

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?)

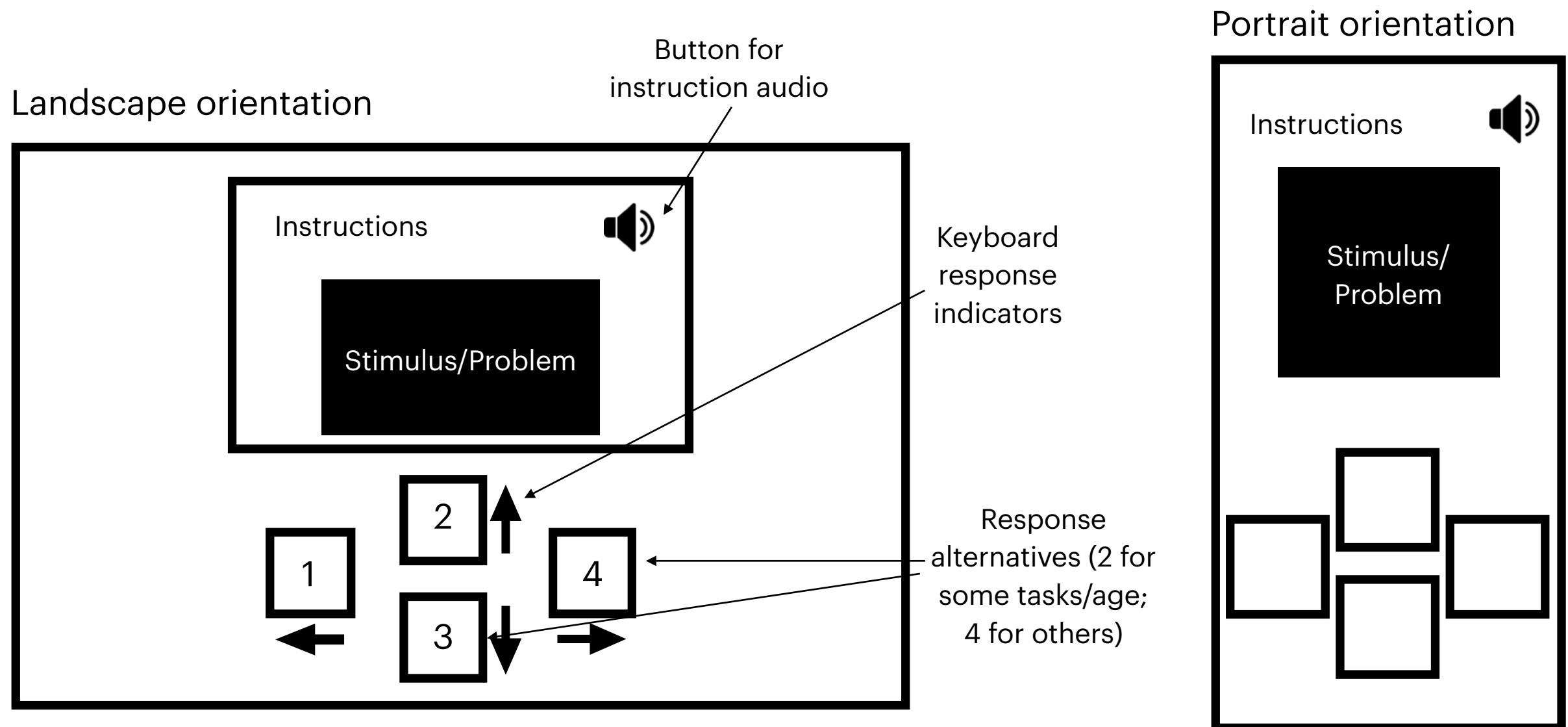
Estimated Task Duration

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/1OnMKVtxHos8lsKDzF0moeghmRAFSTsD1-OpPF7wArCU/edit?usp=sharing>

Interface Design

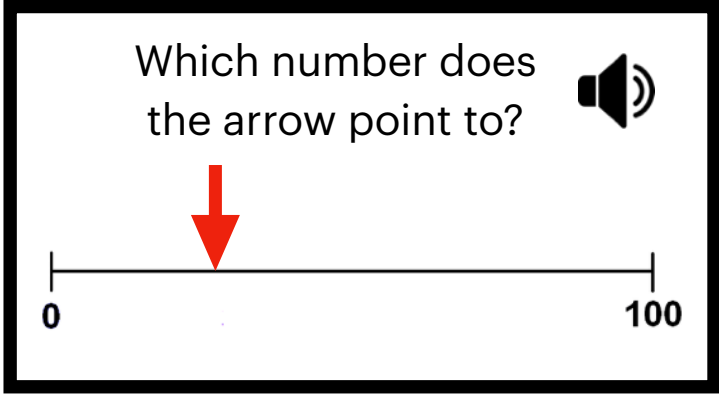
- Standardizing the interface reduces required learning, and reduces bias favoring children with more tablet/computer experience (e.g.: use 2AFC / 4AFC; no open-ended keyboard entry)
- **Desiderata:** support tablet (touch), computer (keyboard + mouse), and phone? (minimum resolution?)—portrait + landscape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



Math: Number Line Estimation

A.

Which number does the arrow point to?



10 30 75 50

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).

