

LEVANTE: Core Task Design and Details

11/1/2023

Questions

- Battery duration:
 - How much time does each task take?
 - How much time can we save by making tasks adaptive?
- Can we make the interfaces more similar, and otherwise streamline instructions/ergonomics?
 - Avoid long instructions/narratives—modify ROAR tasks?
 - Create short, engaging breaks in-between tasks? (e.g. balloon popping / Fruit Ninja-like game?)

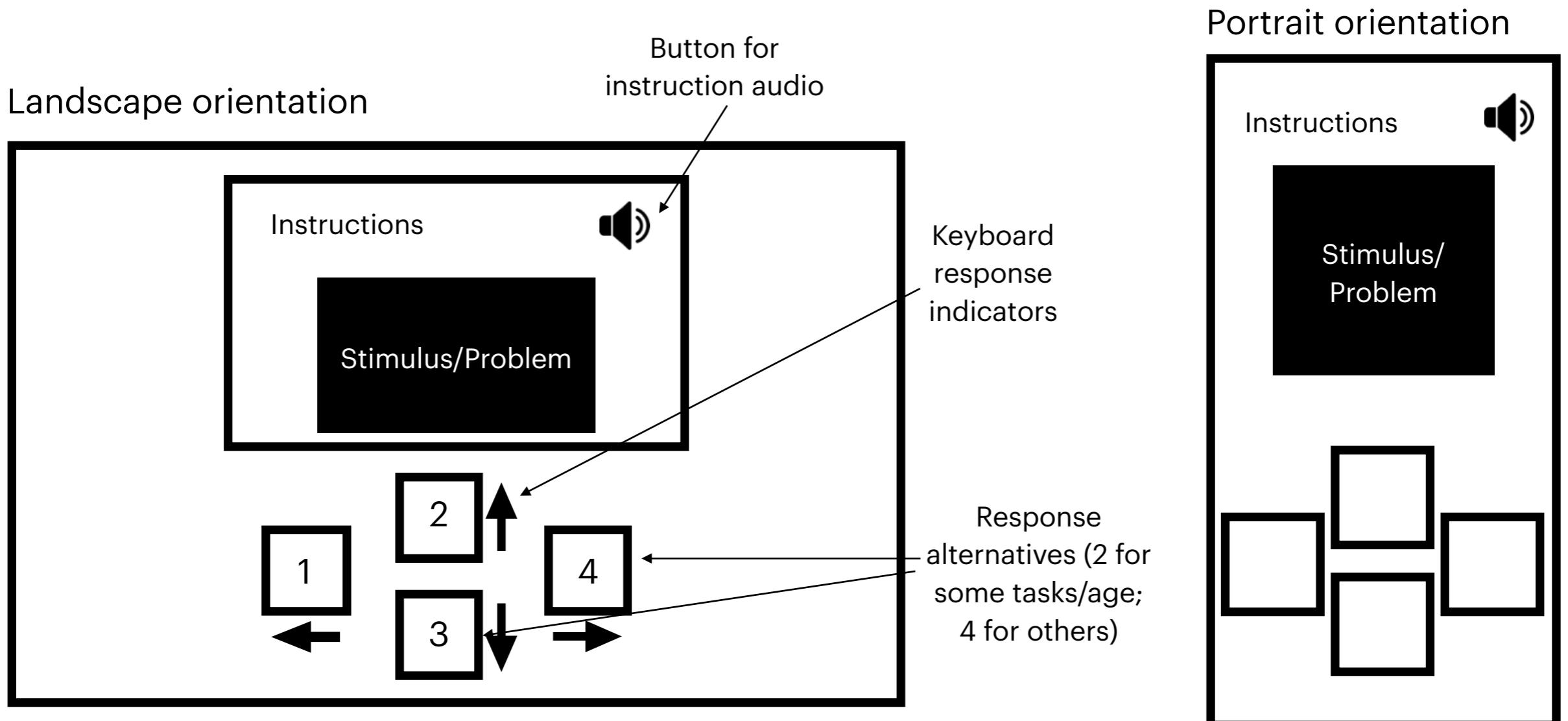
Estimated Task Duration

Skill	Task	Instructions	Trials	Adaptive Trials	Time Per Trial	Original Time	Adaptive Time	% savings	early_stop	task_type
Reasoning	Matrix Reasoning	30	36	10	20	12.50	3.83	69.33	yes	4afc (images stim responses)
EF	Hearts & Flowers	60	62	56	3	4.10	3.80	7.32	yes	2afc (sort of special)
EF	Corsi Block	40	20	10	5	2.33	1.50	35.71	yes	special
EF	Something's the Same	30	24	12	5	2.50	1.50	40.00	yes	2afc (images stim)
EF	MEFS	--	--	--	--	5.00	5.00	--	--	--
Social	Gaze Following					7.50	4.00	46.67	?	
Social	Theory of Mind Battery		25		30	12.50	6.25	50.00	?	
Language	ROAR Vocab	120	90	30	3	6.50	3.50	46.15	yes	
Language	ROAR Single Word Reading	90	76	30	2.5	4.67	2.75	41.07	yes	
Language	ROAR Sentence Comprehension	90	30	15	6	4.50	3.00	33.33	yes	
Math	Number Line Estimation	30	28	12	5	2.83	1.50	47.06	yes	2-4afc (image stim)
Math	EGMA: Number Identification	15	20	10	3	1.25	0.75	40.00	yes	2-4afc
Math	EGMA: Number Discrimination	15	12	6	3	0.85	0.55	35.29	yes	2-4afc
Math	EGMA: Missing number	15	12	6	4	1.05	0.65	38.10	yes	2-4afc
Math	EGMA: Addition (lvl 1 + 2)	15	25	12	5	2.33	1.25	46.43	yes	2-4afc
Math	EGMA: Subtraction (lvl 1 + 2)	15	25	12	6	2.75	1.45	47.27	yes	2-4afc
Spatial	Mental Rotation	30	28	12	3	1.90	1.10	42.11	no	2afc (images stim)
					Total (mins)	75.07	42.38			

Task time estimates: <https://docs.google.com/spreadsheets/d/1OnMKVtxHos8lsKDzFOmoeghmRAFSTsD1-OpPF7wArCU/edit?usp=sharing>

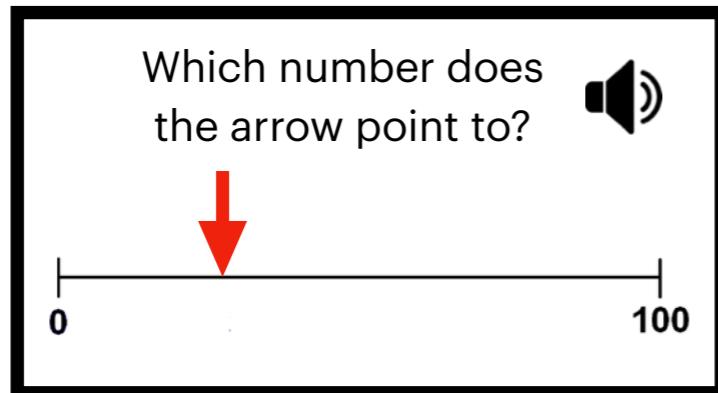
Interface Design

- Standardizing the interface reduces required learning, and reduces bias favoring children with more tablet/computer experience (e.g.: use 2AFC / 4AFC; no open-ended keyboard entry)
- **Desiderata:** support tablet (touch), computer (keyboard + mouse), and phone? (minimum resolution?)—portrait + landscape orientation?



Math: Number Line Estimation

A.

