

# RuCCS Marquee Course Series:

# Making a Mind with a Brain:

from infants to adults in humans and animals

## Course Aims:

Where does our knowledge come from? What are the ontogenetic and phylogenetic origins of human thinking? **In this course we will explore the origins of human knowledge using a comparative approach to behavioral neuroscience and developmental science.**

## Course Information:

**SP22:** 16:830:637/638 (Psych) & 16:185:600:01 (Cog Sci)

Canvas: <https://rutgers.instructure.com/courses/169967>

Web: <https://sites.rutgers.edu/jinjing-jenny-wang/courses/marquee-making-a-mind/>

**Time/Day: Wednesdays 2-5pm**

## Zoom:

<https://rutgers.zoom.us/j/99778588620?pwd=SIRTbnVVTdZzM1RZRnlwcnZQdktGZz09>

## Format:

Hybrid (in person + remote): *Remote until Spring Break / In-person after Spring Break\**

Open to all students with special permission of instructor(s)

## Instructors:

Prof. Kasia Bieszczad: [kasia.bie@rutgers.edu](mailto:kasia.bie@rutgers.edu)

Prof. Jenny Wang: [jinjing.jenny.wang@rutgers.edu](mailto:jinjing.jenny.wang@rutgers.edu)

## Course Structure and Requirements:

The class will meet once a week for 3 hours ( intro + lecture + discussion). Readings will be assigned ahead of time for each class. The course will open with students writing an opinion

paper on their definition of “mind” and whether or not “mind” can be attributed to humans and animals. This paper will be graded pass/fail and counts for 10% of final grade. Students will also submit his/her own questions each week before the class, and later submit reflection on the topic afterwards to answer the following: (1) *Where are there similarities in the developmental psychology and behavioral neuroscience approaches?* (2) *What are the distinctions between the two fields?* These weekly assignments will be graded pass/fail and count for 20% of the final grade. Two course sessions will consist of student presentations (20% of final grade). The course will close with students writing a reflection paper following a “*News and Views*” format, developed with ideas and evidence gained from his/her choice of classroom discussions. Grading rubric will be provided for the final paper, which will count for 50% of course grade.

## Schedule:

\*subject to change and to Rutgers policies

### **1/19 What is a human mind? What is an animal mind? What properties do they share (if any)?**

*The Baby Lab. The New Yorker. 2006.*

*Striedter G. F. (2013). Bird brains and tool use: beyond instrumental conditioning. Brain, Behavior and Evolution, 82(1), 55–67. <https://doi.org/10.1159/000352003>*

*Striedter G. F. (2002). Brain homology and function: An uneasy alliance. Brain Research Bulletin, 57(3-4), 239–242. [https://doi.org/10.1016/s0361-9230\(01\)00692-x](https://doi.org/10.1016/s0361-9230(01)00692-x)*

### **1/26 Nature vs. Nurture: Where does knowledge come from?**

*Wang, J., & Feigenson, L. (2019). Is empiricism innate? Preference for nurture over nature in people’s beliefs about the origins of human knowledge. Open Mind, 3, 89-100.*

*Thompson, R. F., & Kim, J. J. (1996). Memory systems in the brain and localization of a memory. Proceedings of the National Academy of Sciences of the United States of America, 93(24), 13438–13444. <https://doi.org/10.1073/pnas.93.24.13438>*

*Kóbor, A., Janacsek, K., Takács, Á., & Nemeth, D. (2017). Statistical learning leads to persistent memory: Evidence for one-year consolidation. Scientific Reports, 7(1), 760. <https://doi.org/10.1038/s41598-017-00807-3>*

*Asok, A., Leroy, F., Rayman, J. B., & Kandel, E. R. (2019). Molecular Mechanisms of the Memory Trace. Trends in neurosciences, 42(1), 14–22. <https://doi.org/10.1016/j.tins.2018.10.005>*

## 2/2 Presentations I - Debate

### 2/9 Learning and memory: Do we all start with a tabula rasa?

Rovee-Collier, C. K., Sullivan, M. W., Enright, M., Lucas, D., & Fagen, J. W. (1980). Reactivation of infant memory. *Science*, 208(4448), 1159-1161.

