<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Days and Times</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor Boyle</td>
<td><a href="mailto:mboyle@ucsd.edu">mboyle@ucsd.edu</a></td>
<td>Friday, 2-4 pm</td>
<td>CSB 130</td>
</tr>
<tr>
<td>Lauren</td>
<td><a href="mailto:lcurley@ucsd.edu">lcurley@ucsd.edu</a></td>
<td>Tuesday, 10-11 am</td>
<td>CSB 225</td>
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<tr>
<td>Lexi D.</td>
<td><a href="mailto:adalenco@ucsd.edu">adalenco@ucsd.edu</a></td>
<td>Tuesday, 12:30-1:45 pm</td>
<td>The Loft</td>
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<tr>
<td>Elena</td>
<td><a href="mailto:edreisba@ucsd.edu">edreisba@ucsd.edu</a></td>
<td>Thursday, 1-2 pm</td>
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<tr>
<td>Adrian</td>
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<td>Wednesday, 5-6 pm</td>
<td>CSB 114</td>
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<tr>
<td>Audrey</td>
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<td>Tuesday, 4-5 pm</td>
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<tr>
<td>Devansh</td>
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<tr>
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<tr>
<td>Lexi F.</td>
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<td>Thursday, 4-5 pm</td>
<td>CSB 114</td>
</tr>
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Important Information

● Midterm 1
  ○ Grades have been released
  ○ Contact your TA if you don’t see a grade

● Midterm 2
  ○ On Tuesday, May 21 during lecture of Week 8
  ○ Covers all material from Weeks 4 – 6

● EC Reading Quiz
  ○ Based on reading for Dr. Bergen’s lecture: “What Profanity Teaches Us”
  ○ Available on TritonEd from Wednesday, May 8 @ 4pm – Thursday, May 9 @ 10:00 am
Last Week’s Topics

- Lecture 9 | Dr. Deak: How Do We Become Socially Skilled?
1. What are some reasons for cognitive scientists to study development?

2. What are some general types of social skills shared by humans and animals?

3. What is kin recognition?
   a. Is it unique to humans? Why is it important?
   b. What is the evidence that infants discriminate biological motion? What method was used?
   c. How does facial recognition and facial processing develop during infancy?
Lecture 9 | Review Questions (2 of 3)

4. **What type of neural system regulates infant-parent interaction?**
   a. **What neuromodulators are involved in social reward?**
   b. **What are some major functions of DA and Oxytocin, and how do they interact?**

5. **How do infants and adults establish “common ground” in communication?**
   a. **What is attention-sharing? What forms does it take?**
   b. **Is this skill unique to humans?**
   c. **How can attention sharing help infants learn language? (What did Baldwin’s study show?)**
6. Understand the traditional view on how babies think.
7. What knowledge (physics etc.) do babies have? What is the evidence?
8. Define “statistical patterns” with examples. How do babies apply statistics? Why are they like “scientists”?
9. Where can probabilistic models be applied?
10. Why is the immaturity of human babies important?
11. Compare the brain of children and the brain of adults.
1. What are some reasons for cognitive scientists to study development?

**Practical Reasons**
- Treatment of individuals
- Improve education/parenting
- Help children at risk

**Theoretical Reasons**
- Understand traits through its emergence

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The rest of the psychological and behavioral sciences are algebra.

The study of development is calculus.

— Albert Einstein
2. What are some general types of social skills shared by humans and animals?

Diverse, Multivariate Skills in Vertebrates

- Kin Recognition
- Parenting
- Communicating
- Hunting/Playing
- Mating
- Aggression/Dominance
3a. What is kin recognition? Is it unique to humans? Why is it important?

### Importance of Kin Recognition

- **Essential for survival**

  **Evolutionary importance:** don’t want to misdirect maternal care (high cost, little to no benefit)

- Need to establish:
  - Who’s my caregiver?

- **NOT** unique to humans

  Occurs in plants & animals
3b. What is the evidence that infants discriminate biological motion? What method was used?

**Point Light Display Study**

- Carried out by Bertenthal et al. (1987)
- 3-month-olds' discrimination of biological motion → walking patterns
- Habituation and dishabituation using canonical vs. scrambled walker
3c. How does facial recognition and facial processing develop during infancy?