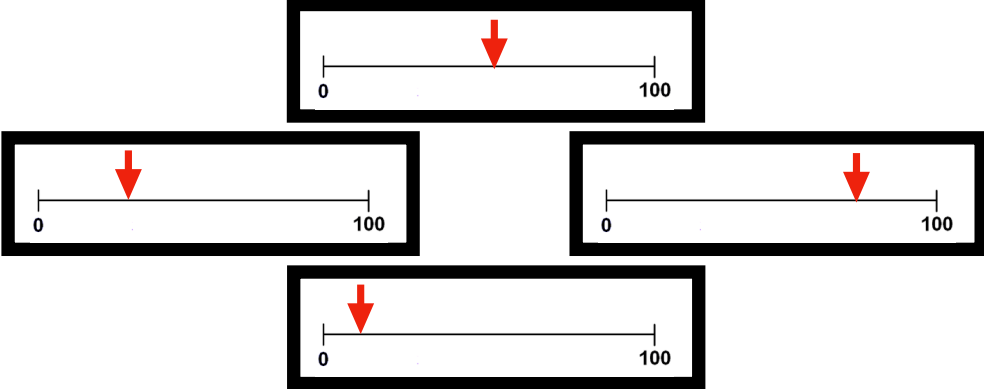
Variant B has the same prompt as C (given #, choose # line), but is only as informative as A (no?) — and the number line options may be quite small on tablets/smartphones.

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

B.

Choose the number line showing...

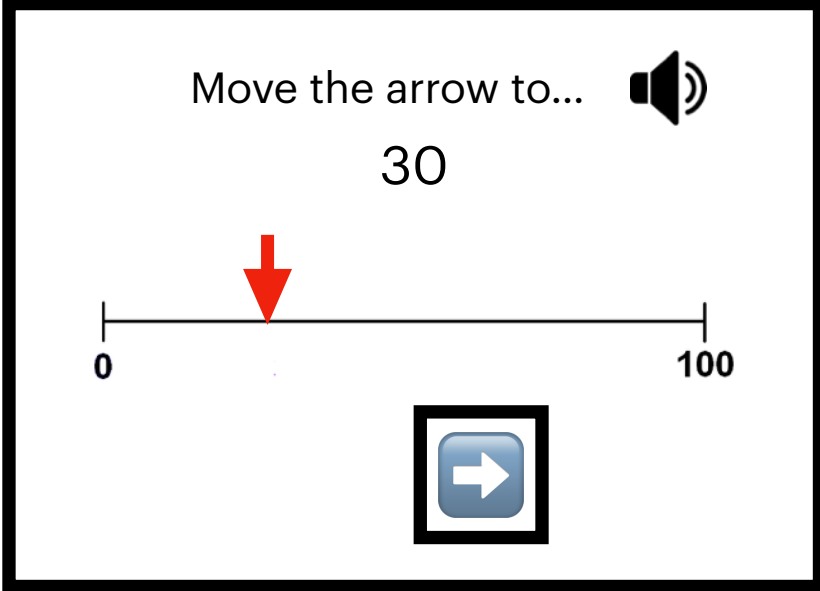
30



C.


Move the arrow to...

30



Math: Number Identification (EGMA)

Younger/less skilled
children: 2AFC


"Choose the
number ____." 

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

75

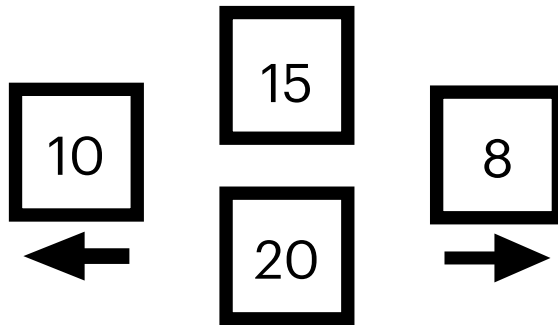
87

Math: EGMA

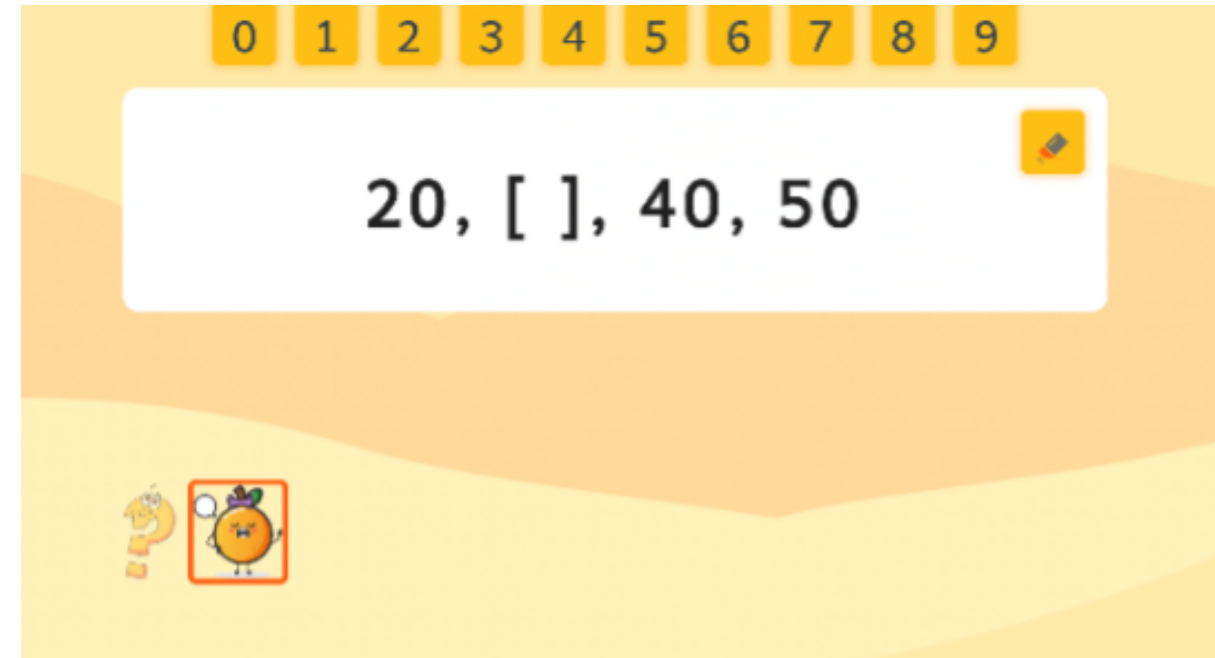
Missing number

Choose the best number
to fill the blank.