Marcus, G. F., Vijayan, S., Rao, S. B., & Vishton, P. M. (1999). Rule learning by seven-month-old infants. *Science*, 283(5398), 77-80.

Takesian, A. E., & Hensch, T. K. (2013). Balancing plasticity/stability across brain development. *Progress in Brain Research*, 207, 3–34. <https://doi.org/10.1016/B978-0-444-63327-9.00001-1>

Seitz, A. R., Kim, D., & Watanabe, T. (2009). Rewards evoke learning of unconsciously processed visual stimuli in adult humans. *Neuron*, 61(5), 700–707. <https://doi.org/10.1016/j.neuron.2009.01.016> (see also Seitz, A. R., & Watanabe, T. (2009). The phenomenon of task-irrelevant perceptual learning. *Vision Research*, 49(21), 2604–2610. <https://doi.org/10.1016/j.visres.2009.08.003>)

### 2/16 Seeing and hearing: How do we sense the world? (Guest Speaker confirmed)

Guest speaker: **Professor Nina Kraus**, Hugh S. Knowles Chair in audiology at Northwestern University, investigating the neural encoding of speech and music and its plasticity. <https://communication.northwestern.edu/faculty/nina-kraus>

Fantz, R. L. (1964). Visual experience in infants: Decreased attention to familiar patterns relative to novel ones. *Science*, 146(3644), 668-670.

**Kraus, N.** (2021) *Of Sound Mind: How our brain constructs a meaningful sonic world.*

### 2/23 Sleep and dreaming: What is it good for?

Walker, M. P., & Stickgold, R. (2006). Sleep, memory, and plasticity. *Annu. Rev. Psychol.*, 57, 139-166.

McGaugh J. L. (2000). Memory--a century of consolidation. *Science (New York, N.Y.)*, 287(5451), 248–251. <https://doi.org/10.1126/science.287.5451.248>

### 3/2 Space and quantity: Analog or digital? (Guest Speaker confirmed)

Guest Speaker: **Professor Randy Gallistel**, Emeritus Professor of Psychology at Rutgers University. He is an expert in the cognitive processes of learning and memory,

using animal models to carry out research on these topics.

<https://psych.rutgers.edu/faculty-profiles-a-contacts/96-charles-randy-gallistel>

**Gallistel, C. R.** (2020). Where meanings arise and how: Building on Shannon's foundations. *Mind & Language*, 35(3), 390-401.

### **3/9 Language and music 1: Are they uniquely human?** (Guest Speaker confirmed)

Guest Speaker: **Professor Aniruddh (Ani) Patel**, Professor of Psychology at Tufts University. Dr. Patel's work focuses on music cognition: the mental processes involved in making, perceiving, and responding to music. Areas of emphasis include music-language relations (the topic of his 2008 book, *Music, Language, and the Brain*, Oxford Univ. Press) rhythmic processing, and cross-species studies of music cognition.

<https://as.tufts.edu/psychology/people/faculty/aniruddh-patel>

**Patel A. D.** (2011). Why would Musical Training Benefit the Neural Encoding of Speech? The OPERA Hypothesis. *Frontiers in Psychology*, 2, 142.  
<https://doi.org/10.3389/fpsyg.2011.00142>

Spring Break

### **3/23 Language and music 2: When were we "preverbal"?** (Guest speaker confirmed)

Guest speaker confirmed: **Professor Erika Bergelson**, Crandall Family Assistant Professor at Duke University. Dr. Bergelson's work focuses on the interplay of processes during language acquisition. In particular, how word learning relates to other aspects of learning language (e.g. speech sound acquisition, grammar/morphology learning), and social/cognitive development more broadly (e.g. joint attention processes) in the first few years of life. <https://dibs.duke.edu/people/elika-bergelson>

**Bergelson, E., & Aslin, R. N.** (2017). Nature and origins of the lexicon in 6-mo-olds. *Proceedings of the National Academy of Sciences*, 114(49), 12916-12921.