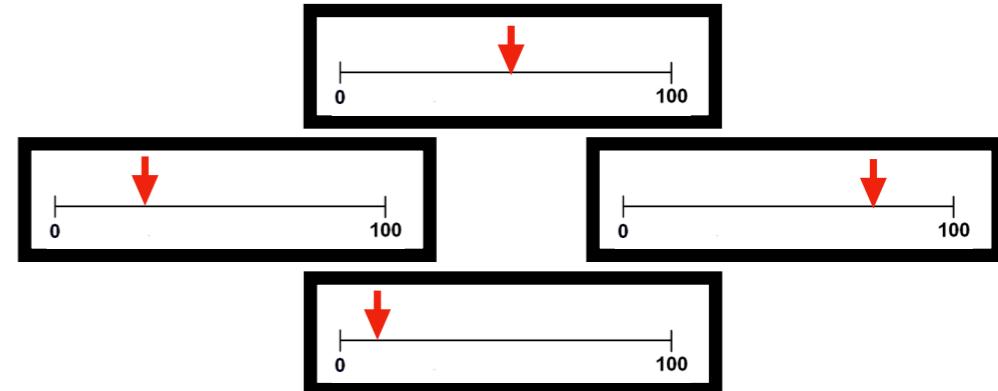


- 10 30 75
50

B.

Choose the number line showing... 

30



Design A most closely matches design of the other core tasks: central stimulus with a prompt, and 4AFC response.

Design C has continuous (>informative) responses—but may require additional task training (tap/drag + “next”), and may advantage kids with prior computer/tablet experience (SES bias).

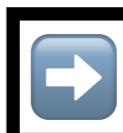
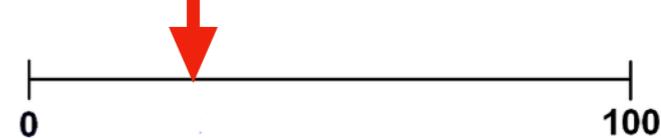
Variant B has the same prompt as C (given #, choose # line), but is only as informative as A (no?) — and the number line options may be quite small on tablets/smartphones.

Task order: 1. Number Identification, 2. Number Comparison, 3. Number Line Estimation — if they fail these, just do 1 problem per subtask

C.

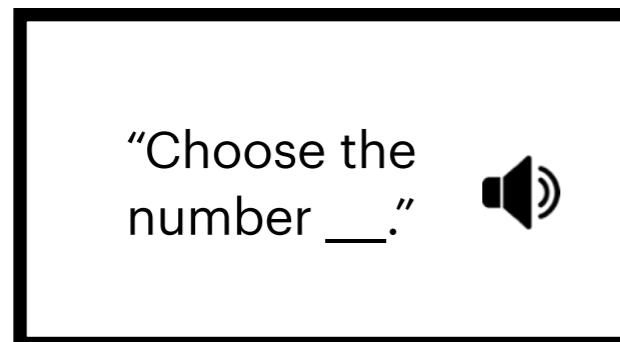
Move the arrow to... 

30



Math: Number Identification (EGMA)

Younger/less skilled
children: 2AFC



8

4

Note: the target number is
only spoken — not written
in the instructions.

Older/more skilled
children: 4AFC

"Choose the number __."

78 35 75
87

Math: Number Comparison (EGMA)

Younger/less skilled
children: 2AFC

Choose the
larger number. 

8

4

Older/more skilled
children: 4AFC

Choose the
largest number. 

78

35

87

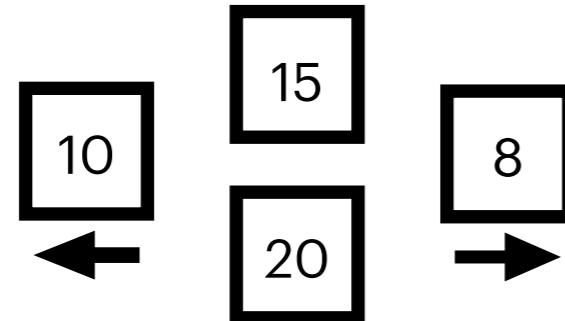
75

Math: EGMA

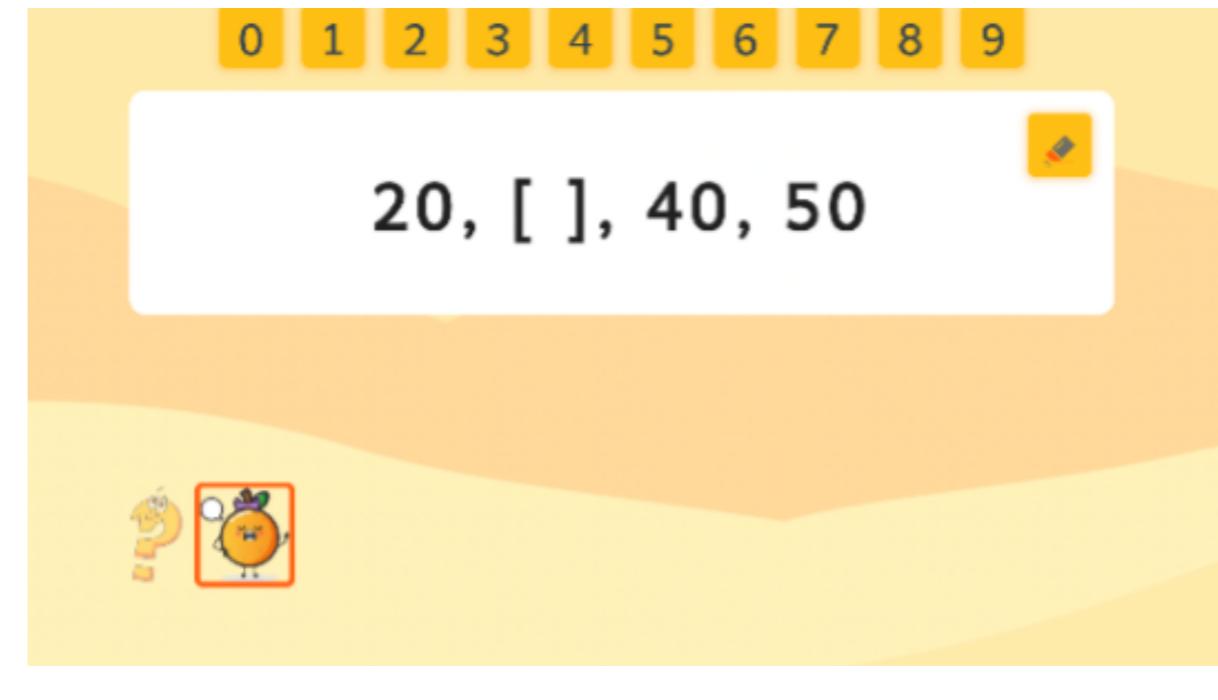
Missing number

Choose the best number
to fill the blank. 