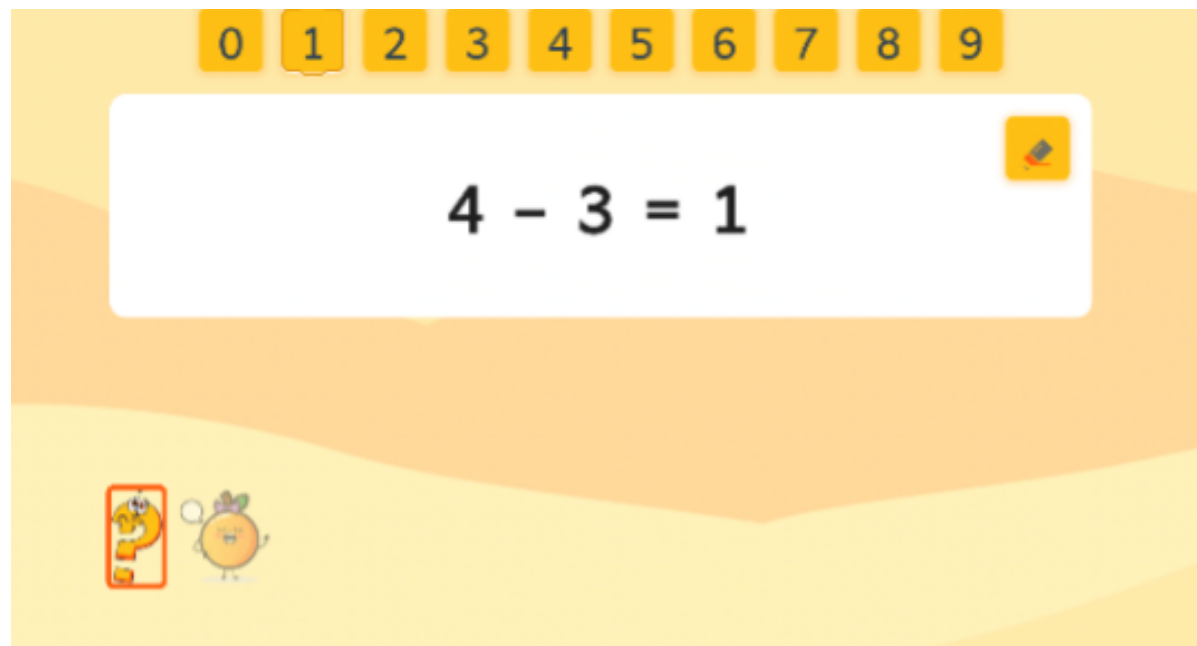
20, __, 40, 50



(Android app)

