PSY 407/507 STRUCTURE OF EXPERIENCE IN HUMAN DEVELOPMENT SPRING 2018

SYLLABUS

Class meets TH 2-3:50 PM Straub 257

INSTRUCTOR
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COURSE OVERVIEW

What is the structure of early human experience and how do regularities in what babies see, hear, and do matter for the developing system? Recent innovations in wearable technology (e.g., child-friendly head cameras and audio recorders) and analytics are making it possible to capture some basic statistical facts about the everyday experiences of young children. In this seminar, we will survey classic ideas about the role of the environment in human development as well as recent empirical discoveries about regularities in language and vision that are available to infants and toddlers. As we grapple with questions about how to capture and characterize the experienced structure, we will draw inspiration from psychology, linguistics, and computer science. Our larger goal will be to think together about how detailed measures of the way that experiences repeat, change and accrue over time provide mechanistic insight into how people build and use knowledge.

COURSE MATERIALS

All materials will be provided as PDF files on our Canvas site.

INSTRUCTION PHILOSOPHY

This is a graduate-level seminar. I expect you to treat this collegial seminar as you would any professional endeavor -- prepare, engage, and deliver. Throughout the course, you should be engaging with the material and using class meetings as opportunities to develop and refine your thinking with colleagues. Your efforts will help you build skills in critical reading, discussing, and implementing next steps in research that matters to you. I expect that you are excited to grapple with the content and plan to make the most of this opportunity to broaden and deepen your research expertise and skills. Welcome.

EXPECTATIONS & GRADING

Your job is to do the reading, prepare for and participate in class discussions, get involved in the material and hone your research design skills. If you are taking this course for one credit, your grade will be based on in-class participation. If you are taking this course for three credits, your grade will be based on in-class participation and writing a research proposal that matters to you.

Readings. Expect to dedicate considerable time outside of class to the readings -- it will be both demanding and rewarding. You are expected to complete the assigned readings before class and to take an active role in the class. Your best bet is to grapple with the issues presented in the readings before and during class.

*Notes: (1) The set of readings in this course is designed to prompt interdisciplinary thinking and discussion -- you will not understand 100% of every reading and that is OK (nobody can be an expert on all topics!). Many insights will emerge from discussion. (2) Most weeks, we will divide & conquer -- not all students will be expected to read all assigned papers.

Research proposal (applies only to students earning 3 credits). You will write a research proposal about a topic that matters to you. You will propose original research. The goal is for you to leave with a top-notch proposal that will be maximally useful to your (under)graduate career. We will discuss specific guidelines and expectations together. Please talk to me early in the quarter (no later than April 26, 2018) to develop a plan.

Participation. As researchers-in-training, you engage in intellectual discussion and debate with colleagues. This class will help you practice and improve these skills. You are expected to attend class and participate in class discussions. For each class, your participation (plus/minus) will be noted.

To earn an "A" for participation, you must earn a "plus" in at least 9 class sessions.
To earn a "Pass" for participation, you must earn a "plus" in at least 7 class sessions.

Your best bet is to attend every class and contribute to the discussions. On Canvas, you will be able to see the "plus/minus" that you earn for each class. Please note that neither of the following things automatically earns you a "plus": showing up, opening your mouth. You must thoughtfully engage with the material. One strategy that will help you prepare to fully participate in discussions with your colleagues is to write down three questions based on the reading(s) that you'd like to discuss.

No. Plus earned (of 10 sessions)	participation grade		
9	A	[100]	
8	B	[89]	
7	C	[79]	PASS
6	D	[69]	
<6	F	[50]	

FINAL LETTER GRADE
To earn 1 credit, your final letter grade will be your participation grade.

To earn 3 credits, your final letter grade will be:
In-class participation 85%; Research proposal 15%

FAQ

What if I miss a class?
We have ten scheduled class meetings. You decide how to best earn the number of "plus" participation marks for the grade that you'd like. No questions asked.

If you have a professional scheduling conflict (e.g., a conference to attend) and you'd like to earn participation for the class session, tell Dr. Fausey at least one week in advance and you can agree on a written assignment. With the exception of extreme and unforeseen circumstances, contacting Dr. Fausey on the day of (or after) a missed class will be considered an unexcused absence and will result in no earned participation. Each class session is designed with you in mind. Your best strategy is to show up and reap the benefits.