Partanen, E., Kujala, T., Näätänen, R., Liitola, A., Sambeth, A., & Huotilainen, M. (2013). Learning-induced neural plasticity of speech processing before birth. *Proceedings of the National Academy of Sciences of the United States of America*, 110(37), 15145-15150.  
<https://doi.org/10.1073/pnas.1302159110>

Moon, C., Lagercrantz, H., & Kuhl, P. K. (2013). Language experienced in utero affects vowel perception after birth: a two-country study. *Acta paediatrica (Oslo, Norway : 1992)*, 102(2), 156-160. <https://doi.org/10.1111/apa.12098>

**3/30 Mind and the brain: What happens when something goes wrong?** (Guest Speaker Confirmed)

Guest Speaker: **Professor Barbara Landau**, Dick and Lydia Todd Professor in the Department of Cognitive Science at Johns Hopkins University. Landau specializes in language learning, spatial representation and relationships between these foundational systems of human knowledge. <https://cogsci.jhu.edu/directory/barbara-landau/>

**Landau, B., Gleitman, H., & Spelke, E. (1981).** Spatial knowledge and geometric representation in a child blind from birth. *Science*, 213(4513), 1275-1278.

Reh, R. K., Dias, B. G., Nelson, C. A., 3rd, Kaufer, D., Werker, J. F., Kolb, B., Levine, J. D., & Hensch, T. K. (2020). Critical period regulation across multiple timescales. *Proceedings of the National Academy of Sciences of the United States of America*, 117(38), 23242–23251. <https://doi.org/10.1073/pnas.1820836117>

Day J. J. (2014). New approaches to manipulating the epigenome. *Dialogues in Clinical Neuroscience*, 16(3), 345–357. <https://doi.org/10.31887/DCNS.2014.16.3/jday>

Do, K. Q., Cuenod, M., & Hensch, T. K. (2015). Targeting Oxidative Stress and Aberrant Critical Period Plasticity in the Developmental Trajectory to Schizophrenia. *Schizophrenia bulletin*, 41(4), 835–846. <https://doi.org/10.1093/schbul/sbv065>

**4/6 Consciousness: Might the mind and the brain tell us different things?** (Guest Speaker confirmed)

Guest Speaker: **Professor Ned Block**, Silver Professor of Philosophy, Psychology and Neural Science at New York University. He works in philosophy of perception and foundations of neuroscience and cognitive science. <https://www.nyu.edu/gsas/dept/philo/faculty/block/>

**Block, N. (1995).** On a confusion about a function of consciousness. *Behavioral and brain sciences*, 18(2), 227-247.

Isa, T., & Yoshida, M. (2021). Neural mechanism of blindsight in a macaque model. *Neuroscience*, 469, 138–161. <https://doi.org/10.1016/j.neuroscience.2021.06.022> (See also Fox, D. M., Goodale, M. A., & Bourne, J. A. (2020). The age-dependent neural substrates of blindsight. *Trends in Neurosciences*, 43(4), 242–252. [doi.org/10.1016/j.tins.2020.01.007](https://doi.org/10.1016/j.tins.2020.01.007))

Nieder, A., Wagener, L., & Rinnert, P. (2020). A neural correlate of sensory consciousness in a corvid bird. *Science (New York, N.Y.)*, 369(6511), 1626–1629. <https://doi.org/10.1126/science.abb1447>

#### 4/13 Emotions: Where do feelings come from? (Guest Speaker confirmed)

Guest Speaker: **Professor Vanessa Lobue**, Associate Professor of Psychology and Director of the Child Study Center at Rutgers University. Dr. LoBue studies humans' behavioral responses to emotionally valenced stimuli—specifically to negative or threatening stimuli—and the mechanisms that guide the development of these behaviors. <https://sasn.rutgers.edu/about-us/faculty-staff/vanessa-lobue>

DeLoache, J. S., & **LoBue, V.** (2009). The narrow fellow in the grass: Human infants associate snakes and fear. *Developmental science*, 12(1), 201-207.