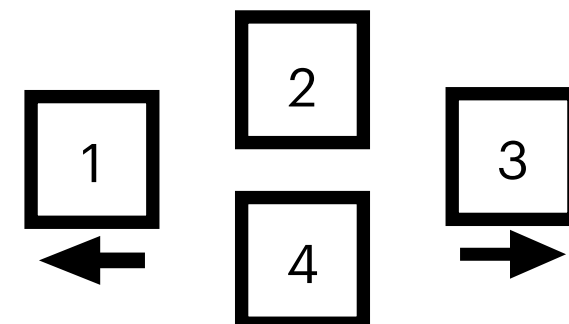


Addition/Subtraction



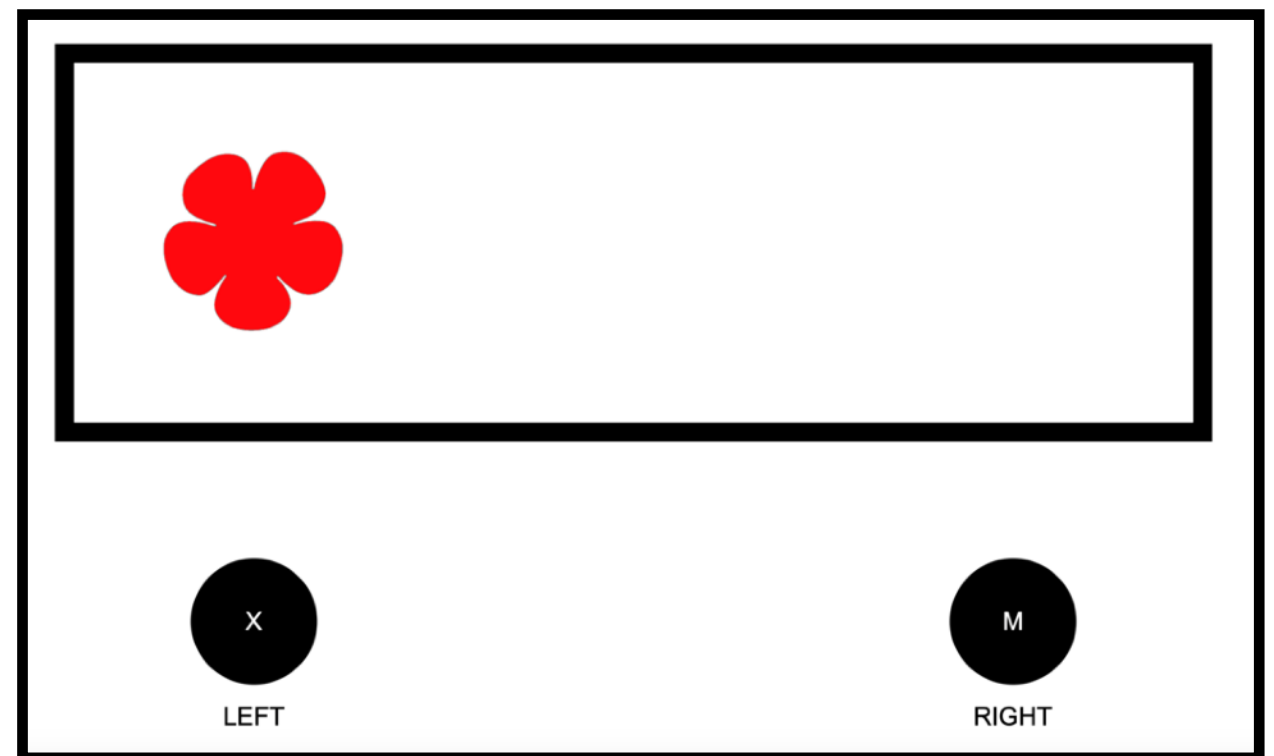
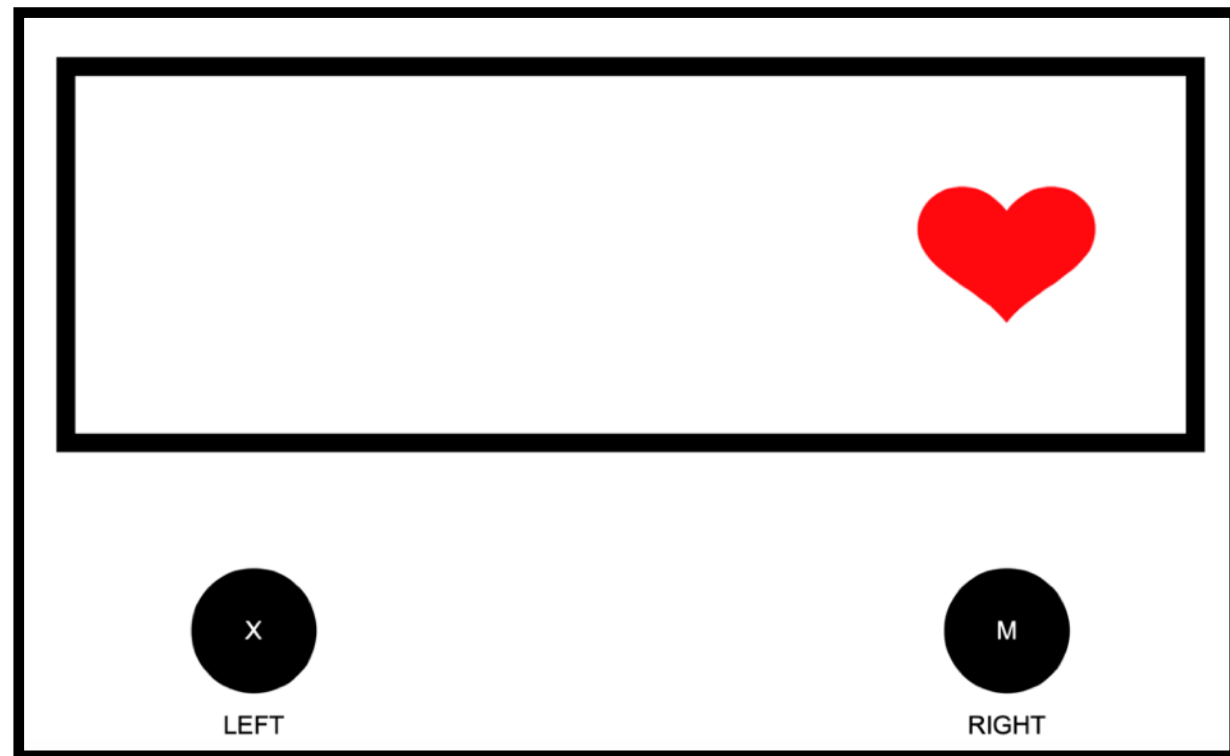
Choose the number
to fill the blank.

4 - 3 = __



EF: Hearts & Flowers

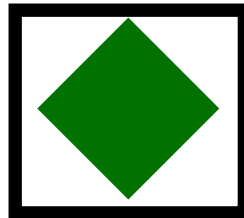
This can be adapted to fit the design, although we may not want to show instructions on every trial—just at the beginning of each block, when the new task is introduced.



EF: Something's the Same

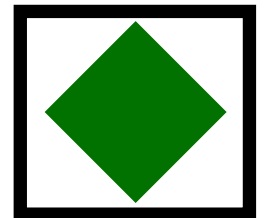
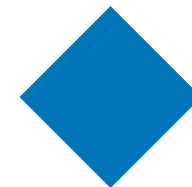
This fits the design (2AFC), although each trial has two phases.
Jelena's plan is to also mix in some FIST trials (which are also multi-phase).

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 pictures is the
same as this new picture?