What if I turn in an assignment late?
If you submit an assignment after its due date, your grade on the assignment will be reduced by 50%. This is true whether you submit your assignment 1, 2, 3, 4, or 5 days late. After 5 days, late work will no longer be accepted without some documented medical or family emergency. Your best strategy is to submit assignments on time.

Do you grade on a curve? Offer extra credit?
No, I do not grade on a curve. No, I do not offer extra credit. Your best strategy is to focus your energy on doing your best on all of your work.

ACADEMIC HONESTY
The short version: Don't cheat. Don't plagiarize. If you are unsure, please ask me.

As a member of the university community you are expected to be honest and forthright in all of your academic endeavors. To falsify the results of one's research, to present the words, ideas, data, or work of another as one's own, or to cheat on an examination corrupts the essential process by which knowledge is advanced.

All work submitted in this course must be your own and produced exclusively for this course. The use of sources (ideas, quotations, paraphrases) must be properly acknowledged and documented.

One form of academic misconduct is cheating. Among other definitions, it is considered cheating if you lie to Dr. Fausey about a class absence or absence/delay relating to an assignment.

Another form of academic misconduct is plagiarism, or using someone else's ideas and words without appropriate citation on a written assignment. Do not copy from Wikipedia, other college students' papers, scholarly articles, websites, and a host of other sources. In this course, all submitted work will be checked by VeriCite. Do not attempt plagiarism because you will be caught. Plagiarism is academic misconduct and cases of plagiarism will be treated as such.

Please note that it is mandatory for instructors to report suspected academic misconduct to the Office of Student Conduct. For the consequences of academic dishonesty, refer to the Schedule of Classes published quarterly. Violations will be taken seriously and are noted on student disciplinary records.

For more information regarding academic honesty and the student conduct code at the University of Oregon, visit the University's Office of Student Life website at: https://studentlife.uoregon.edu/conduct

STATEMENT FOR STUDENTS WITH DISABILITIES
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact UO Accessible Education Center.

DISCLAIMER
This syllabus is an outline of the course and its policies, which may be changed for reasonable purposes during the quarter at the instructor's discretion. You will be notified in class and/or via email if any changes are made to this syllabus and an updated syllabus will be provided on Canvas.

Date	Description	Readings
April 5	**Group Discussion:** What is structure? What kinds of structure(s) matter for what kinds of developmental change?	
April 12	**How does the environment matter for developmental change? Some classics.**	West & King, 1987 Gottlieb, 1991
April 19	**Infants can learn from structure**	sequences Saffran et al., 1996; Kirkham et al., 2002 cross-modal co-occurrence Smith & Yu, 2008; Vlach & Sandhofer, 2011 distributions Casenhiser & Goldberg, 2005; Oakes & Spalding, 2007; Perry et al., 2010
April 26	**Structure in the lab vs. wild**	Lee, Cole, Golenia, & Adolph, 2017 Tamis-LeMonda et al., 2017
May 3	**Structure in language** (there is a deep literature on this topic, that we won't have time to discuss! these papers provide an opportunity to compare & contrast recent methods, theorizing, & kinds of structure)	Weisleder & Fernald, 2013 Roy et al., 2015 Abney et al., 2017 Montag et al., 2018
May 10	**Structure in vision**	egocentric views in the lab Smith, Yu, & Pereira, 2011; Franchak et al., 2011 egocentric views in the wild Jayaraman et al., 2015; Fausey et al., 2016; Clerkin et al., 2017; Smith et al., 2018
May 17	**Insights about structure & learning across different systems**	infants & robots Cangelosi & Schlesinger, 2018; Oudeyer, 2017 infants & machine learning Smith & Slone, 2017; Bambach et al., 2016 humans, monkeys, & deep neural nets Rajalingham et al., 2018
May 24	**The curious case of non-uniform distributions** **Part 1: instance types & tokens**	overview (language) Piantadosi, 2014 computer vision Salakhutdinov et al., 2011; Zhu et al., 2014 infant vision -- already discussed, May 10 infant music Mendoza & Fausey, in prep *Group discussion: How should these distributions matter for learning? (we've read some relevant papers in prior classes, and there is lots more to hypothesize!)