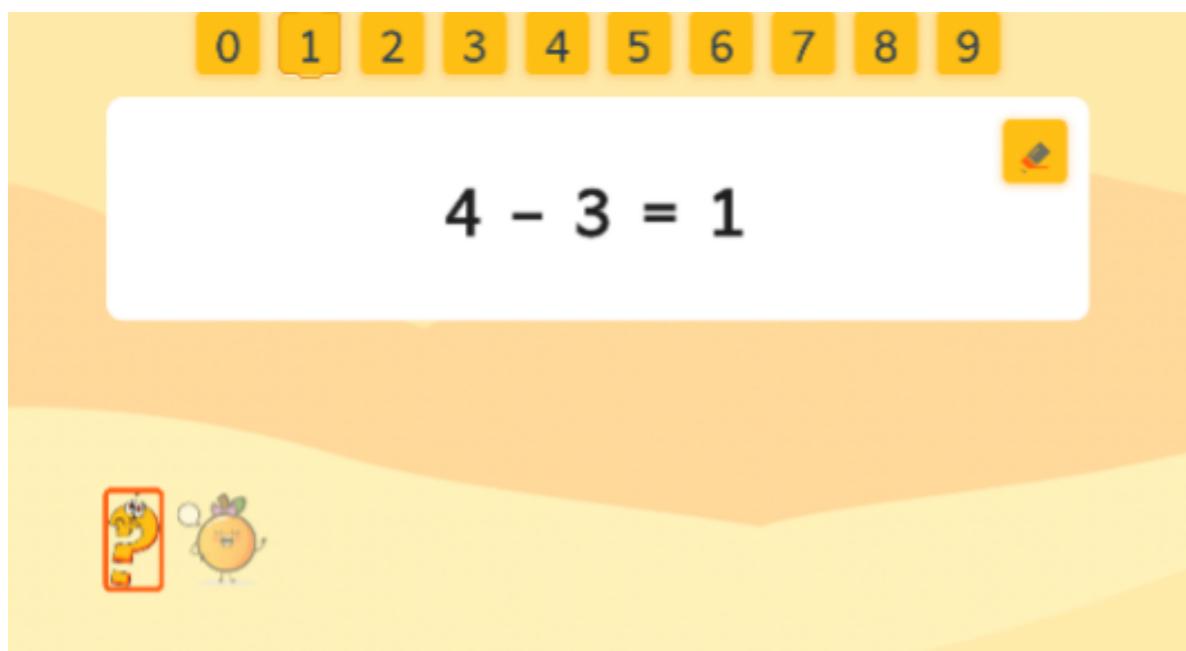
20, __, 40, 50



(Android app)

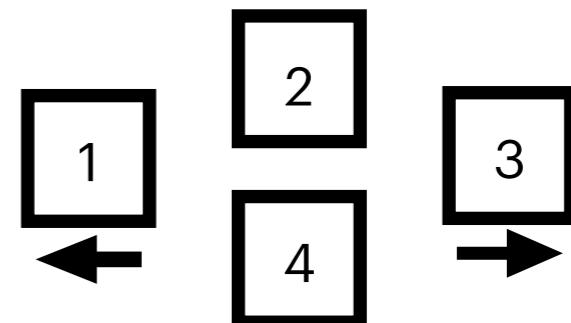


Addition/Subtraction



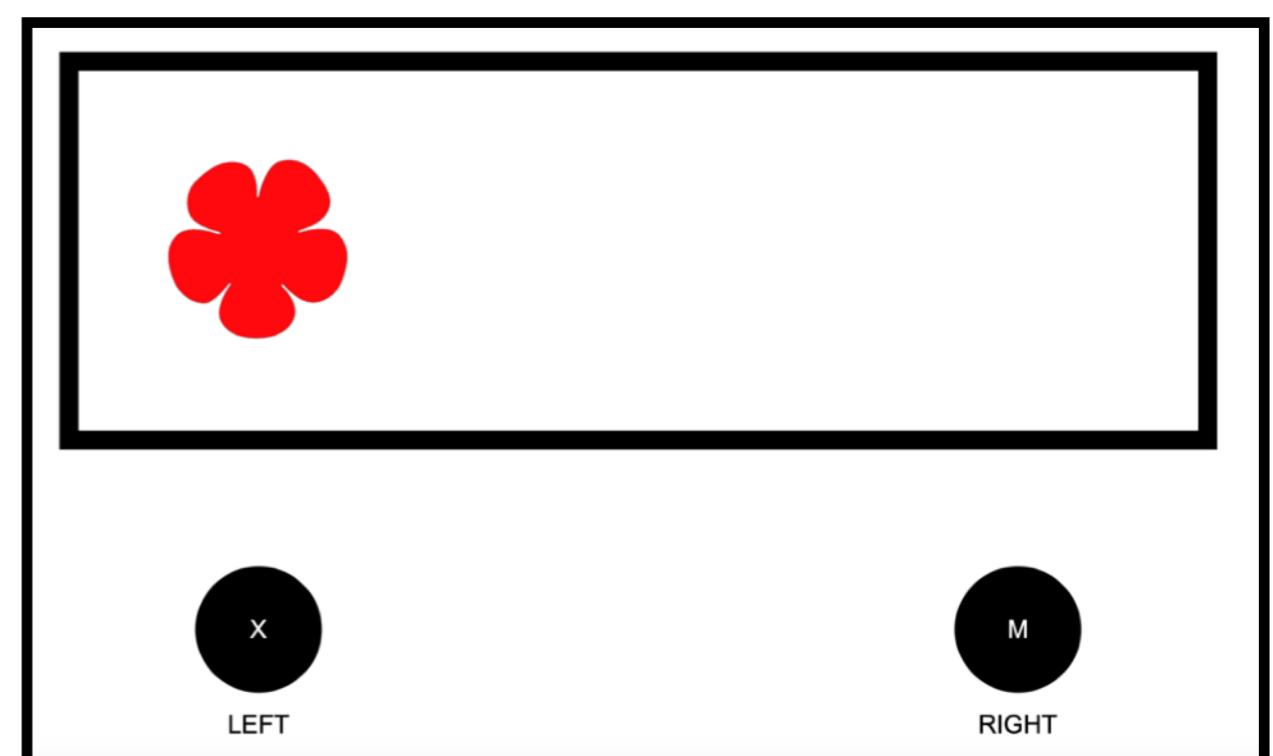
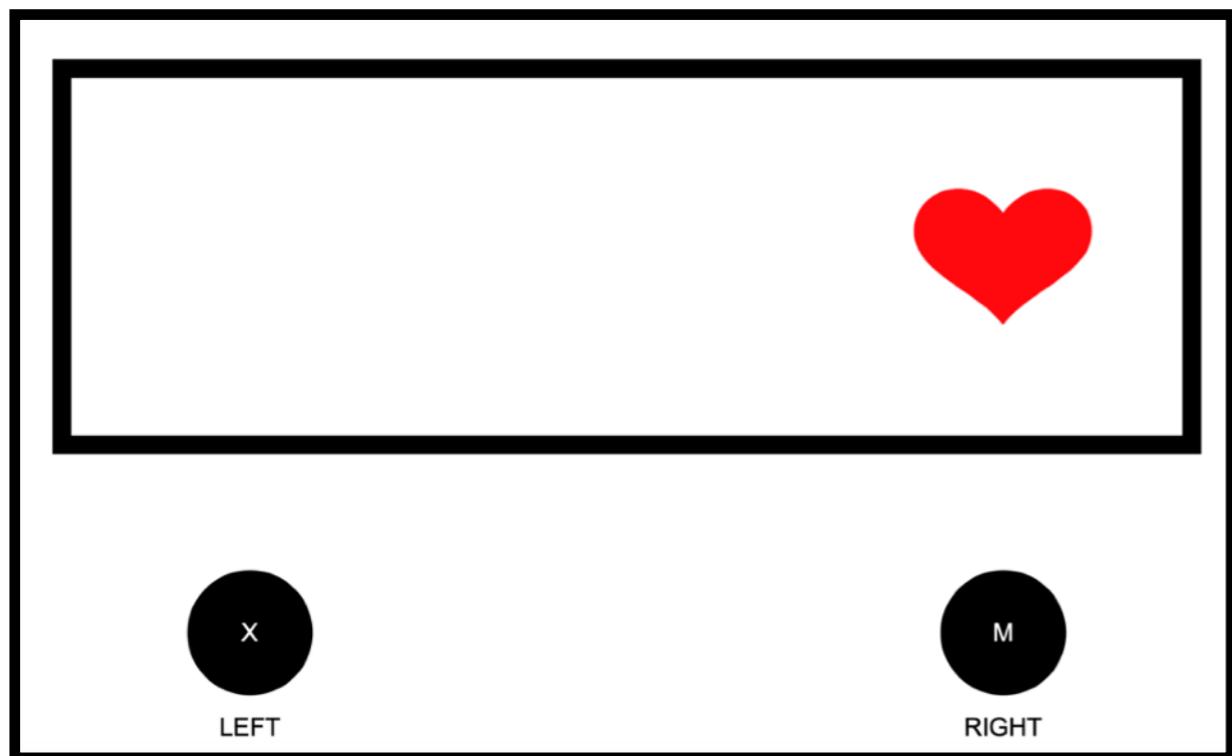
Choose the number
to fill the blank. 

