

Psy5112HI
SEX DIFFERENCES IN BRAIN AND BEHAVIOUR
Fall 2015
Dr. G. Einstein
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Sid Smith 4025—416-978-0896
OFFICE HOURS:
Starting September 28, Mondays 3:30-5PM
and by appointment

Course Description

This course will engage with the historic and contemporary literature in the field of Hormones and Behaviour following the development of the field from Beach's early rodent studies to current studies using brain imaging to identify differences in gay, straight, and transgendered human brains. Primarily dealing with central nervous system anatomy and its relationship to sexually dimorphic behaviours, this course emphasizes the role of steroid hormones and experience in shaping differences in behaviour, cognition, and identity. In following this field into the present, students will gain an appreciation for changing norms in research, how a field of scientific knowledge develops, sex differences in the brain, and the role of steroid hormones in shaping cognition, mental health, and neurological disorders. Students will present papers in the text as well as of their own choosing.

Course Objectives

On successful completion of the course students will be able to:

- appreciate how a field of scientific knowledge develops,
- understand changing norms in one area of neuroscience research,
- be familiar with sex differences in the brain and in behaviour,
- learn about the role of steroid hormones and genes in shaping cognition, mental health, and neurological disorders
- know how to design an experiment to study sex differences

Course Format

2 hour seminars will be held weekly. Each week will have a portion that is student led.

Classroom Interactions

This is a classroom in which we aim to engage with each other in respectful and thoughtful conversations about the relationship between brain, behaviour, and sex differences. Attendance is mandatory. Because a significant part of the course will be classroom discussion, a major assignment is keeping up with readings, participating in dialogue an informed way, and providing thoughtful feedback to other students. You should come to class not only having done the assigned reading, but also having thought about it and having prepared some points/questions for discussion. Your responses to other students should not be negative. As an engaged learner, your job is to enter into conversations about what was read/heard, and your responses to the ideas presented. You are asked to structure your responses with the following in mind:

- Identifying the ideas that engage you

As you read texts or listen to the lectures, presentations, and discussions which ideas caught your attention or captured your imagination? Which ones stuck a chord for you?

- Describing the intentions of the writers or speakers

What values and principles regarding people, their health and well-being, and the world more generally do these ideas evoke? What do the ideas suggest to you about the writers' or speakers' purposes and commitments?

- Situating your responses

What is it about your own life experiences or interests that account for why these ideas caught your attention? Do you have a sense of which aspects of your own experiences resonated with these ideas?

- Identifying gaps and spaces

What are some gaps and spaces that you notice in each reading? What areas do you think need further exploration in this topic area? What remains confusing, unclear, or underdeveloped? What suggestions in the form of other authors and ideas can you offer to help the analysis along?

- Recognising the growth of your ideas throughout the course

How have you been moved by engaging with these ideas? Where have these ideas taken you? How have you shifted as a result of listening to and participating in the development of these ideas?

Accessibility Information

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs. Students with diverse learning styles and needs are welcome in this course. Please feel free to approach us or Accessibility Services so we can assist you in achieving academic success in this course.

ACCESSIBILITY SERVICES:

Phone: (416) 978 8060

Email: accessibility.services@utoronto.ca ; Website: www.accessibility.utoronto.ca

DATES, TOPICS & READINGS

| Date | Topic | Reading |
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| Sep 16 | 1. Course Introduction | Overview of the course and the field. Course goals and assignments |
| 23 | 1. Female and Male Sexual Behaviour 2. The Hypothalamus/the Hypothalamic-pituitary Axis RESCHEDULED to 30th | Frank A. Beach (1941) Female mating behavior shown by male rats after administration of testosterone propionate. <i>Endocrinology</i> 29: 409–412. 41 Frank A. Beach and Priscilla Rasquin (1942) Masculine copulatory behavior in intact and castrated female rats. <i>Endocrinology</i> 31: 393–409. G. W. Harris (1937) The induction of ovulation in the rabbit, by electrical stimulation of the hypothalmohypophysial mechanism. <i>Proceedings of the Royal Society of London B</i> 612: 374–394. 77 G. W. Harris and Dora Jacobsohn (1950) Proliferative capacity of the hypophysial portal vessels. <i>Nature</i> 165:854. 91 H. J. Campbell, G. Feuer, and G. W. Harris (1964) The effect of intrapituitary infusion of median eminence and other brain extracts on anterior pituitary gonadotrophic secretion. <i>Journal of Physiology</i> 170: 474–486. |
| 23 & 30 | 1. Female and Male Sexual Behaviour 2. The Hypothalamus/HP axis 3. Sexual Differentiation: Chromosomes, Phenotype and Gender | Sinclair et al. (1990) A gene from the human sex determining region encodes a protein with homology to a conserved DNA-binding motif. <i>Nature</i> 346: 240–244. Haqq et al. (1995) Molecular basis of mammalian sexual determination: Activation of Mullerian inhibiting substance gene expression by SRY. <i>Science</i> 266:1494–1500. Page et al. (1987) Exchange of terminal portions of X- and Ychromosomal short arms in human XX males. <i>Nature</i> 328:437–440. |
| Oct 7 | 1. Effects of Estrogen Receptors 2. Estrogens as Growth Factors | Madhabananda Sar and Walter E. Stumpf (1977) Distribution of androgen target cells in rat forebrain and pituitary after [3H]-dihydrotestosterone administration. <i>Journal of Steroid Biochemistry</i> 8: 1131–1135. Shughrue et al. (1990) Developmental changes in estrogen receptors in mouse cerebral cortex between birth and postweaning: Studied by autoradiography with 11b-methoxy-16a-[125I]iodoestradiol. <i>Endocrinology</i> 126: 1112–1124. C. Dominique Toran-Allerand (1976) Sex steroids and the development of the newborn mouse hypothalamus and |