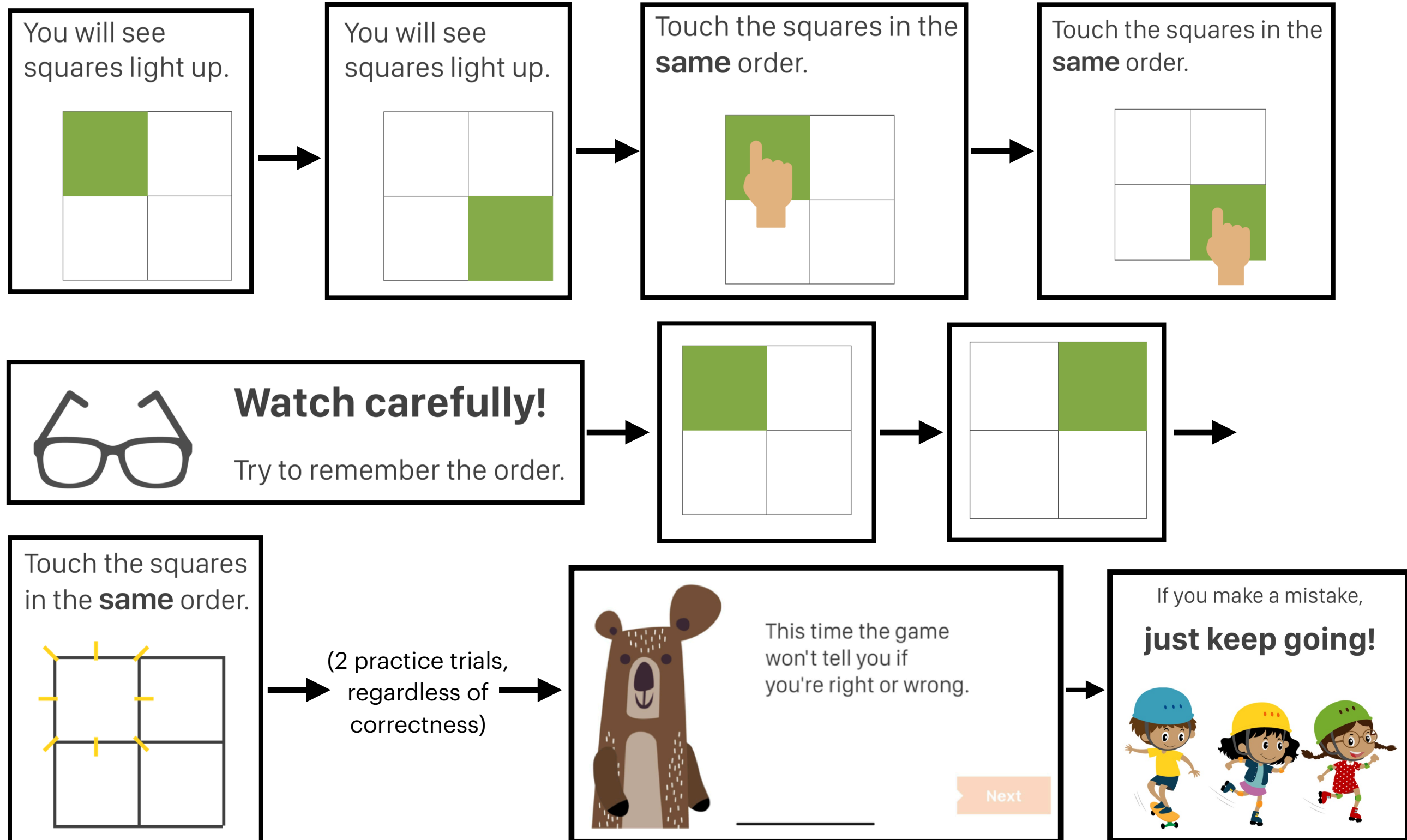


Phase I presents two images and notes similarity
on one dimension (content, color, or size).

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.

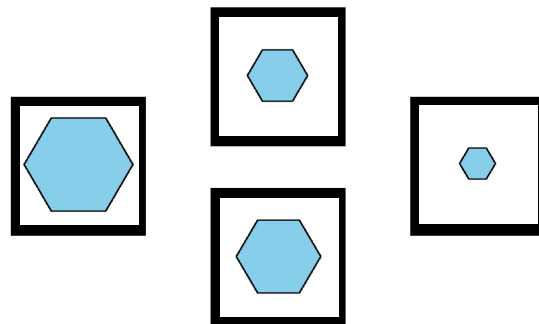
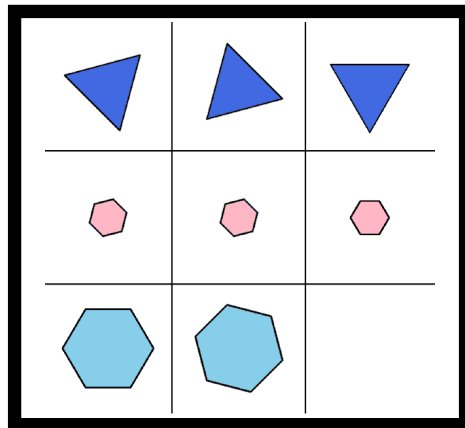
EF: Dot Matrix Memory Game

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



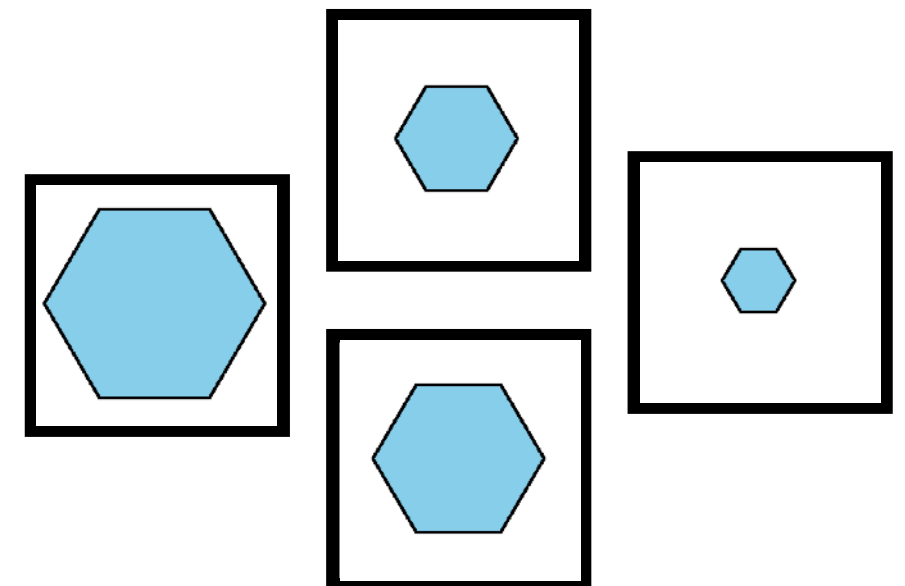
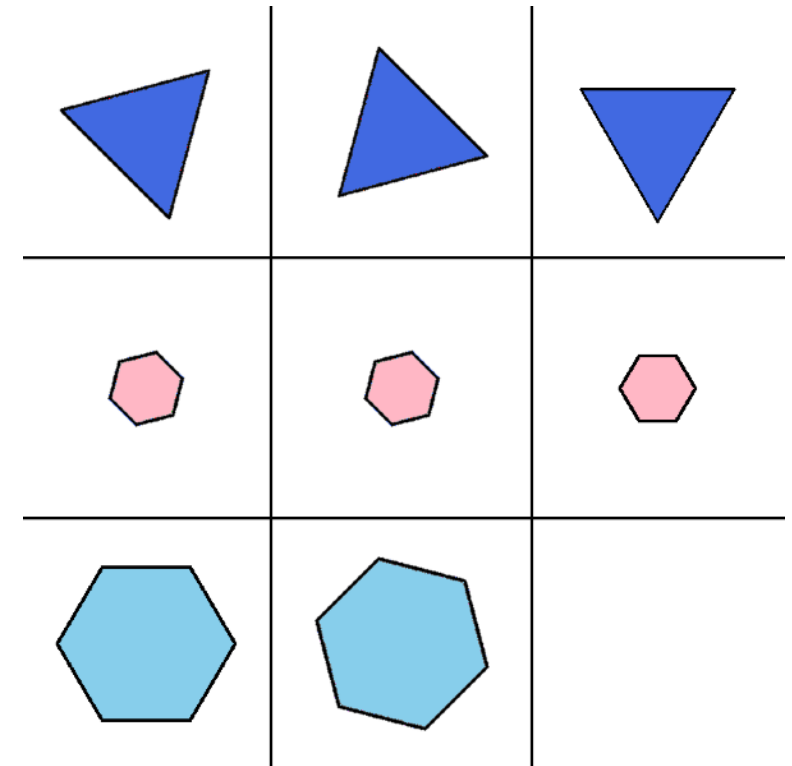
Reasoning: Matrix Reasoning