$$4 - 3 = \underline{\quad}$$



EF: Hearts & Flowers

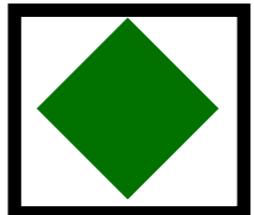
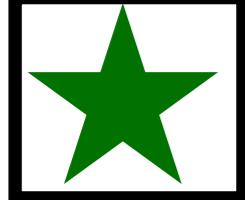
This can be adapted to fit the design, although we may not want to show instructions on every trial—just at the beginning of each block, when the new task is introduced.



EF: Something's the Same

This fits the design (2AFC), although each trial has two phases. Jelena's plan is to also mix in some FIST trials (which are also multi-phase).

Look, these two shapes
are the same **color**.



For stimuli, we'll want to
use a mix of shapes and
animals. (Laura Kuhn can't
share the original stim.)

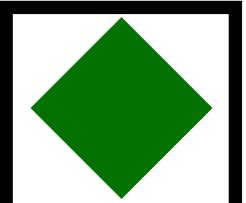
Asked Kat & Michael

Which of the shapes is the
same as this new picture?



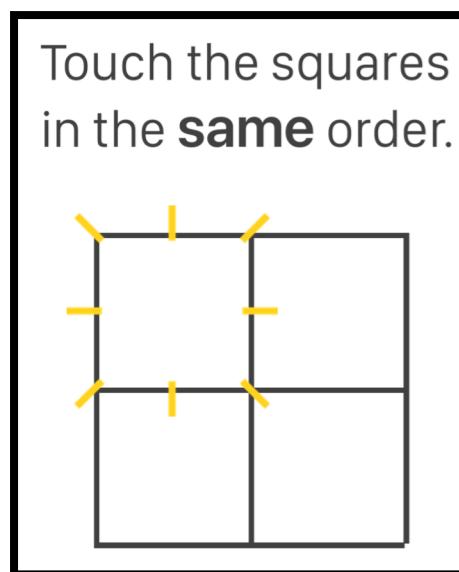
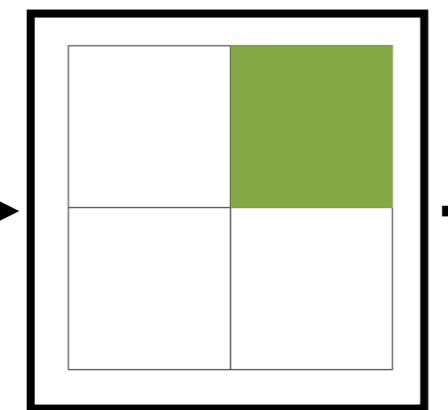
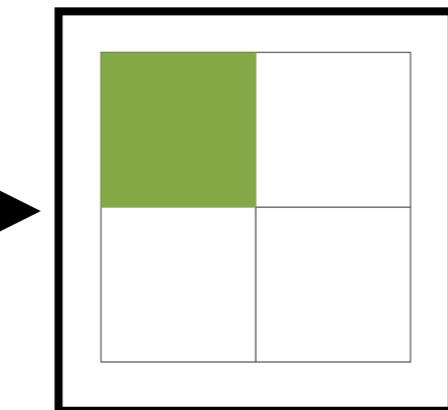
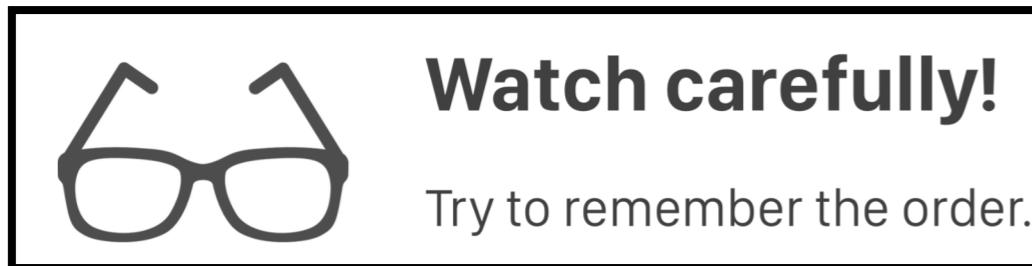
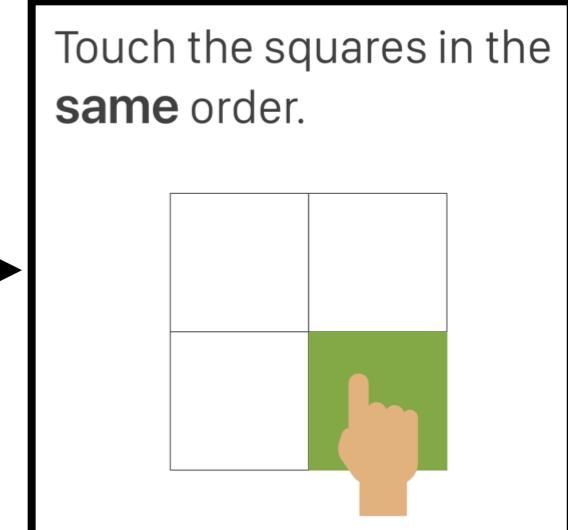
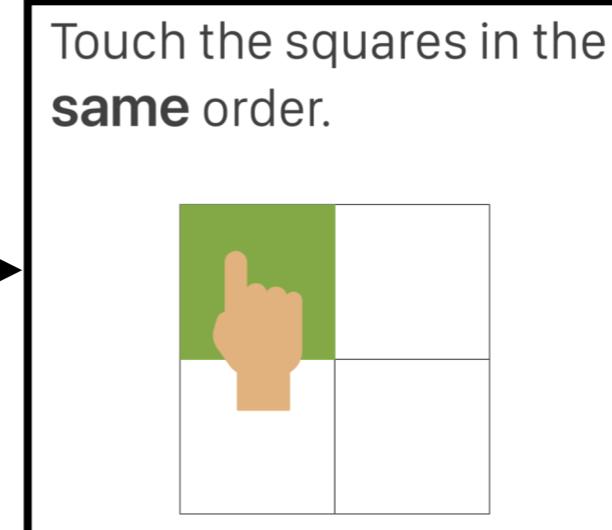
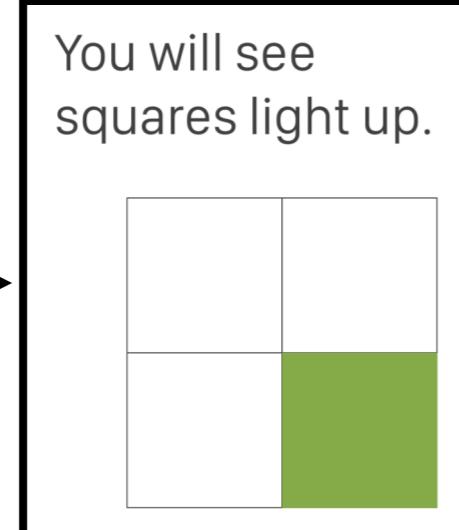
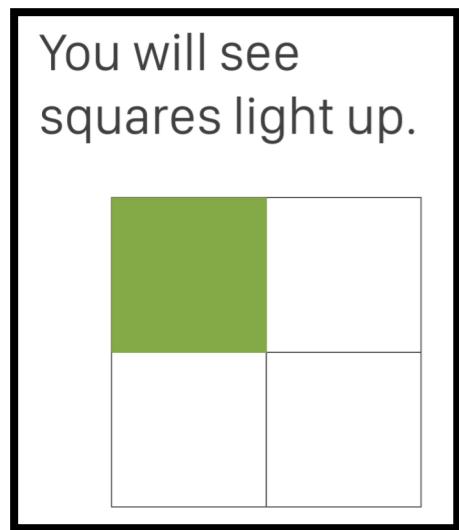
Phase I presents two images and notes similarity
on one dimension (content, color, or size).