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| | | <p>preoptic area in vitro: Implications for sexual differentiation. <i>Brain Research</i> 106: 407–412.</p> <p>Catherine S. Woolley and Bruce S. McEwen (1992) Estradiol mediates fluctuation in hippocampal synapse density during the estrous cycle in the adult rat. <i>Journal of Neuroscience</i> 12: 2549–2554.</p> |
| 14 | <p>Organization and Activation</p> <p>RESCHEDULED to 21st</p> | <p>Charles H. Phoenix, Robert W. Goy, Arnold A. Gerall, and William C. Young (1959) Organizing action of prenatally administered testosterone propionate on the tissues mediating mating behavior in the female guinea pig. <i>Endocrinology</i> 65: 369–382.</p> |
| 14 & 21 | <p>1. Organization and Activation</p> <p>2. The Song Bird</p> <p>3. The Mammalian Spinal Cord</p> | <p>Fernando Nottebohm and Arthur P. Arnold (1976) Sexual dimorphism in vocal control areas of the songbird brain. <i>Science</i> 194: 211–213. 247</p> <p>Fernando Nottebohm (1980) Testosterone triggers growth of brain vocal control nuclei in adult female canaries. <i>Brain Research</i> 189: 429–436. 251</p> <p>S. Marc Breedlove and Arthur P. Arnold (1980) Hormone accumulation in a sexually dimorphic motor nucleus of the rat spinal cord. <i>Science</i> 210: 564–566. 261</p> <p>S. Marc Breedlove and Arthur P. Arnold (1983) Hormonal control of a developing neuromuscular system. I. Complete demasculinization of the male rat spinal nucleus of the bulbocavernosus using the anti-androgen flutamide. <i>Journal of Neuroscience</i> 3: 417–423.</p> |
| 28 | <p>1. Anatomy of Cycling</p> <p>2. Anatomy of Sex Difference</p> | <p>G. Raisman and P. M. Field (1973) Sexual dimorphism in the neuropil of the preoptic area of the rat and its dependence on neonatal androgen. <i>Brain Research</i> 54: 1–29.</p> <p>R. A. Gorski, J. H. Gordon, J. E. Shryne, and A. M. Southam (1978) Evidence for a morphological sex difference within the medial preoptic area of the rat brain. <i>Brain Research</i> 148: 333–346.</p> <p>Laura S. Allen, Melissa Hines, James E. Shryne, and Roger A. Gorski (1989) Two sexually dimorphic cell groups in the human brain. <i>Journal of Neuroscience</i> 9: 497–506.</p> |
| 4 | <p>1. Functional Sex Differences</p> <p>2. Neurotransmitter Differences</p> | <p>Gary W. Arendash and Roger A. Gorski (1983) Effects of discrete lesions of the sexually dimorphic nucleus of the preoptic area or other medial preoptic regions on the sexual behavior of male rats. <i>Brain Research Bulletin</i> 10: 147–154. 339</p> <p>A. A. Perachio, L. D. Marr, and M. Alexander (1979) Sexual behavior in male Rhesus monkeys elicited by electrical stimulation of preoptic and hypothalamic areas. <i>Brain Research</i> 177: 127–144. 347</p> |

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| | | <p>Y. Oomura, H. Yoshimatsu, and S. Aou (1983) Medial preoptic and hypothalamic neuronal activity during sexual behavior of the male monkey. <i>Brain Research</i> 266: 340–343.</p> <p>R. B. Simerly, L. W. Swanson, and R. A. Gorski (1984) Demonstration of a sexual dimorphism in the distribution of serotonin-immunoreactive fibers in the medial preoptic nucleus of the rat. <i>Journal of Comparative Neurology</i> 225: 151–166.</p> <p>G. J. De Vries, R. M. Buijs, and F. W. van Leeuwen (1984) Sex differences in vasopressin and other neurotransmitter systems in the brain. <i>Progress in Brain Research</i> 61:185–197.</p> |
| 11 | When Does A Difference Make a Difference? | <ol style="list-style-type: none"> 1. Fausto-Sterling: Life in the XY Corral 2. De Vries: Sex Differences in Adult and Developing Brains: Compensation, Compensation, Compensation 3. Richardson: The Case of Sex Determination Genetics |
| 18 | Other cultures' views on hormones and behaviour | Jennifer Bright |
| 25 | Students present their grant proposals | |
| Dec 2 | Students present their grant proposals | |

Text

Text: Einstein, G (ed) (2007) *Sex and the Brain*. MIT Press.