Choose the best pattern to fill in the blank.



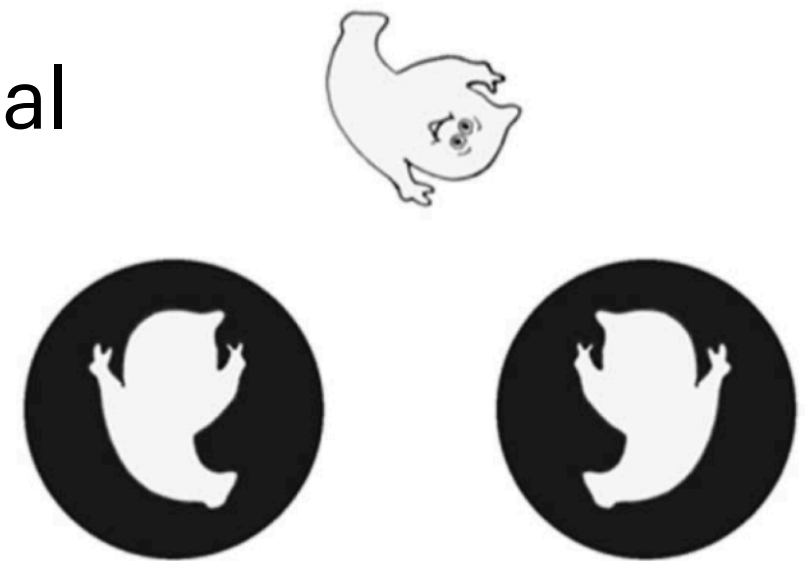
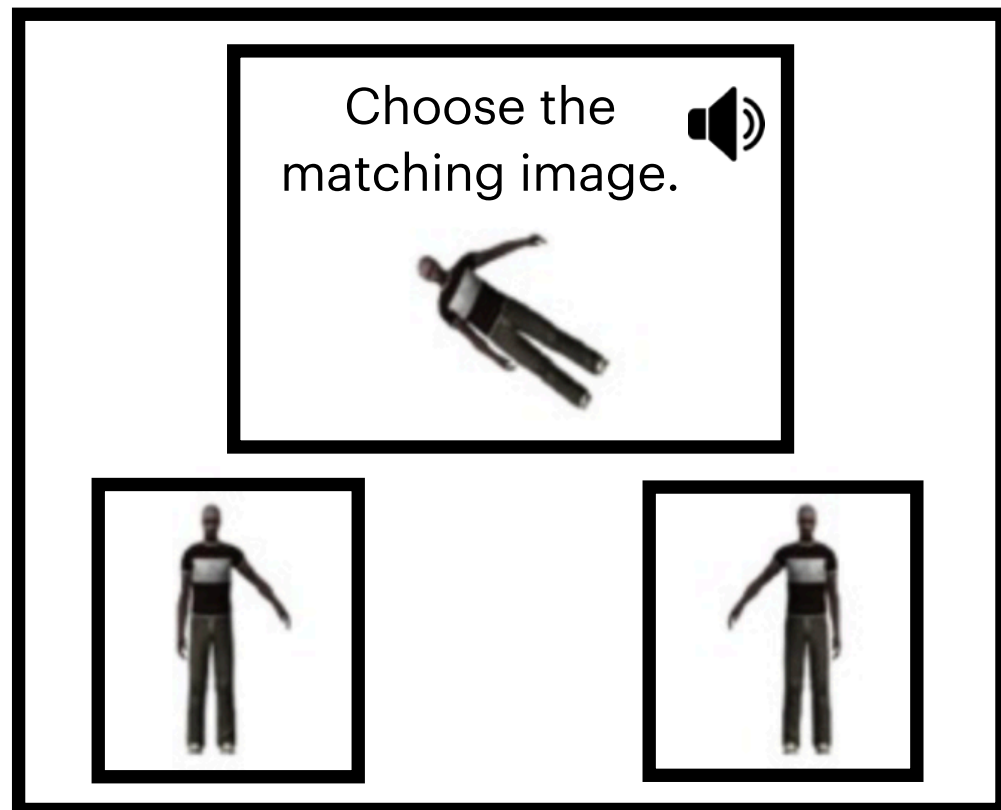
Rogier Kievit and Nick Judd are selecting and piloting stimuli.

Choose the best pattern to fill in the blank.