May 31	**The curious case of non-uniform distributions** **Part 2: structure in time**	From our friendly neighborhood physicists Barabasi, 2005; Goh & Barabasi, 2008 Infant language, vision, and music Falk & Kello, 2017; Abney et al., in prep; Mendoza & Fausey, in prep *Group discussion: How should these distributions matter for learning?
June 7	**So you want to design a study. . .** **Methodological issues in measuring & manipulating structure in infants' environments**	Measuring Adolph & Robinson, 2011; Tomasello & Stahl 2004; Smith et al., 2015; Montag et al., 2018 Manipulating Suskind et al., 2016; Pickron et al., 2017

Reading List

Note: One quarter is far too little time to cover every relevant and interesting paper on this course topic! Ask me about any topic(s) you are interested in and/or use google scholar to search for lots more!

Abney, D.H., Jayaraman, S., Fausey, C.M., Slone, L.K., & Smith, L.B. (in prep). Developmental changes in the temporal properties of infant visual experiences at multiple timescales: Faces and Hands.

Abney, D. H., Warlaumont, A. S., Oller, D. K., Wallot, S., & Kello, C. T. (2017). Multiple coordination patterns in infant and adult vocalizations. *Infancy*, *22*, 514-539.

Adolph, K. E., & Robinson, S. R. (2011). Sampling development. "Tools of the Trade" section, *Journal of Cognition and Development, 12,* 411-423.

Bambach, S., Crandall, D. J., Smith, L. B., & Yu, C. (2016). Active viewing in toddlers facilitates visual object learning: An egocentric vision approach. In *Proceedings of the 38th Annual Conference of the Cognitive Science Society. Philadelphia, PA*.

Barabasi, A. L. (2005). The origin of bursts and heavy tails in human dynamics. *Nature*, *435*, 207-211.

Cangelosi, A., & Schlesinger, M. (2018). From Babies to Robots: The Contribution of Developmental Robotics to Developmental Psychology. *Child Development Perspectives*. https://doi.org/10.1111/cdep.12282

Casenhiser, D., & Goldberg, A. E. (2005). Fast mapping between a phrasal form and meaning. *Developmental Science*, *8*, 500-508.

Clerkin, E. M., Hart, E., Rehg, J. M., Yu, C., & Smith, L. B. (2017). Real-world visual statistics and infants' first-learned object names. *Phil. Trans. R. Soc. B*, *372*, 20160055.

Falk, S., & Kello, C. T. (2017). Hierarchical organization in the temporal structure of infant-direct speech and song. *Cognition*, *163*, 80-86.

Fausey, C.M., Jayaraman, S., & Smith, L.B. (2016). From faces to hands: Changing visual input in the first two years. *Cognition*, *152*, 101-107.

Franchak, J. M., Kretch, K. S., Soska, K. C., & Adolph, K. E. (2011). Head-mounted eye-tracking: A new method to describe infant looking. *Child Development, 82*, 1738-1750.

Goh, K. I., & Barabási, A. L. (2008). Burstiness and memory in complex systems. *EPL (Europhysics Letters)*, *81*, 48002.

Gottlieb, G. (1991). Experiential canalization of behavioral development: Theory. *Developmental Psychology, 27*, 4-13.

Jayaraman, S., Fausey, C.M., & Smith, L.B. (2015). The faces in infant-perspective scenes change over the first year of life. *PLoS One, 10*, e0123780.

Kirkham, N. Z., Slemmer, J. A., & Johnson, S. P. (2002). Visual statistical learning in infancy: Evidence for a domain general learning mechanism. *Cognition*, *83*, B35-B42.

Kurumada, C., Meylan, S. C., & Frank, M. C. (2013). Zipfian frequency distributions facilitate word segmentation in context. *Cognition*, *127*, 439-453.

Lee, D. K., Cole, W. G., Golenia, L., & Adolph, K. E. (2017). The cost of simplifying complex developmental phenomena: A new perspective on learning to walk. *Developmental science*. e12615. https://doi.org/10.1111/desc.12615.