Ancillary Readings

Bailey, Michael (2003) *The Man Who Would be Queen: The Science of Gender Bending and Transsexualism*. Joseph Henry Press.

Baron-Cohen, Simon (2003) *The Essential Difference: Men, Women, and the Extreme Male Brain*. Basic Books.

Baron-Cohen, Simon (2005) *Prenatal Testosterone in Mind*. MIT Press.

Brizendine, Louann (2006) *The Female Brain*. Broadway Books.

Colapinto, John (2000) *As Nature Made Him: The Boy Who was Raised as a Girl*. Harper Collins.

Fausto-Sterling, Anne (1992) *Myths of Gender*. Basic Books

Fausto-Sterling, Anne (2000) *Sexing the Body*. Basic Books

Fine, Cordelia (2010) *Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference*. WW Norton & Co

Jordan-Young, Rebecca (2011) *Brian Storms: The flaws in the science of sex differences*. Harvard University Press

Laqueur, Thomas (1990) *Making Sex: Body and Gender from the Greeks to Freud*. Harvard University Press.

LeVay, Simon (1994) *The Sexual Brain*. Bradford Books.

Pinker, Susan (2009) *The Sexual Paradox: Men, Women, and the Real Gender Gap*. Vintage Canada.

Stein, Edward (1999) *The Mismeasure of Desire: The Science, Theory, and Ethics of Sexual Orientation*. Oxford University Press.

These books have been placed on Reserve at Gerstein, Robarts or New College Library

STUDENT EVALUATION & ASSIGNMENTS

Evaluation will be based on in-class participation and three required assignments described and weighted below. Written assignments must be typed, double-spaced using the APA format. Adherence to the Code of Student Conduct and the Code of Behaviour on Academic Matters will be enforced in this course.

Active Class Participation (20% of Final Grade): What you get out of a course depends largely on what you put into the course. Sharing your ideas, work, thoughts on the readings, and thoughts on other members' comments are incredibly important—both for training and for your own learning. This grade will be based on attendance, contributions, dialogue, and comments on other class members' work.

Assignment #1: Leading the Seminar (25% of Final Grade)

Each student will select a class to lead and present the papers from the text on the week's topic and 1 current paper in the literature on the same topic. One week prior to the seminar, students leading are required to distribute a brief abstract and outline of topics of their seminar plus the readings (in the book and chosen from the recent literature) to course participants. Professor Einstein will be available to consult on the readings. Leading the seminar is 15% of the grade. The abstract and outline are 10% of the grade.

Due Date: TBD

Assignment #2: Proposal for an operating grant proposal looking at sex differences (15% of Final Grade)

Students select a topic reflecting a central concern of the course or in their research program to address in a grant proposal. Students are required to submit a succinct proposal for the proposal (500 words max not counting the references) describing:

- the issue to be addressed
- the rationale for, or the objectives of the proposed experiments
- an outline of the perspective/approach to be taken
- a preliminary list of readings and resources that will be drawn upon.

Helpful reading: Becker et al. (2005) *Endocrinology* 146(4):1650–1673.

Due Date for the proposed proposal: Oct 28, 2015

Assignment #3: Grant Proposal (40% of Final Grade)

Students will complete the project proposed in Assignment #2 taking into account the written feedback received from the instructor. The grant proposal may follow the specifications of an operating grant (not a student grant) for a grant to NSERC, CIHR or SSHRC in terms of length, format etc.

1. Abstract
2. Background including gaps in the literature that need addressing
3. Experimental Design – drawing on paradigms studied in this course
4. Proposed findings – if you find them, what will it mean; if you do not find them, what will it mean
5. Significance of the outcomes for understanding human health, sex differences, or hormones and behaviour.

30% of grade based on the written proposal

10% of grade based on presentation of the proposal

Students must retain a copy of the paper. **Due Date: Dec 8, 2015**

All written assignments should be typewritten, double spaced, and in APA format. Please proof your proposals by actually reading them and not just 'spell checking!'

ACADEMIC INTEGRITY:

Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves.

Familiarize yourself with the University of Toronto's *Code of Behaviour on Academic Matters* (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>). It is the rule book for academic behaviour at the U of T, and you are expected to know the rules. Potential offences include, but are not limited to:

In papers and assignments:

Using someone else's ideas or words without appropriate acknowledgement.

Copying material word-for-word from a source (including lecture and study group notes) and not placing the words within quotation marks.

Submitting your own work in more than one course without the permission of the instructor.

Making up sources or facts.

Including references to sources that you did not use.

Lending your work to a classmate who submits it as his/her own without your permission.

Obtaining or providing unauthorized assistance on any assignment including:

working in groups on assignments that are supposed to be individual work;

having someone rewrite or add material to your work while "editing".

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the *Code*. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact me. If you have questions about appropriate research and citation methods, seek out additional information from me, or from other available campus resources like the [U of T Writing Website](#). If you are experiencing personal challenges that are having an impact on your academic work, please speak to me.