Cognition: Methods and Models

PSYC 2040

L11: Social Cognition

Part 1

logistics: what's coming up

14	April 25 (Tuesday)	L11: Social Cognition
14	April 27 (Thursday)	Guest Lecture: Dr. Marta Stojanovic
14	April 30 (Sunday)	**Project Milestone 5: First Draft due**
15	May 2 (Tuesday)	L12: Judgment and Decision Making + L7-L12 Review
15	May 4 (Thursday)	**Assessment 2**
16	May 9 (Tuesday)	Wrapping up + Project presentations
16	May 14 (Sunday)	**Project Milestone 6: Final Project due**

logistics: assessment

- practice assessment 2
  - questions + answers will be available this weekend
  - 40 multiple-choice + 10 short-answer for practice
  - actual exam will have 30 multiple-choice + 5 short-answer
  - equation sheet will be provided
  - calculator not needed but you are welcome to bring one
- L12 (judgment and decision making; May 2)
  - conceptual reflection is optional
  - Qs on exam will focus on simple concepts

logistics: office hours + survey

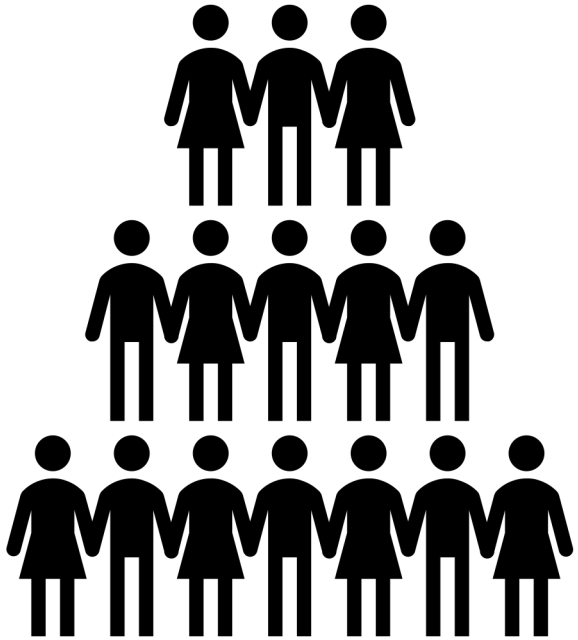
- Matt's office hours
  - Mon/Wed 7-8 pm, Kanbar 200
  - review sessions: May 1 and May 3
- My office hours
  - none this week
  - next week:
    - Tuesday (10-11 am, 3-5 pm)
    - Thurs (9-10 am, 11-1 pm)
    - Fri (11.30-1 pm)
    - virtual by appointment (email me!)
- April/May extra credit survey opens next week (Monday)
  - due May 7

recap: Apr 18/20, 2023

- what we covered:
  - key debates in language research
  - statistical learning, co-occurrence, and language models
- your to-dos were:
  - *finish*: L10 quiz/assignment
  - *work on:* project milestone #3
  - *read*: L11 reading

