp]

Reuter, M., Roth, S., Holve, K., & Hennig, J. (2006).

Identification of first candidate genes for  
creativity: A pilot study. *Brain Research*,  
1069(1), 190-197. [6 pp]

Dasgupta, S. (2003). Multidisciplinary creativity: The case  
of Herbert A. Simon. *Cognitive Science*, 27(5),  
683-707. [21 pp]

**Final term paper due**

15: Dec. 5 **Creativity and intelligence**  
(last day of class)

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(Final exams Dec. 10-14; no exam in this class)

**Appendix: Good movies with intelligence and creativity themes**

**General intelligence**

Gattaca (1997)  
Little Man Tate (1991)  
Real Genius (1985)  
Quiz Show (1994)

**Verbal intelligence**

Lenny (1974)  
Spellbound (2002)  
The Usual Suspects (1995)  
Wordplay (2006)

**Social and emotional intelligence**

12 Angry Men (1957)  
Catch Me if you Can (2002)  
House of Games (1987)  
Six Degrees of Separation (1993)  
The Last King of Scotland (2006)  
The Negotiator (1998)  
The Spanish Prisoner (1997)  
The Talented Mr. Ripley (1999)  
What Women Want (2000)

**Mating Intelligence**

Before Sunset (2004)  
Dangerous Liaisons (1988)  
Groundhog Day (1993)  
Knocked Up (2007)

The Last Seduction (1994)  
The Tao of Steve (2000)

### **Cognitive disabilities**

Borat (2006)  
Fargo (1996)  
I Am Sam (2001)  
Idiocracy (2006)  
Memento (2000)  
Mozart and the Whale (2005)  
My Flesh and Blood (2003)  
Rain Man (1988)  
Sling Blade (1996)  
Zoolander (2001)

### **Artificial intelligence**

A.I.: Artificial Intelligence (2001)  
Blade Runner: The Director's Cut (1982) I, Robot (2004)

### **Alien intelligence**

Contact (1997)  
Dark City (1998)  
Solyaris (1972)  
Stalker (1979)  
Starship Troopers (1997)  
The Abyss (1989)

## **Specific domains of intelligence and creativity**

### **Art & architecture**

Art: 21  
Crumb (1994)  
Frida (2002)  
La Belle Noiseuse (1991)  
Max (2002)  
My Architect: A Son's Journey (2003)  
My Left Foot (1989)  
Pollock (2000)  
Rivers and Tides (2001)  
The Shape of Things (2003)

### **Business, invention**

Cypher (2002)  
Enron: The Smartest Guys in the Room (2005)  
Glengarry Glen Ross (1992)

Paycheck (2003)  
Primer (2004)  
Schindler's List (1993)  
The Aviator (2004)  
The Insider (1999)  
The Triumph of the Nerds (1996)  
Wall Street (1987)

**Games (e.g. chess)**

A Beautiful Mind (2001)  
Existenz (1999)  
Fail-Safe (1964)  
Game Over: Kasparov and the Machine (2003)  
Searching for Bobby Fischer (1993)  
The Game (1997)  
The Luzhin Defence (1995)

**Government, espionage**

Spy Game (2001)  
The Bourne Identity (2002)  
The Fog of War (2003)  
The Good Shepherd (2006)  
Three Days of the Condor (1975)

**Literature**

Henry Fool (1997)  
Quills (2000)  
The Hours (2002)  
The Source (1999)

**Math**

Good Will Hunting (1997)  
N is a Number: A Portrait of Paul Erdos (1993)  
Pi (1998)  
Proof (2004)

**Music**

Amadeus (1984)  
No Direction Home (2005)  
Shine (1996)  
Three Colors: Blue (1993)  
Thirty Two Short Films about Glenn Gould (1993)