Phase II presents a new image similar to one of
the images on a different dimension, and asks
children to select the image that matches it.



EF: Dot Matrix Memory Game

The Corsi/dot matrix memory task 1) does not fit the mAFC design, and 2) requires more instructions.

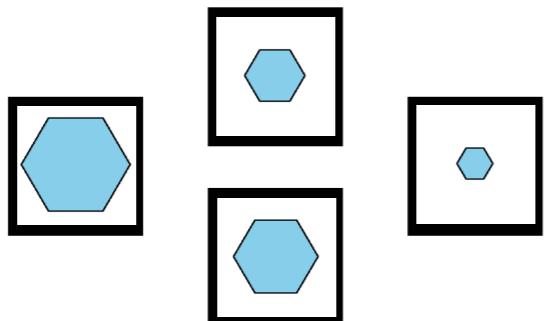
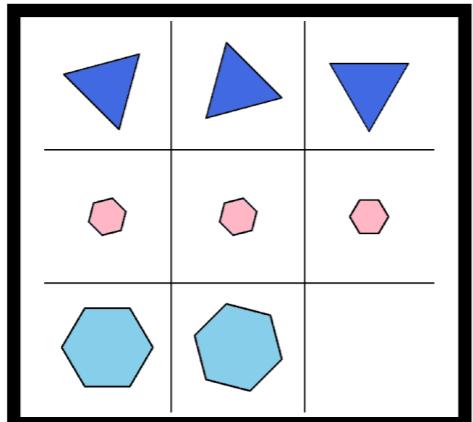


(2 practice trials,
regardless of
correctness)

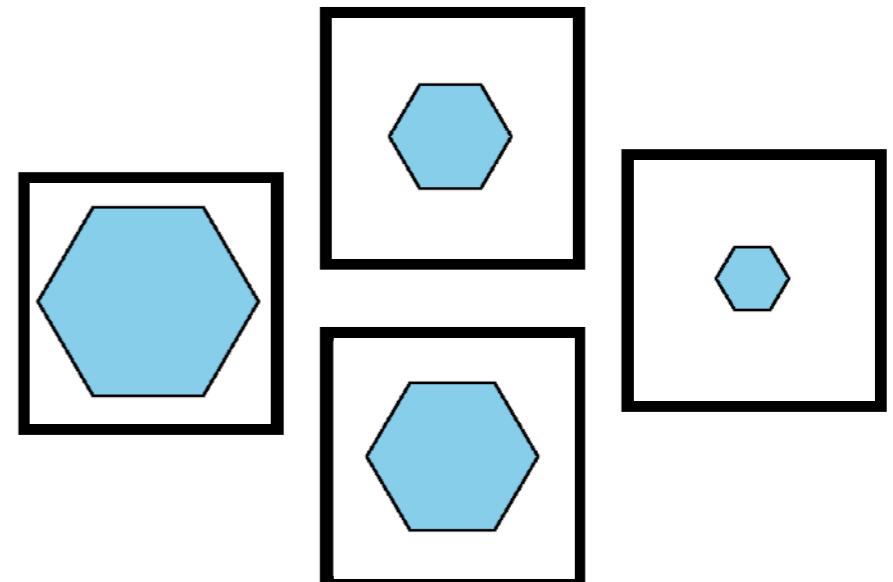
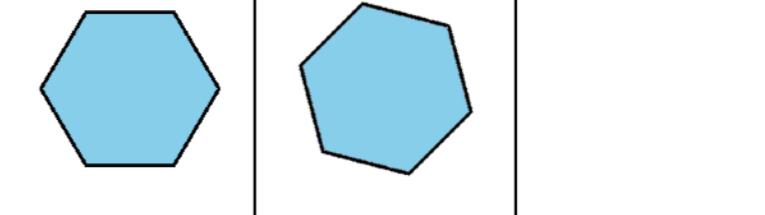
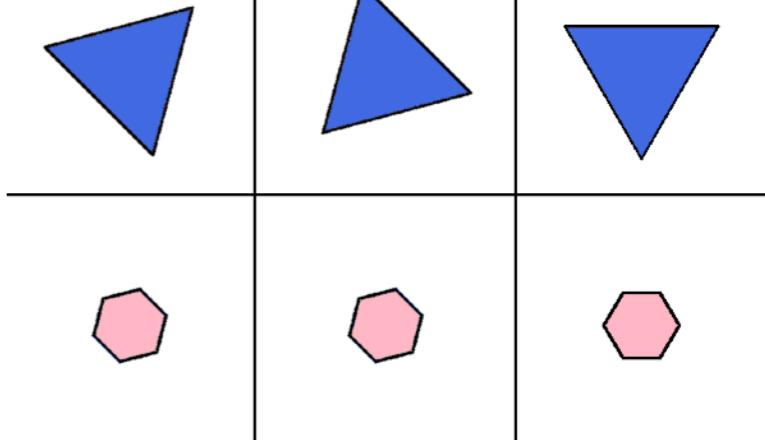


Reasoning: Matrix Reasoning

Choose the best pattern to fill in the blank. 