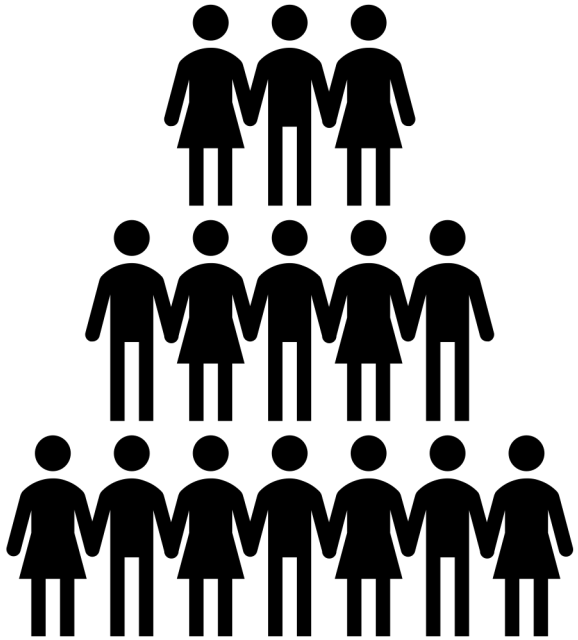
today’s agenda

- social cognition
- mechanisms of social learning
  - imitation
  - inference



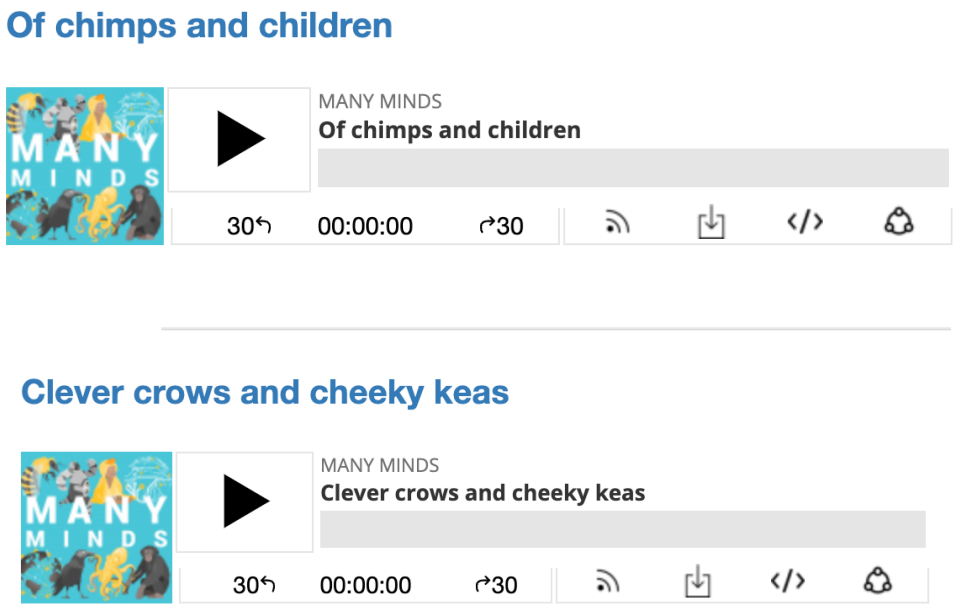
key questions in social cognition

- social cognition is a field that studies how people process, store, and retrieve information in social contexts
- many questions:
  - how do we learn from others?
  - how do we interpret communicative signals?
  - how do we teach?
  - how do we collaborate/compete/cooperate?



social learning

- social learning = learning from others
- humans do this, but so do chimpanzees, crows, bumblebees, and fish!
- but, humans appear to have harnessed social learning for complex purposes, e.g., developing and managing systems and institutions



mechanisms: imitation

- imitation, or copying others, is considered a fundamental mechanism for social transmission

faithful imitation

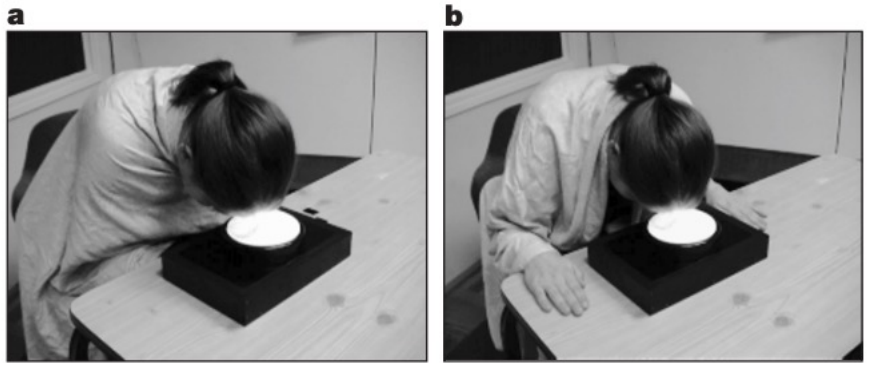
- Meltzoff (1988) tested 14-month-old infants
- first session, three conditions:
  - imitation: presented with six target actions
  - baseline control: no exposure to the toys or actions
    - why?
  - manipulation control: other non-target actions
    - why?
- second session: 1 week delay
  - 20 seconds to play with six objects
- infants in the imitation condition produced more target behaviors than baseline or manipulation control conditions

