

PSYCHOLOGY 352  
**Arrested or Adaptive Development of the Adolescent Brain**

Fall 2016  
Tuesday and Thursdays  
1:00-2:15pm

**Instructor**

B.J. Casey, PhD  
Professor of Psychology  
Kirtland Hall 211 [Office hours by appointment]  
Email: [bj.casey@yale.edu](mailto:bj.casey@yale.edu)

**Reaching Assistant**

Kayla Velnoskey  
[kayla.velnoskey@yale.edu](mailto:kayla.velnoskey@yale.edu)

**DESCRIPTION**

The teen brain has received a lot of media coverage with advances in brain imaging techniques that provide a voyeuristic opportunity for us to look under the hood of the behaving adolescent brain. This course will cover empirical and theoretical accounts of adolescent-specific changes in brain and behavior that relate to the development of self control. These theoretical and empirical accounts of adolescent brain and behavioral will then be discussed in the context of relevant legal, social and health policy issues. Lectures and discussion will address: Under what circumstances self control appears to be diminished in adolescents. How do dynamic changes in neural circuitry help to explain changes in self control across development? When does the capacity for self control fully mature? Are these changes observed in other species? How might these changes be evolutionarily adaptive and when are they maladaptive? How might understanding adolescent brain and behavioral development inform interventions and treatments for maladaptive behavior or inform policy for changing the environment to protect youth?

**COURSE GOALS**

1. The primary goal of this course is for students to acquire an in-depth understanding of how examining changes in brain and behavior during the period of adolescence improves our understanding of social and psychological situations that may diminish self control as well as enhance it.
2. A second goal of this course is to gain exposure to behavioral and imaging methods commonly used to study brain function and development. Students are expected to gain an understanding for how these methods contribute to the study of the adolescent brain as well as the limitations of these methods.
3. The third goal of this course is to stimulate critical thinking about how scientific findings about the adolescent brain can inform societal, legal and health policies to protect young people from undue harm while still protecting their rights.

**PREREQUISITES**

Prerequisites for this course are PSYC110 and 160. The course will serve as fulfilling the "natural science" requirement for Psychology majors and is also open to Cognitive Science, Biology and related

majors. The estimated enrollment is 40-50 students.

## REQUIREMENTS

### *Attendance*

Class attendance and participation are required. Because the course will include a classroom debate working in groups, it is important that students are present for each and every class and become comfortable working as a team and discussing the debate topic throughout the course.

### *Debate*

To immerse you in the science behind when the teen brain reflects “adaptive” or “arrested” development, the class will be divided into two teams (Adaptive vs. Arrested) to engage in a spirited and fun debate on this question. Class discussions and reading materials will focus on this theme throughout the year. You will prepare for the debate as a group during 4 class sessions that are indicated on the syllabus. Students are encouraged to be creative in making their arguments. All students must contribute to the debate during the 4 class sessions and orally during the debate.

### *Short Paper*

One of the goals of the course is to encourage you to integrate and apply the information about the adolescent brain learned in the class to important societal, legal and health policies. You will report on how our readings and discussion shed light on a particular policy integrating theories and research findings discussed in class in pursuit of greater understanding of the topic. The short paper should be 5 pages doubled space (approximately 1200 words) and completed individually. Your topic must be submitted by e-mail **before class October 13 for approval** and the paper will be **due before class on December 6**.

## GRADING

Your final grade will be based on two exams, your participation in the group debate and the short paper. Your grade will be calculated as follows:

Midterm Exam	35%
Debate participation	15%
Comprehensive Exam	35%
Paper	15%

## ADMINISTRATIVE DETAILS

Policy on absences. If you are going to miss class, for whatever reason (illness, etc.), please notify me by email before the class meeting.

Policy on plagiarism. Students are expected to be familiar with Yale’s policies on plagiarism and [academic dishonesty](#). Yale punishes academic dishonesty severely, ranging from failing grades on specific assignments to suspension from the university. For this course, you should **not** produce identical papers. Similarly, all assignments should be completed independently except for the class debate which will be a team effort. You can find a more in-depth discussion of using sources and avoiding plagiarism on the [Writing Center Website](#).

Policy on late assignments. All assignments are due before THE BEGINNING of class on the due date. Late assignments will not be accepted.

Policy on accommodations for academic disabilities. I encourage students with disabilities, including "invisible" disabilities like chronic diseases or learning disabilities, to identify themselves to me after class or during my office hours, prior to the 3<sup>rd</sup> week of the term.

Important note. I realize that individual cases may involve extenuating circumstances that would allow for changing some of these procedures. I encourage you to contact me if you have any questions about how your particular case should be treated.