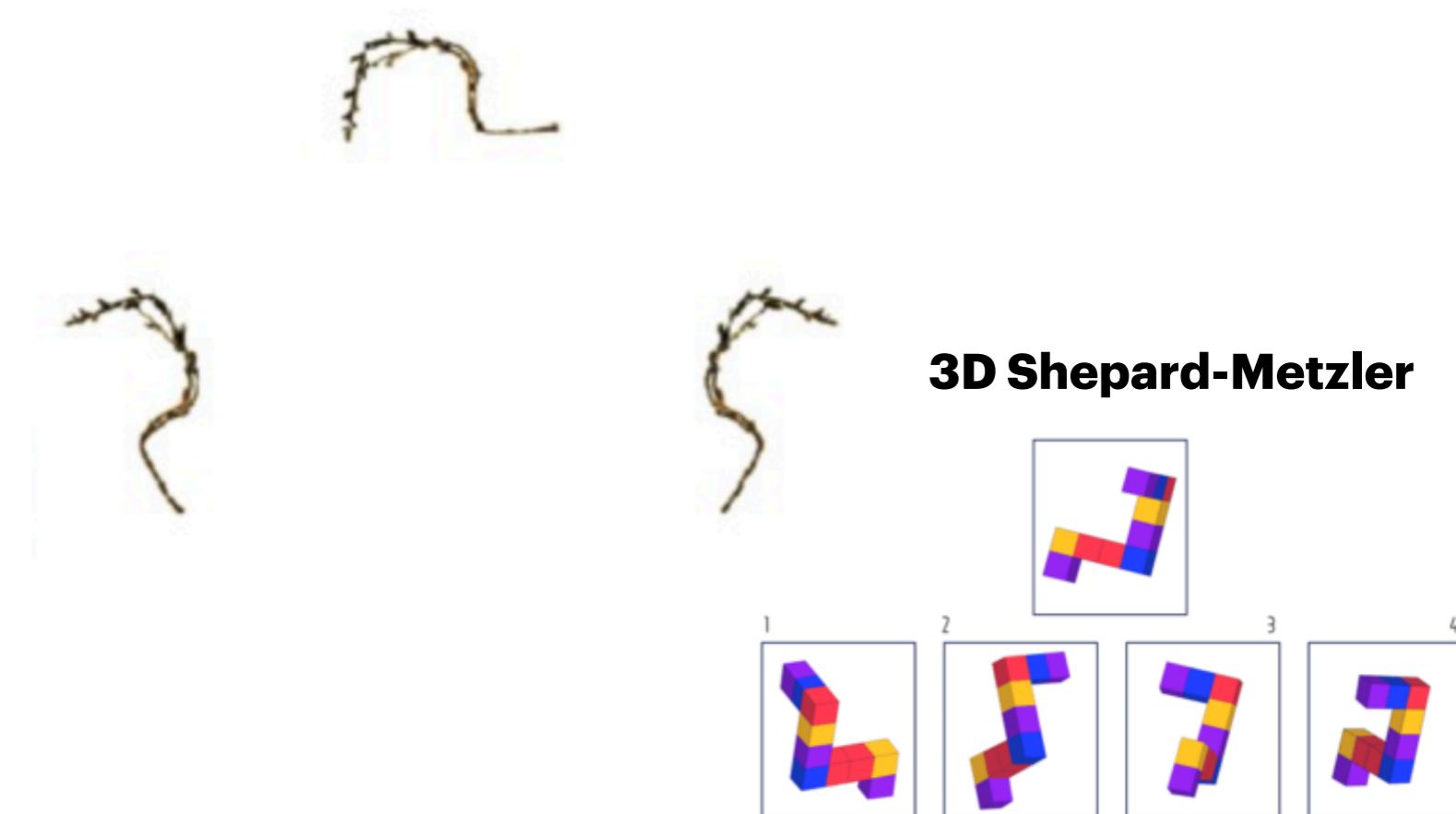
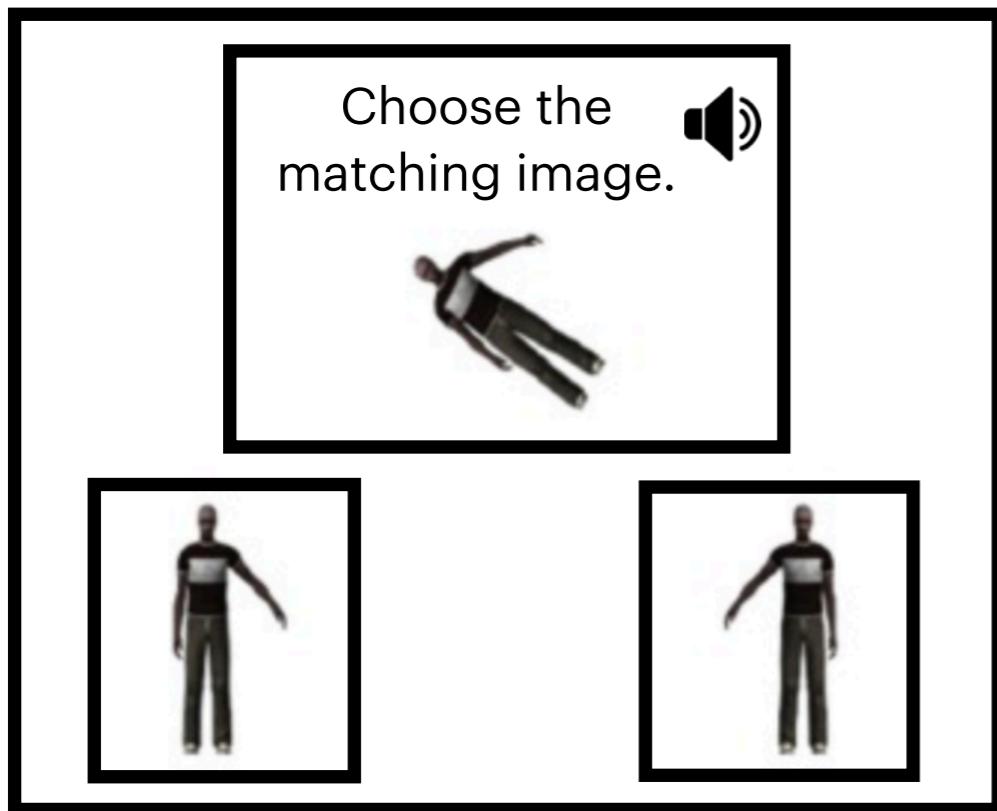
Choose the best pattern to fill in the blank. 



Rogier Kievit and Nick Judd are selecting and piloting stimuli.