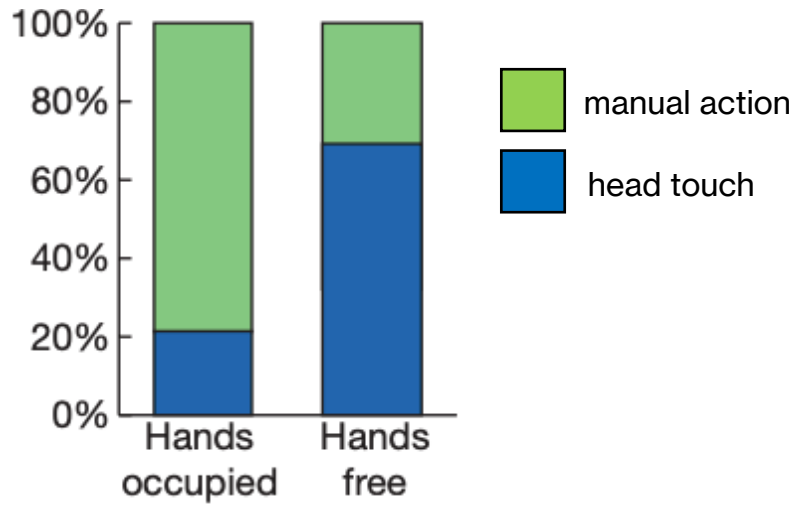
Proportion of Subjects Producing Each Target Act as a Function of the Test Condition

	Test condition		
Target act	Baseline ($n = 12$)	Adult-manipulation ($n = 12$)	Imitation ($n = 12$)
Head touching	.000	.000	.667
Object pulling	.167	.250	.833
Button pushing	.667	.750	.833
Egg shaking	.083	.083	.250
Hinge folding	.333	.417	.750
Bear dancing	.000	.167	.083
M	.208	.278	.569

rational imitation

- Gergely, Bekkering and Király (2002) modified the original Meltzoff study
  - hands-free condition
  - hands-occupied condition
- logic?
- infants imitated the head touch in the hands-free condition, but to a much lesser degree in the hands-occupied condition
- inference: infants were rationalizing whether or not the head touch was necessary to turn on the light: a selective, inferential process





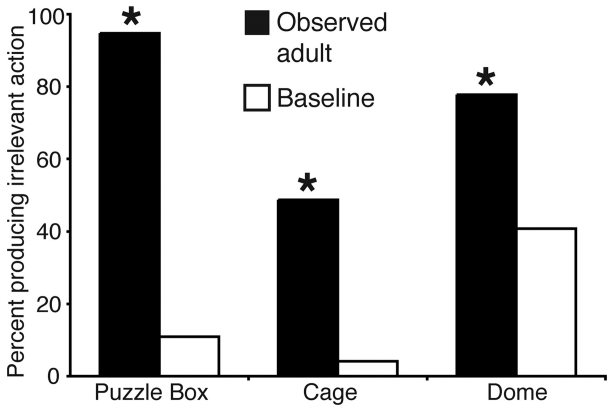
overimitation

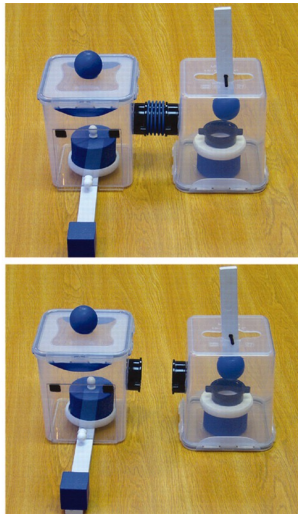
- Lyons, Young, and Keil (2007) tested 3-5-year-olds on a set of relevant (necessary) and irrelevant (unnecessary) actions that led to opening a box
- children were trained to distinguish between relevant and irrelevant actions using familiar objects
- children were then tested on novel objects

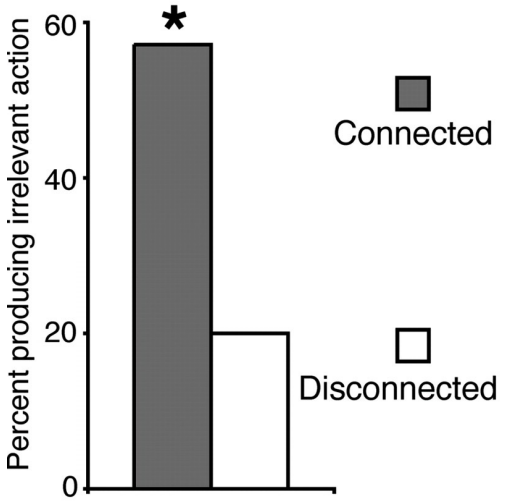
overimitation: test

overimitation

- children repeated the irrelevant actions for all objects, despite training
- follow-ups:
  - took away the pressure of test: same pattern
  - explicitly instructed to avoid irrelevant actions: same pattern
  - violate causal connection: overimitation more in the connected igloo compared to the disconnected igloo
- inference: overimitation is driven by causal reasoning and not simply social motivation or curiosity