## Primary Readings

1. *Current Directions in Psychological Science* (2013) Special issue of on the teen brain, 22, 79-161.
2. *Annual Rev of Psychology* (2015) Beyond simple models of self control to circuit-based accounts of adolescent behavior. Vol. 66, 295-319.

Additional required and recommended readings are listed on the syllabus.

DATE	TOPIC	READINGS AND ASSIGNMENTS
9/1/16	Overview of Course and Introduction to Topic	<u>Required:</u> 1. Casey, BJ (2103). <i>The Teenage Brain An Overview</i> . <i>Current Directions in Psychological Science</i> 22 (2), 80-81.
9/6/16	Neurobiological theories of adolescence	<u>Required:</u> 1. Casey, BJ (2015). <i>Beyond simple models of self control to circuit-based accounts of adolescent behavior</i> . <i>Annual Reviews of Psychology</i> Vol. 66, only pp. 295-297. <u>Recommended:</u> 1. BJ Casey, A Galván, LH Somerville (2016). <i>Beyond simple models of adolescence to an integrated circuit-based account: A commentary</i> . <i>Developmental cognitive neuroscience</i> 17, 128-130
9/8/16*	The teen brain	<u>Required:</u> 1. Galván, A (2014) <i>Insights about adolescent behavior, plasticity, and policy from neuroscience research</i> , <i>Neuron</i> 83 (2), 262-265. <u>Recommended:</u> 1. <a href="http://tedxtalks.ted.com/video/Insight-Into-the-Teenage-Brain">http://tedxtalks.ted.com/video/Insight-Into-the-Teenage-Brain</a> ; 2. <a href="https://www.ted.com/talks/sarah_jayne_blakemore_the_mysterious_workings_of_the_adolescent_brain?language=en">https://www.ted.com/talks/sarah_jayne_blakemore_the_mysterious_workings_of_the_adolescent_brain?language=en</a>
9/13/16	Self Control Circuitry	<u>Required:</u> 1. Casey, BJ & Caudle, K (2013) <i>The Teenage Brain: Self Control</i> . <i>Current Directions in Psychological Science</i> pp. 82-87. 2. Casey (2015) <i>Beyond simple models of self control to circuit-based accounts of adolescent behavior</i> . <i>Annual Reviews of Psychology</i> only pp. 297-300. <u>Recommended:</u> 1. Casey, B.J., Somerville, L.H., Gotlib, H., Ayduk, O., Franklin, N., Askren, M.K., Jonides, J., Berman, M.G., Wilon, N.L., Teslovich, T., Glover, G., Zayas, V., Mischel, W., & Shoda, Y. (2011). <i>Behavioral and neural correlates of Delay of Gratification 40 years later</i> . <i>Proc Natl Acad Sci USA</i> , 108(36), 14988 – 15003. 2. Somerville, L., Hare, T. & Casey, B.J. (2011). <i>Frontostriatal maturation predicts cognitive control failure to appetitive cues in adolescents</i> . <i>J of Cognitive Neuroscience</i> , 23(9), 2123-2143
9/15/16	Teen Brain on Rewards	<u>Required:</u> 1. Galvan (2013) <i>The Teenage Brain: Sensitivity to Rewards</i> . <i>Current Directions in Psychological Science</i> , pp. 88-93. <u>Recommended:</u> 1. Galvan, A, Hare, T, Parra, CE, Penn, J, Voss, H, Glover, G & Casey, B.J. (2006). <i>Earlier development of the accumbens relative to Orbitofrontal cortex may underlie risk taking in adolescence</i> . <i>Journal of Neuroscience</i> , 26(25), 6885-6892. 2. Galvan, A & Barkley-Levenson, E (2014). <i>Neural representation of expected value in the adolescent brain</i> . <i>Proceedings of the National Academy of Sciences</i> 111 (4), 1646-1651.