Dinh, H. T., Nishimaru, H., Le, Q. V., Matsumoto, J., Setogawa, T., Maior, R. S., Tomaz, C., Ono, T., & Nishijo, H. (2021). Preferential Neuronal Responses to Snakes in the Monkey Medial Prefrontal Cortex Support an Evolutionary Origin for Ophidiophobia. *Frontiers in Behavioral Neuroscience*, 15, 653250. <https://doi.org/10.3389/fnbeh.2021.653250>

Pape, H. C., & Pare, D. (2010). Plastic synaptic networks of the amygdala for the acquisition, expression, and extinction of conditioned fear. *Physiological reviews*, 90(2), 419-463.

Phelps, E. A., Lempert, K. M., & Sokol-Hessner, P. (2014). Emotion and decision making: multiple modulatory neural circuits. *Annual Review of Neuroscience*, 37, 263–287. <https://doi.org/10.1146/annurev-neuro-071013-014119>

#### 4/20 Presentations II - News and Views

#### 4/27 Closing session addressing distinctions/non-distinctions between humans and animals

#### Grading Scheme:

**10% Early-semester Reflection paper** (pass/fail)

**20% Weekly question and answer assignments** (pass/fail)

**20% Student presentations** (pass/fail)

**50% News & Views Reflection paper** (graded)

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**100% Total**

### **Current Academic Integrity Policy:**

Summary: <http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers/>

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, having someone else complete your course work, and facilitating violations of academic integrity by others.

Resources for Students: <http://academicintegrity.rutgers.edu/resources-for-students/>

### **List of Required Books &/or Materials**

No required textbook.

All readings will be articles or book chapters available in PDF format, posted on Canvas.

### **Self-Reporting Absence Application:**

Lecture attendance is mandatory as lectures will cover material that is not presented in your readings. If you miss a lecture, it is your responsibility to obtain the notes. You should plan to do all of the assigned reading because the material in the readings may not be covered in lecture. Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

### **Mask Requirement**

In order to protect the health and well-being of all members of the University community, masks must be worn by all persons on campus when in the presence of others (within six feet) and in buildings in non-private enclosed settings (e.g., common workspaces, workstations, meeting rooms, classrooms, etc.). Masks must be worn during class meetings; any student not wearing a mask will be asked to leave.

Masks should conform to CDC guidelines and should completely cover the nose and mouth: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html>

Each day before you arrive on campus or leave your residence hall, you must complete the brief survey on the Rutgers **My Campus Pass** symptom checker self-screening app.

*Please respect the CDC quarantine/isolation guidelines on what to do if you have been a close contact of someone who has tested positive for COVID-19, or if you yourself test positive, with or without symptoms. **Up-to-date guidelines can be found at the following link:*** <https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html>

## **Student-Wellness Services**

### **Counseling, ADAP & Psychiatric Services (CAPS)**

**(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/**

**<http://health.rutgers.edu/medical-counseling-services/counseling/>**

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community, and consultation and collaboration with campus partners.

**Crisis Intervention** : <http://health.rutgers.edu/medical-counseling-services/counseling/crisis-intervention/>

**Report a Concern:** <http://health.rutgers.edu/do-something-to-help/>

### **Violence Prevention & Victim Assistance (VPVA)**

**(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)**

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

### **Disability Services**

**(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>**

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at:

<https://ods.rutgers.edu/students/registration-form>.

### **Cheating and Plagiarism**

Don't cheat. Don't plagiarize. We expect *Academic Integrity*.

<https://studentconduct.rutgers.edu/processes/academic-integrity>

Visit the following helpful link to understand the definition of plagiarism and how to avoid it:

<https://libguides.rutgers.edu/CitingSources/plagiarism>