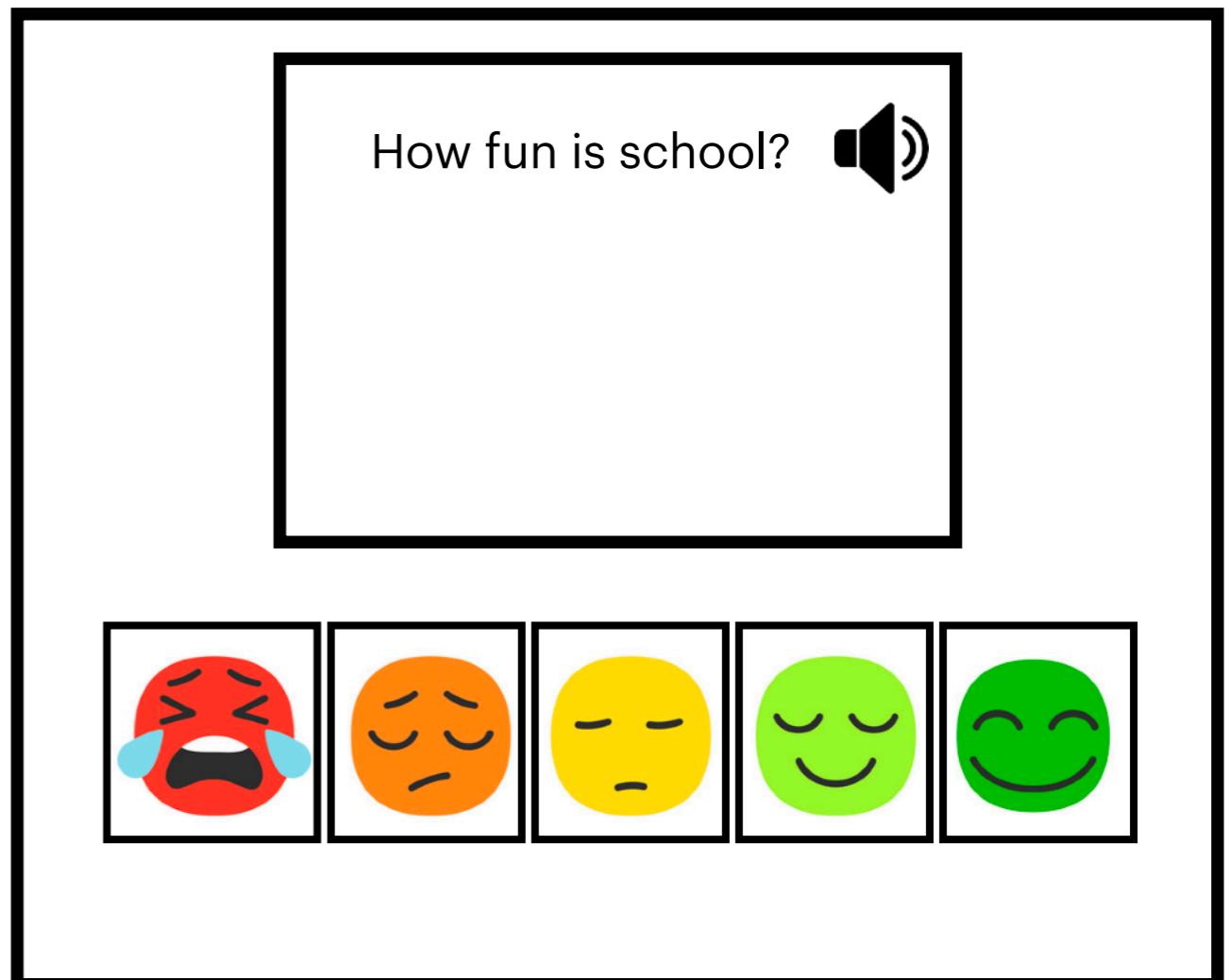
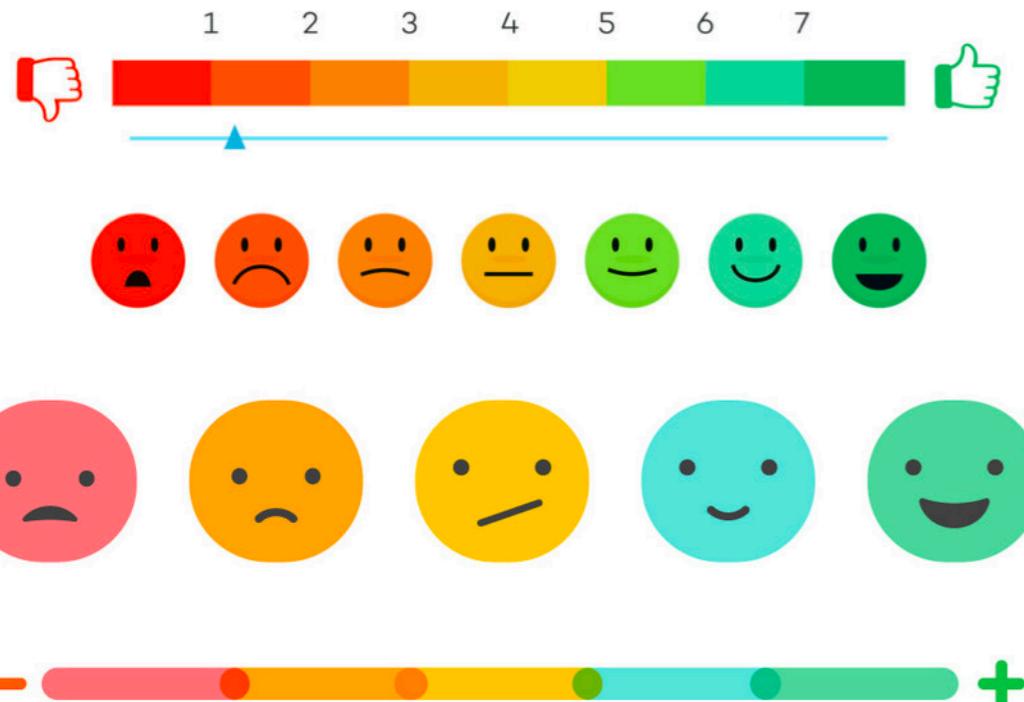
Spatial: Mental Rotation

- 1 animated match-to-sample instruction trial
- 2D: 2AFC, 3 types of stimuli
- 3D: 2AFC or 4AFC?



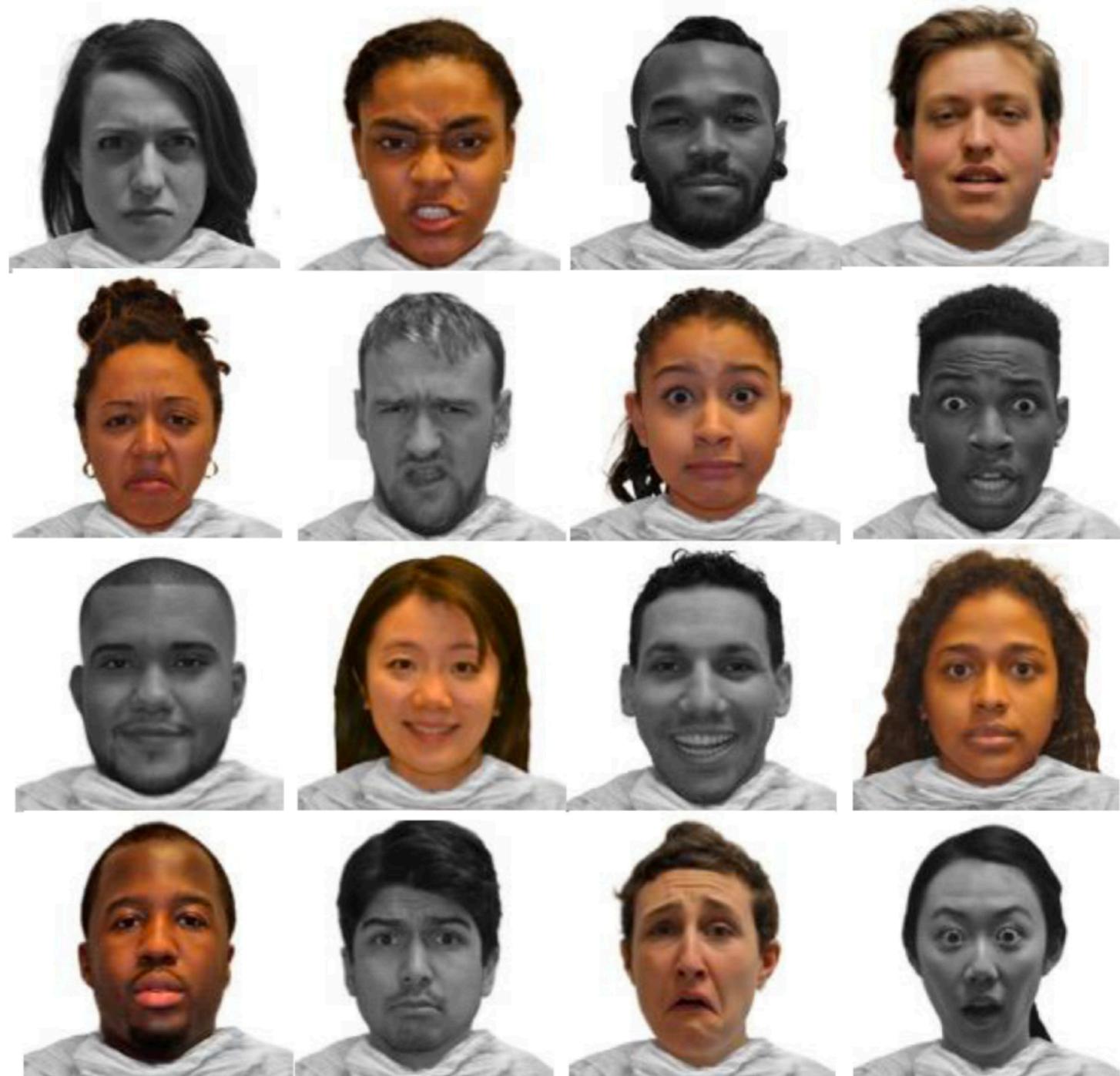
Context: Child Questionnaire

- 2D: 2AFC, 3 types of stimuli
 - Is the scale too odd for some items?
- 3D: 2AFC or 4AFC?
 - "I am good at math."
- Universality of thumbs up/down? Check mark/X?
 - "Does your teacher say nice things about you?"
 - (Are some of these yes/no?)
- Red/green problematic...