9/20/16	<p>Rewards and Risk: A Neuroeconomic Perspective Guest Lecturer: Dr. Ifat Levy, senior author of 2012 PNAS paper</p>	<p><u>Required:</u> 1. Van Duijvenvoorde, ACK &amp; Crone, EA (2013) <i>The Teenage Brain: A Neuroeconomic Approach to Adolescent Decision Making</i> <i>Current Directions in Psychological Science</i> pp. 108-113. 2. Tymula A, Rosenberg Belmaker LA, Roy AK, Ruderman L, Glimcher, P. &amp; Levy, I. (2012) <i>Adolescents' risk-taking behavior is driven by tolerance to ambiguity.</i> <i>Proc Natl Acad Sci USA</i> 109: 17135–17140.</p> <p><u>Recommended:</u> 1. Galvan, T Hare, H Voss, G Glover, BJ Casey <i>Risk-taking and the adolescent brain: who is at risk? A Developmental science</i> 10 (2), F8-F14.</p>
9/22/16	<p>Influence of Peers on Risky Behavior</p>	<p><u>Required:</u> 1. Albert, D., Chein, J &amp; Steinberg, L (2013) <i>The Teenage Brain: Peer Influences on Adolescent Decision Making.</i> <i>Current Directions in Psychological Science</i>, pp 114-120;</p> <p><u>Recommended:</u> 1. Chein, J, Albert, D, O'Brien, L, Uckert, K &amp; Steinberg, L (2010). <i>Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry .</i> <i>Dev. Science</i> 14: 2, pages f1–f10. 2. Logue, S Chein, J, Gould, T Holliday, E, and Steinberg, L (2014) <i>Adolescent Mice, Unlike Adults, Consume More Alcohol in the Presence of Peers than Alone.</i> <i>Dev Sci.</i> 17(1): 79-85.</p>
9/27/16	<p>Risk and Rationality</p>	<p><u>Required:</u> Reyna, V. F., &amp; Farley, F. (2006). <i>Risk and rationality in adolescent decision-making: Implications for theory, practice, and public policy.</i> <i>Psychological Science in the Public Interest</i>, 7(1), 1-44.</p>
9/29/16	<p>Social Evaluation by Peers</p>	<p><u>Required:</u> 1. Somerville, LH (2013). <i>The Teenage Brain: Sensitivity to Social Evaluation.</i> <i>Current Directions in Psychological Science</i>, pp 121-127.</p> <p><u>Recommended:</u> 1. Somerville, LH, Jones, RM, Ruberry, EJ, Dyke, JP Glover, G, Casey, BJ (2013). <i>The medial prefrontal cortex and the emergence of self-conscious emotion in adolescence.</i> <i>Psychological science</i> 24 (8), 1554-1562 2. Jones, RM , Somerville, LH , Li, Ruberry, EJ, Powers, A, Mehta, N Dyke, J Casey, BJ (2014). <i>Adolescent-specific patterns of behavior and neural activity during social reinforcement learning.</i> <i>Cognitive, Affective and Behavioral Neuroscience.</i> 14 (2), 683-697.</p>
10/4/16	<p>Cognitive Control and Motivation</p>	<p><u>Required:</u> 1. Luna, B, Paulsen, DJ &amp; Padmanabhan (2013). <i>The Teenage Brain: Cognitive Control and Motivation.</i> <i>Current Directions in Psych Science</i>, pp 94-100.</p> <p><u>Recommended:</u> 1. T Teslovich, M Mulder, NT Franklin, EJ Ruberry, A Millner, LH Somerville, Simen, P, Durston, S, Casey, BJ. <i>Adolescents let sufficient evidence accumulate before making a decision when large incentives are at stake</i> <i>Developmental science</i> 17 (1), 59-70</p>
10/6/16*	<p>1<sup>st</sup> In-class preparation for group debate</p>	<p>Use all class readings and presentations</p>
10/11/16	<p>Fear and the adolescent brain</p>	<p><u>Required:</u> 1. Pattwell, S, Casey, BJ &amp; Lee, FS 2013 <i>The teen brain: Altered fear in humans and mice.</i> <i>Current Directions in Psychological Science</i> 146-151;</p> <p><u>Recommended:</u> 1. SS Pattwell, KG Bath, BJ Casey et al.,(2011). <i>Selective early-acquired fear memories undergo temporary suppression during adolescence</i></p>