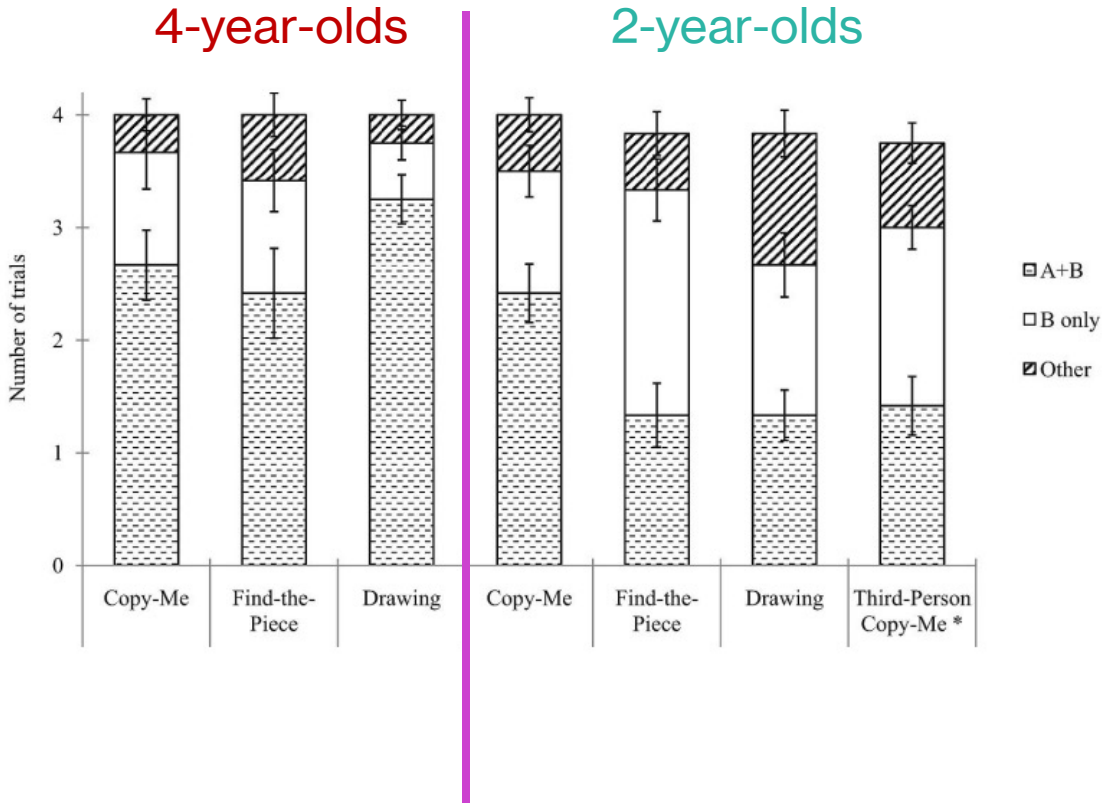






selective vs. faithful imitation

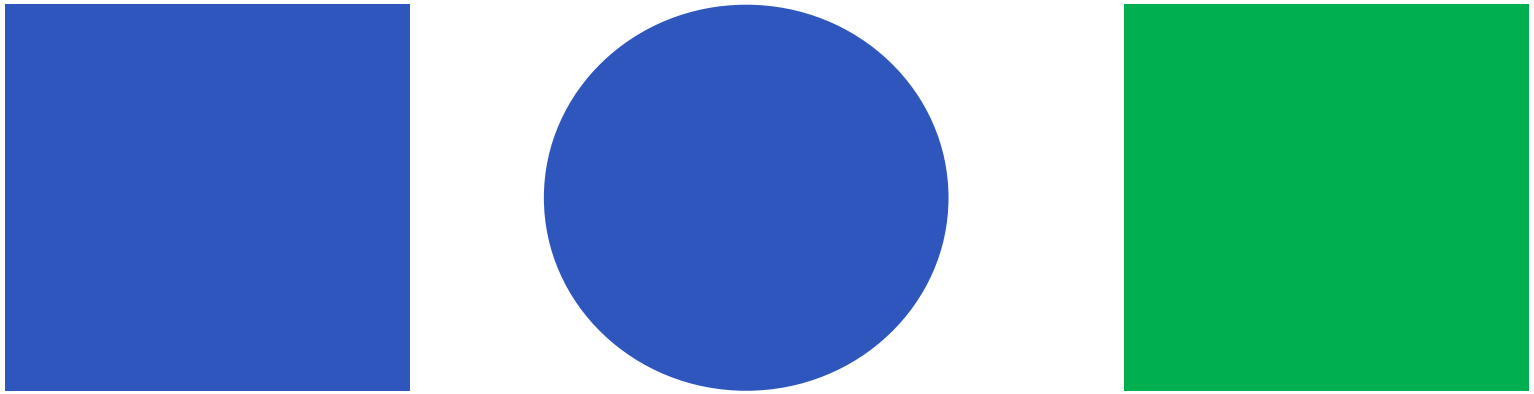
- Yu and Kushnir (2014) tested two and four-year-olds in an imitation game
  - familiarization
  - prior game conditions: copy-me (mimicry), find-the-piece (instrumental), or drawing (non-interactive control)
  - imitation task
- 2-year-olds imitated selectively after an instrumental game vs. mimicry game, whereas 4-year-olds faithfully imitated across all conditions
- inference: children are sensitive to causally relevant information, but older children may be more aware of normative actions/ritual/artifacts