Social: Emotion Recognition

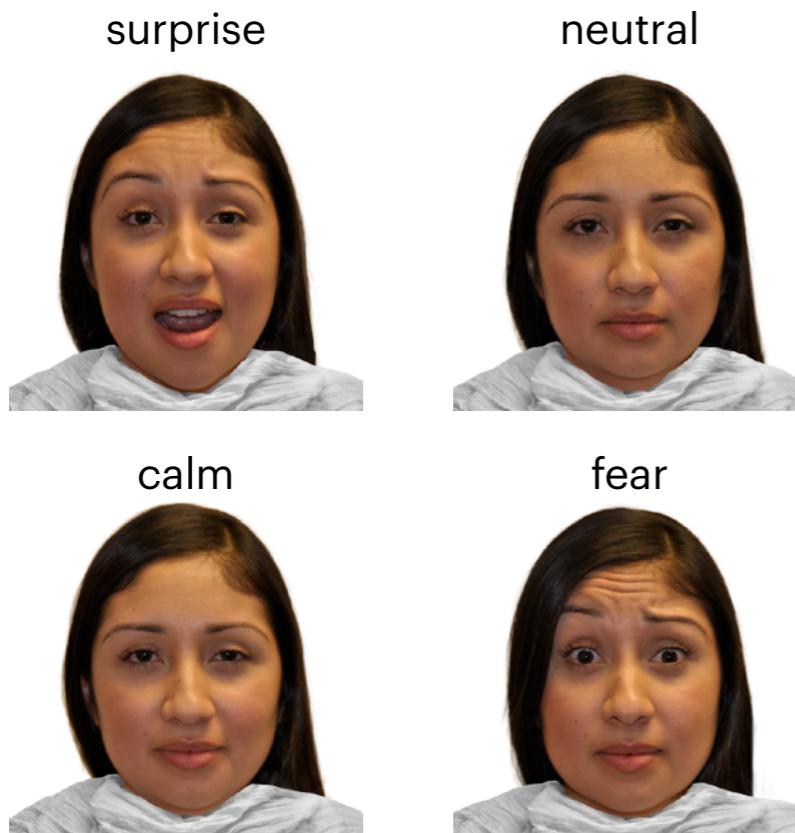
- RADIATE dataset (16 emotions, racially diverse, color / B&W) + parametric noise
- To do 4AFC, do we want to do match-to-sample? Or pick a cued face (e.g. “angry”)?
- All Closed vs. all open?
- Type/amount of noise?
- Subset of the emotions?



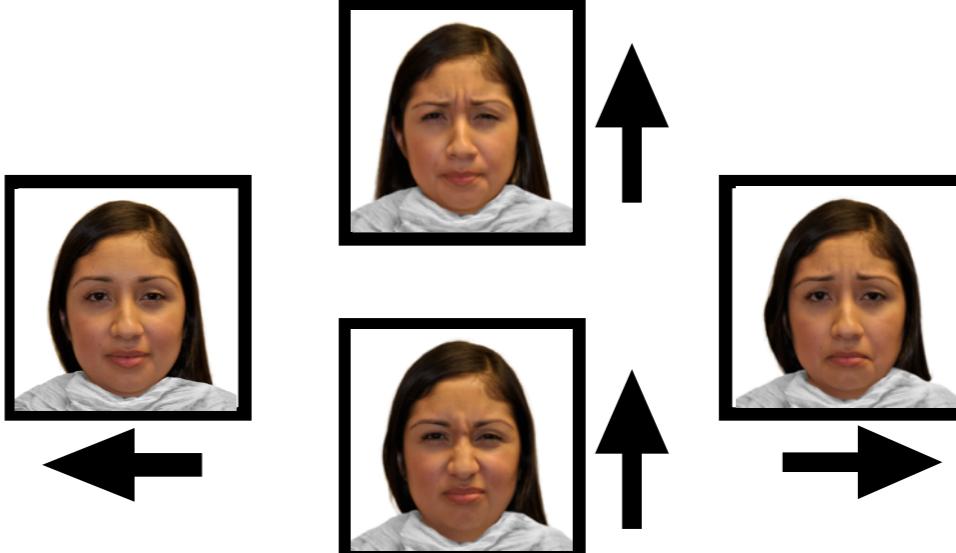
Angry (closed), Angry (open), Calm (closed), Calm (open), Disgust (open), Disgust (closed), Fear (closed), Fear (open), Happy (closed), Happy (open), Happy (exuberant), Neutral (closed), Neutral (open), Sad (closed), Sad (open), Surprise

Social: Emotion Recognition

- Pick the face that matches the emotion (either name (e.g. “angry”) or tone of voice (intermodal match))
- 8 open-/closed-mouth photos per actor available; choose 4 (add noise?)



Which face shows **anger** /  **matches the voice.**

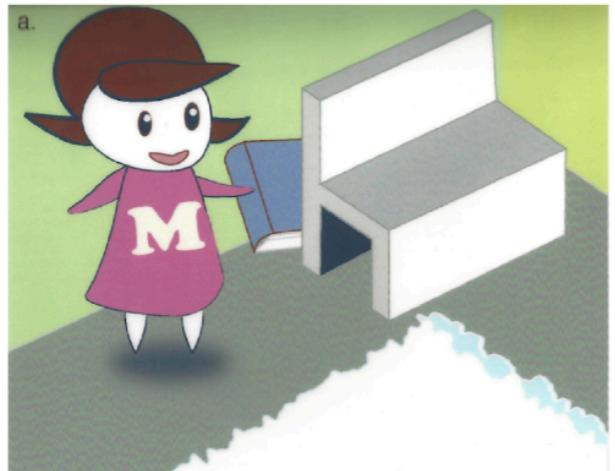


The diagram shows five square headshots of the same woman arranged in two rows. The top row contains one face with an upward-pointing arrow to its right. The bottom row contains four faces: the first with a leftward-pointing arrow below it, the second with an upward-pointing arrow to its right, the third with a rightward-pointing arrow to its right, and the fourth with an upward-pointing arrow to its right. A large black rectangular frame surrounds the text and the bottom row of images.

Social: Theory of Mind

- Narrative slides + 2AFC questions

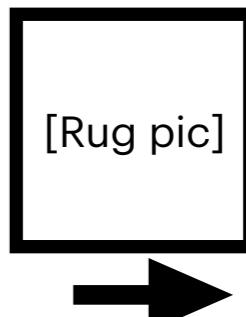
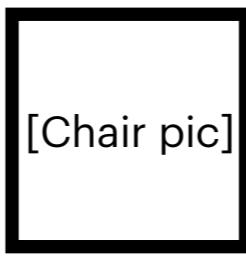
Here is Madison. This morning, Madison put her book behind the chair, because she didn't want anyone to find it.



But when Madison was outside playing, someone did find it! And hid it under the rug.



So now it's reading time and Madison wants her book. Where will Madison look first for her book? Behind the chair or under the rug?



Language: TROG

Test for Reception of Grammar (Bishop, 1983)

- Original TROG: 80 4AFC items, ordered by difficulty
- Recreating stimuli