		<p><i>Proceedings of the National Academy of Sciences 108 (3), 1182-1187</i></p> <p>2. <i>SS Pattwell, S Duhoux, CA Hartley et al. (2012). Altered fear learning across development in both mouse and human. Proceedings of the National Academy of Sciences 109 (40), 16318-16323</i></p>
10/13/16	<p>Why would the brain be programmed this way? Review <b>Paper Topic due for approval before class</b></p>	<p><u>Required:</u></p> <p>1. <i>Casey, BJ (2015) Beyond simple models of self control to circuit-based accounts of adolescent behavior. Annual Reviews of Psych. pp. 310-311.</i></p> <p><u>Recommended:</u></p> <p>1. <i>Casey, BJ Duhoux, S &amp; Malter Cohen, M (2010) Adolescence: What do Transmission, Transition, and Translation have to do with it? Neuron 67 (5), 749-760</i></p>
10/18/16	<b>Midterm exam</b>	<i>Based on readings and class discussion to date</i>
10/19-23	<b>OCT RECESS</b>	
10/25/16	Psychopathology and the teen brain	<p><u>Required:</u></p> <p>1. <i>Casey, BJ (2015) Beyond simple models of self control to circuit-based accounts of adolescent behavior. Annual Reviews of Psych pp. 311-312.</i></p> <p><u>Recommended:</u></p> <p>1. <i>Casey, BJ , Oliveri, ME &amp; Insel, T (2014). A neurodevelopmental perspective on the research domain criteria (RDoC) framework. Biological psychiatry 76 (5), 350-353</i></p> <p>2. <i>Lee, FS, Heimer, H, Giedd, JN, Lein, ES, Sestan, N, Weinberger, D. &amp; Casey, BJ (2014) Adolescent mental health: An opportunity and an obligation. Science 346:547-549</i></p>
10/27/16*	2 <sup>nd</sup> In-class preparation for group debate	<i>Use all class readings and presentations</i>
11/1/16	Implications for treatment of biological states of developing brain	<p><u>Required:</u></p> <p><i>Casey, BJ (2015) Beyond simple models of self control to circuit-based accounts of adolescent behavior. Annual Reviews of Psych pp. 312-313.</i></p> <p><u>Recommended:</u></p> <p>1. <i>Drysdale, A.T., Hartley, C.A., Pattwell, S.S., Ruberry, E.J., Somerville, L.H., Compton, S.N. Lee, F.S.*, Casey, B.J.*, Walkup, J.T.* (2013) Fear and Anxiety from Principle to Practice: Implications for when to treat youth with anxiety disorders. Biological Psychiatry, 75(11): e19–e20</i></p> <p>2. <i>Johnson, D &amp; Casey, BJ (2015) Extinction during memory reconsolidation blocks recovery of fear in adolescents. Nature Scientific Reports. 5: 8863, 1-5.</i></p>
11/3/16	Alcohol and the teen brain	<p><u>Required:</u></p> <p>1. <i>Spear (2013) Alcohol and the adolescent brain. Current Directions in Psychological Science pp. 152-157.</i></p>
11/8/16	When is an adolescent an adult?	<p><u>Required:</u></p> <p>1. <i>Cohen, A.O., Breiner, K, Steinberg, L et al. (2016). When is an adolescent an adult? Assessing cognitive control in emotional and non-emotional contexts, Psych Science. pp. 1-14.</i></p>
11/10/16	Social and legal policies	<p><u>Required:</u></p> <p>1. <i>Bonnie, R. J., &amp; Scott, E. S. (2013). Adolescent brain research and the law. CDPS, 22, 158–161.</i></p> <p><u>Recommended:</u></p> <p>1. <i>Cohen, AO, Bonnie, RJ, Taylor, Thompson, K &amp; Casey, BJ (2016) When does a juvenile become an adult implications for law and policy. Temple Law Review, pp. 1-22.</i></p>
11/15/16*	Treatment of youth by the Justice System	<p><u>Recommended reading and Ted Talks:</u></p> <p>1. <i>Chapter 4. Adolescent Development from National Research Council. (2013). Reforming Juvenile Justice: A Developmental Approach. Committee</i></p>

		<p>on Assessing Juvenile Justice Reform. Washington, DC: The National Academies Press. pp 89-118.</p> <p>2. Chapter 5. A Framework for Reform from National Research Council. (2013). <i>Reforming Juvenile Justice: A Developmental Approach</i>. Committee on Assessing Juvenile Justice Reform. Washington, DC: The National Academies Press. pp 119-138.</p> <p>3. Michele Deitch <a href="https://www.youtube.com/watch?v=5YHhz5MIKHM">https://www.youtube.com/watch?v=5YHhz5MIKHM</a></p> <p>4. Bryan Stevenson <a href="http://ideas.ted.com/how-americas-justice-system-failed-our-children/">http://ideas.ted.com/how-americas-justice-system-failed-our-children/</a></p>
11/17/16*	3 <sup>rd</sup> In-class preparation for group debate	Use all class readings and presentations
11/18-27	YALE FALL RECESS	
12/1/16	Mental health in the juvenile justice system	<p><u>Required:</u></p> <p>1. Shufelt, JL &amp; Coccozza, JJ (2006). <i>Youth with Mental Health Disorders in the Juvenile Justice System: Results from a Multi-State Prevalence Study</i>. National Center for Mental Health and Juvenile Justice Research and Program Brief. pp. 1-6</p>
12/6/16	Adapted or Arrested Development: Review <b>Paper due before class</b>	<p><u>Required:</u></p> <p>1. <i>Current Directions in Psychological Science</i> (2013) Special issue on the teen brain, 22, 79-161.</p> <p>2. <i>Annual Rev of Psychology</i> (2015) Beyond simple models of self control to circuit-based accounts of adolescent behavior. Vol. 66, 295-319.</p>
12/8/16	4 <sup>th</sup> In-class preparation for group debate	Use all class readings and presentations
12/13/16	<b>Class Team Debate</b>	Use all class readings and presentations
12/15/16	<b>Comprehensive Final Exam</b>	Based on all course readings and class discussion