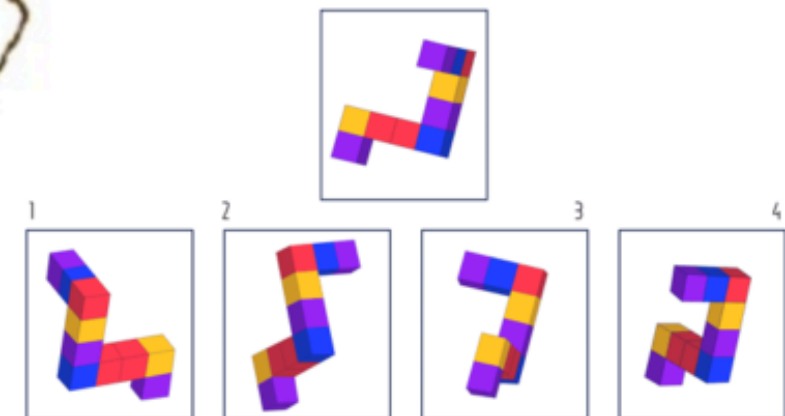


Spatial: Mental Rotation

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



3D Shepard-Metzler



Context: Child Questionnaire

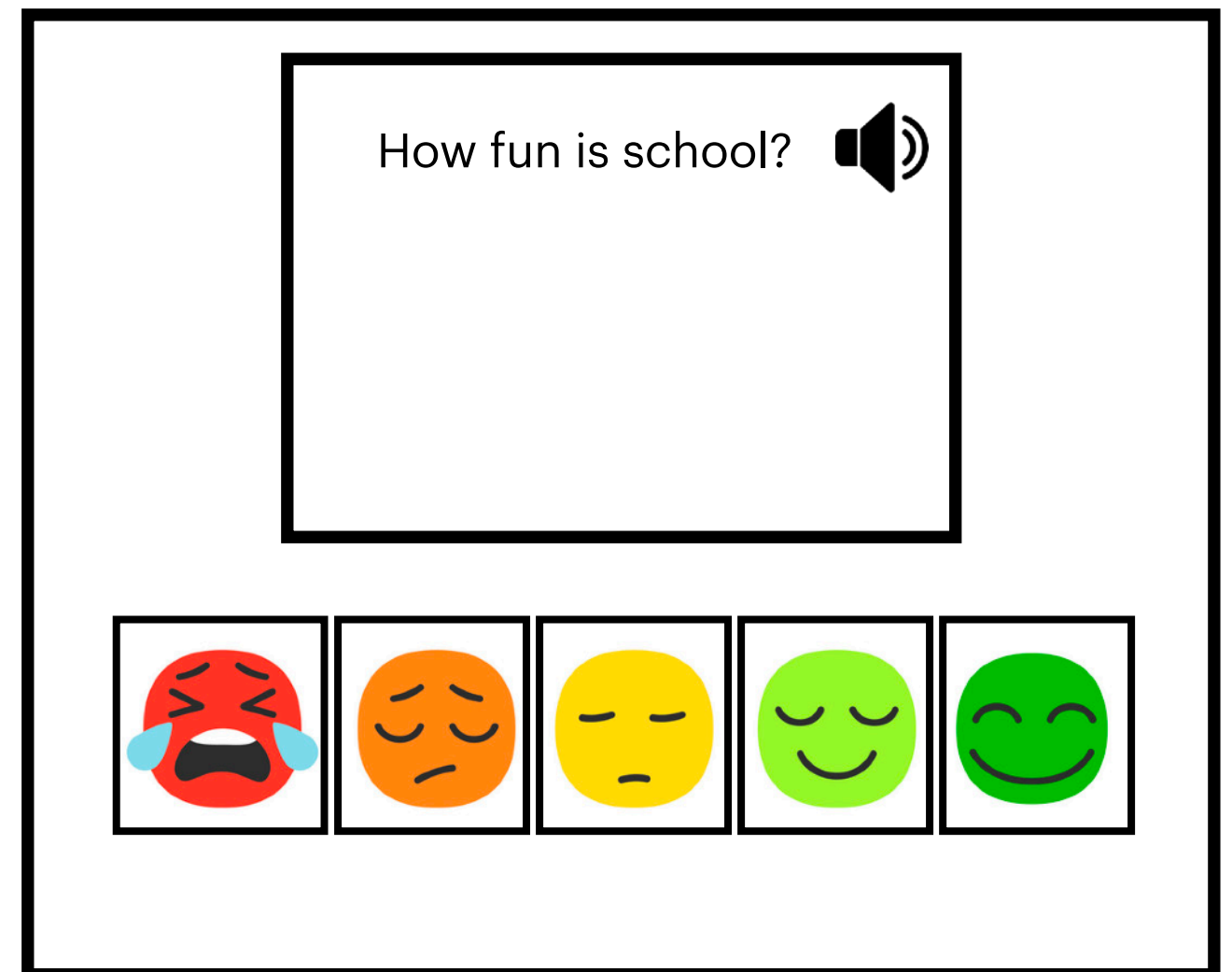
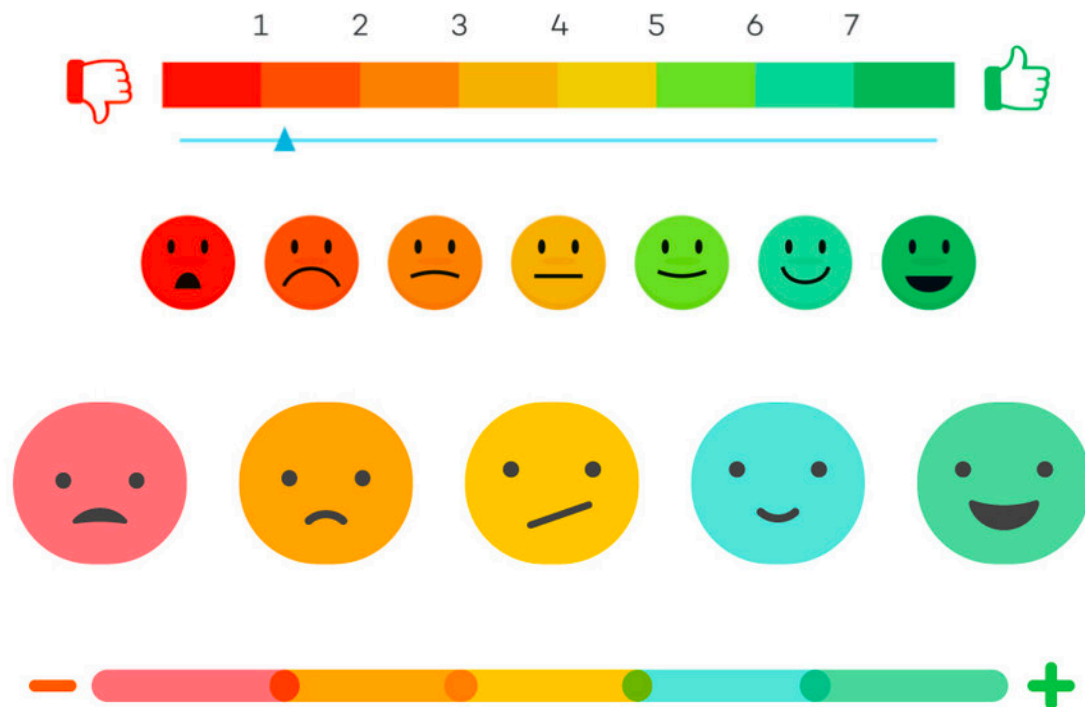
- 2D: 2AFC, 3 types of stimuli
- 3D: 2AFC or 4AFC?
- Universality of thumbs up/down? Check mark/X?
- Red/green problematic...