Mendoza & Fausey (in prep). TBD.

Montag, J. L., Jones, M. N., & Smith, L. B. (2018). Quantity and diversity: Simulating early word learning environments. *Cognitive science*. https://doi.org/10.1111/cogs.12592

Oakes, L. M., & Spalding, T. L. (1997). The role of exemplar distribution in infants' differentiation of categories. *Infant Behavior and Development*, *20*, 457-475.

Oudeyer, P. Y. (2017). What do we learn about development from baby robots?. *Wiley Interdisciplinary Reviews: Cognitive Science*, *8*(1-2).

Perry, L. K., Samuelson, L. K., Malloy, L. M., & Schiffer, R. N. (2010). Learn locally, think globally: Exemplar variability supports higher-order generalization and word learning. *Psychological science*, *21*, 1894-1902.

Piantadosi, S.T. 2014). Zipf's law in natural language: a critical review and future directions. *Psychonomic Bulletin and Review.*

Rajalingham, R., Issa, E. B., Bashivan, P., Kar, K., Schmidt, K., & DiCarlo, J. J. (2018). Large-scale, high-resolution comparison of the core visual object recognition behavior of humans, monkeys, and state-of-the-art deep artificial neural networks. *bioRxiv*, 240614.

Pickron, C. B., Iyer, A., Fava, E., & Scott, L. S. (2017). Learning to Individuate: The Specificity of Labels Differentially Impacts Infant Visual Attention. *Child development*. https://doi.org/10.1111/cdev.13004

Roy, B. C., Frank, M. C., DeCamp, P., Miller, M., & Roy, D. (2015). Predicting the birth of a spoken word. *Proceedings of the National Academy of Sciences*, *112*, 12663-12668.

Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science*, *274*(5294), 1926-1928.

Salakhutdinov, R., Torralba, A., & Tenenbaum, J. (2011, June). Learning to share visual appearance for multiclass object detection. In *Computer Vision and Pattern Recognition (CVPR)* (pp. 1481-1488). IEEE.

Smith, L. B., Jayaraman, S., Clerkin, E., & Yu, C. (2018). The Developing Infant Creates a Curriculum for Statistical Learning. *Trends in cognitive sciences, 22,* 325-336.

Smith, L. B., & Slone, L. K. (2017). A developmental approach to machine learning?. *Frontiers in psychology*, *8*, 2124.

Smith, L. B. & Yu, C. (2008). Infants rapidly learn word-referent mappings via cross-situational statistics. *Cognition, 106,* 1558-1568.

Smith, L. B., Yu, C., & Pereira, A. F. (2011). Not your mother's view: The dynamics of toddler visual experience. *Developmental science, 14*, 9-17.

Smith, L.B., Yu, C., Yoshida, H., & Fausey, C.M. (2015). Contributions of head-mounted cameras to studying the visual environments of infants and young children. *Journal of Cognition and Development*, *16,* 407-419.

Suskind, D. L., Leffel, K. R., Graf, E., Hernandez, M. W., Gunderson, E. A., Sapolich, S. G., ... & Levine, S. C. (2016). A parent-directed language intervention for children of low socioeconomic status: A randomized controlled pilot study. *Journal of child language*, *43*, 366-406.

Tamis-LeMonda, C. S., Kuchirko, Y., Luo, R., Escobar, K., & Bornstein, M. H. (2017). Power in methods: Language to infants in structured and naturalistic contexts. *Developmental science*, *20*, 1-14. doi: 10.1111/desc.12456

Tomasello, M., & Stahl, D. (2004). Sampling children's spontaneous speech: how much is enough?. *Journal of child language*, *31*, 101-121.

Vlach, H. A., & Sandhofer, C. M. (2011). Developmental differences in children's context-dependent word learning. *Journal of experimental child psychology*, *108*, 394-401.

Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science, 24*, 2143-2152.

West, M. J., & King, A. P. (1987). Settling nature and nurture into an ontogenetic niche. *Developmental psychobiology*, *20*, 549-562.

Zhu, X., Anguelov, D., & Ramanan, D. (2014). Capturing long-tail distributions of object subcategories. In *Computer Vision and Pattern Recognition (CVPR).* IEEE.