mechanisms: inference

- a more recent theory frames social learning as inferential reasoning
- key idea: humans learn by drawing inferences from observation and interaction with others
- this is not easy!

an inference game!



Frank and Goodman (2012)

BLUE

which shape am I referring to?

blue square

0%

blue circle

0%

green square

0%

pragmatic inference

BLUE 

- if I wanted to communicate the blue circle:
  - I could just say “circle”
- if I wanted to communicate the green square:
  - I could just say “green” or “square”
- pragmatic inference: what a speaker did not say conveys as much information as what they did say
- modeling inference:
  - ground truth > literal listener > pragmatic speaker > pragmatic listener

Frank and Goodman (2012)

modeling inference

	blue square	blue circle	green square
blue	1	1	0
circle	0	1	0
square	1	0	1
green	0	0	1

ground truth
records whether a label refers to an object or not

Frank and Goodman (2012)

literal listener choices

	blue square	blue circle	green square
blue	0.5	0.5	0
circle	0	1	0
square	0.5	0	0.5
green	0	0	1

literal listener uses ground truth to make decisions about objects using a given label by scaling for each label

Frank and Goodman (2012)

literal listener probabilities

	blue square	blue circle	green square
blue	0.5	0.5	0
circle	0	1	0
square	0.5	0	0.5
green	0	0	1

literal listener uses ground truth to make decisions about objects using a given label

Frank and Goodman (2012)

pragmatic speaker choices

	blue square	blue circle	green square
blue	0.5	0.5	0
circle	0	1	0
square	0.5	0	0.5
green	0	0	1

pragmatic speaker uses literal listener to assess the value of different labels given a target object

Frank and Goodman (2012)

pragmatic speaker probabilities

	blue square	blue circle	green square
blue	0.5	0.5	0
circle	0	1	0
square	0.5	0	0.5
green	0	0	1

pragmatic speaker uses literal listener to assess the value of different labels given a target object

Frank and Goodman (2012)

pragmatic speaker probabilities

	blue square	blue circle	green square
blue	0.5	0.33	0
circle	0	0.67	0
square	0.5	0	0.33
green	0	0	0.67

pragmatic speaker uses literal listener to assess the value of different labels given a target object

Frank and Goodman (2012)

pragmatic listener choices

	blue square	blue circle	green square
blue	0.5	0.33	0
circle	0	0.67	0
square	0.5	0	0.33
green	0	0	0.67

pragmatic listener uses pragmatic speaker to assess the most likely object given a label

Frank and Goodman (2012)

pragmatic listener probabilities

	blue square	blue circle	green square
blue	0.60	0.40	0
circle	0	1	0
square	0.60	0	0.40
green	0	0	1

pragmatic listener uses pragmatic speaker to assess the most likely object given a label