**Facial Recognition Begins Early**

- Start responding to face-like shapes → <1 week
- Smile at people → 3 months
- Stranger anxiety, preferential affection to parents → 7-9 months
- Experiment by Layton & Rochat, 2007: *Habituate* to stranger #1; then *Dishabituate* to stranger #2 or mother
4a. What type of neural system regulates infant-parent interaction? What neuromodulators are involved in social reward?

**Neuromodulatory Regulation**

- **Examples of Neuromodulators:**
  - Dopamine (DA)
  - Norepinephrine (NE)
  - Serotonin (5-HT)
  - Acetylcholine (ACh)

- **Neuropeptides / hormones:**
  - Oxytocin
  - Endogenous opiates, androgens
4b. What are some major functions of DA & oxytocin, and how do they interact?

**Neural Correlates of Parent-Infant Interaction**

Interaction of oxytocin & dopaminergic system ⇒ motivation to seek social contact

**Dopamine (DA):**
Involved in motivation / reward

**Oxytocin:**
Facilitates childbirth-related processes, promotes social behavior
5a. How do infants and adults establish “common ground” in communication? What is attention-sharing? What forms does it take?

Matching One's Focus with Another Person's

- Look where someone is looking
- Get someone to look where you’re looking
- Important for teaching & learning
5b. Is the skill (joint attention) unique to humans?

**Social Gaze in Non-Human Primates**

- Evidence for gaze following
  - Found in primates e.g. macaques, chimpanzees, etc.
- Joint attention can also be observed in these species.

1. Gaze Following vs. 2. Joint Attention
5c. How can attention sharing help infants learn language (What did Baldwin’s study show?)

**Language Through Shared Meaning**

- Figure out *what’s important* to other people and what they mean
- Watch and learn from skilled conspecifics
- 18-month-olds associate word with object only in *shared* attention context (Baldwin, 1991, 1993)
6. Understand the traditional view on how babies think.

**Traditional Viewpoint:**

Babies / young children are **irrational**, egocentric & amoral.

**MYTHS BUSTED**

Even the youngest children know, experience and learn far more than scientists ever thought possible.
7. What knowledge (physics etc.) do babies have? What is the evidence?

**Physics**
- Trajectories, gravity and containment

**Biology**
- Growth, inheritance and illness

**Psychology of Others**
- Theory of Mind
8. Define “statistical patterns” with examples. How do babies apply statistics? Why are they like “scientists”?

**Statistical pattern** ⇒ in developmental context: identifying regularities vs. discrepancies in the environment

- Draw conclusions about the world

Example from your reading:

- **Grammatical patterns**
  - Study by Saffran, Aslin & Newport (1996)
  - Play syllable sequence, some are more likely to follow than others (e.g. “ro” follows “bi” ⅓ of time, while “da” always follows “bi”)

Babies listened longer to the statistically improbable syllable strings!
8. Define “statistical patterns” with examples. How do babies apply statistics? Why are they like “scientists”?

**Baby Scientists**

**The Blicket Detector**

Young children can utilize **statistical probabilities** to figure out how the machine works (i.e. which objects make the novel apparatus light up).
9. Where can probabilistic models be applied?

- Use math to describe the hypotheses that children might have about things.
- Systematically relate the hypotheses to the probability of different patterns of events.
- When children use Bayesian statistical analysis
  - Better than adults on unusual possibilities
  - Instruction → less creativity

Babies look longer at novel or unexpected events than at more predictable ones, and experimenters can use this behavior to figure out what babies expect to happen.
10. Why is the immaturity of human babies important?

**Precocial vs. Altricial**

- **Precocial** ⇒ rely on innate capacities, mature quickly (in some species, immediately after birth)
- **Altricial** ⇒ offspring require extensive care & parental investment (e.g. humans)

“Fundamentally, babies are designed to learn”

Correlation between **intelligence & flexibility** and **immaturity of babies** across animal kingdom
11. Compare the brain of children and the brain of adults.

**Babies' vs. Adults' Brains:**

- Brains of babies are more plastic
- More connections between neurons
- High level of chemicals → easy change
- Lack of prefrontal-control
Quiz Time!

- No talking, signaling, or communicating of any kind.
- Put away your books, notes, computers, phones, etc.
- Pen or pencil is okay (just make sure it’s a black pen and you press hard with a pencil).
- Write your name in the “Name” box, write and circle in your PID, and sign the academic integrity agreement.
- Bubble in this section
- Please have your student ID out when you turn in your quiz!