Frank and Goodman (2012)

inference = recursive thinking

ground truth

	blue square	blue circle	green square
blue	1	1	0
circle	0	1	0
square	1	0	1
green	0	0	1

literal listener

	blue square	blue circle	green square
blue	0.5	0.5	0
circle	0	1	0
square	0.5	0	0.5
green	0	0	1

pragmatic speaker

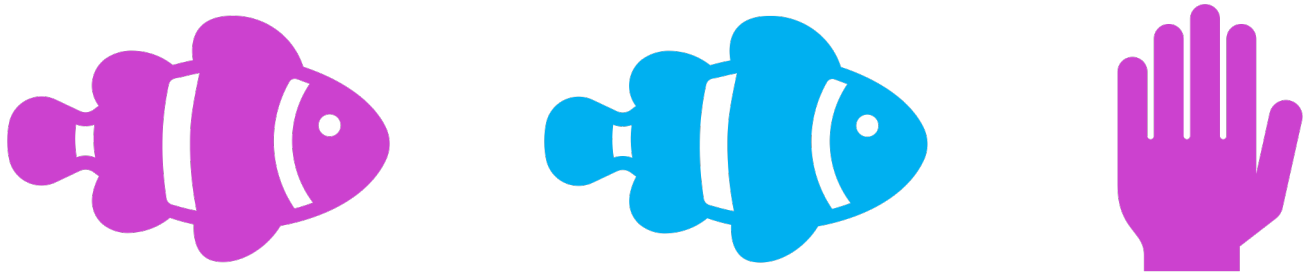
	blue square	blue circle	green square
blue	0.5	0.33	0
circle	0	0.67	0
square	0.5	0	0.33
green	0	0	0.67

pragmatic listener

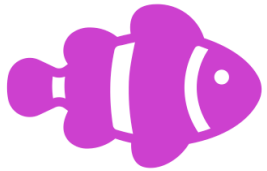
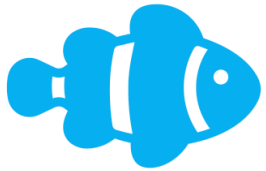
	blue square	blue circle	green square
blue	0.60	0.40	0
circle	0	1	0
square	0.60	0	0.40
green	0	0	1

Frank and Goodman (2012)

inference activity



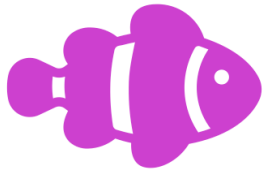
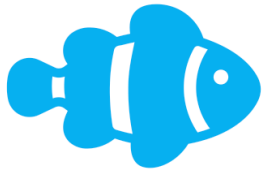
inference activity


- groups of 3
- construct the ground truth table
  - labels: pink/fish/blue/glove
  - objects/referents: pink fish, blue fish, pink glove
- get literal listener probabilities
- get pragmatic speaker probabilities
- get pragmatic listener probabilities

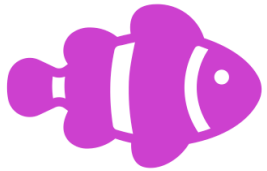
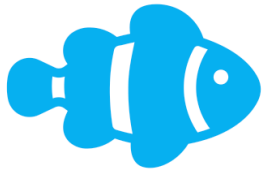
	pink fish	blue fish	pink glove
pink			
fish			
blue			
glove			

ground truth

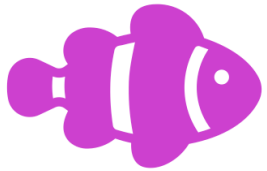
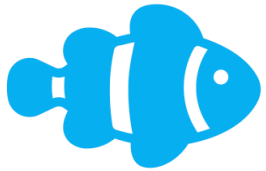

	pink fish	blue fish	pink glove
pink	1	0	1
fish	1	1	0
blue	0	1	0
glove	0	0	1

literal listener

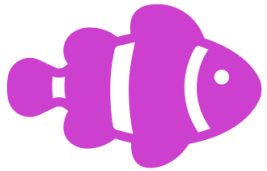
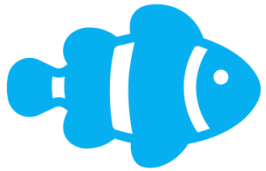

	pink fish	blue fish	pink glove
pink	0.5	0	0.5
fish	0.5	0.5	0
blue	0	1	0
glove	0	0	1

pragmatic speaker


	pink fish	blue fish	pink glove
pink	0.5	0	0.33
fish	0.5	0.33	0
blue	0	0.67	0
glove	0	0	0.67

pragmatic listener


	pink fish	blue fish	pink glove
pink	0.60	0	0.40
fish	0.60	0.40	0
blue	0	1	0
glove	0	0	1

big takeaways

- get in groups of 3 and report key takeaways from today
- takeaways document

next class

- **before** class:
  - *finish:* L11 reading
  - *post*: conceptual reflection
- **during** class:
  - social cognition contd.
  - Dr. Marta Stojanovic!