Is the scale too odd for some items?

"I am good at math."

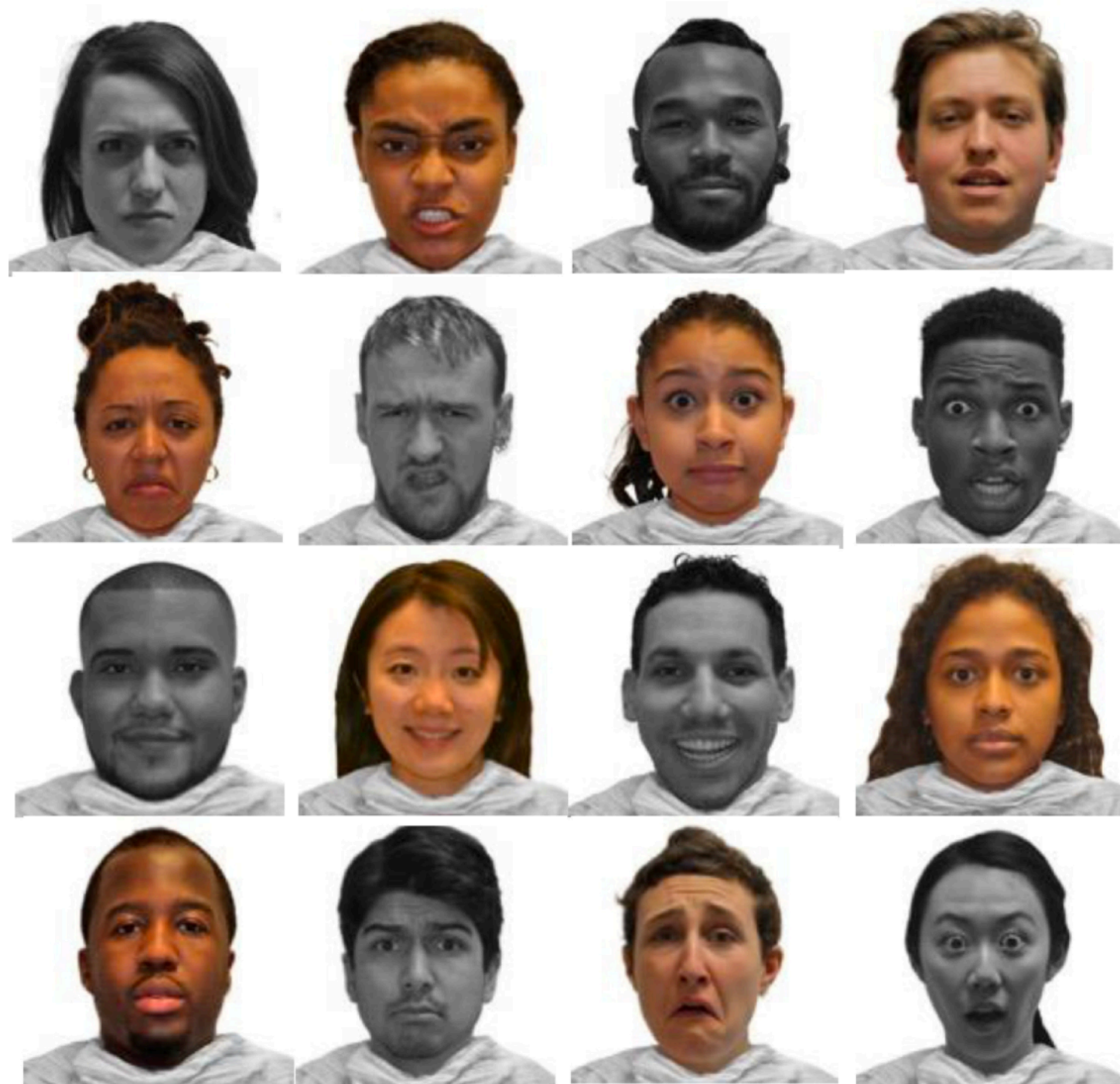
"Does your teacher say nice things about you?"

(Are some of these yes/no?)



Social: Emotion Recognition

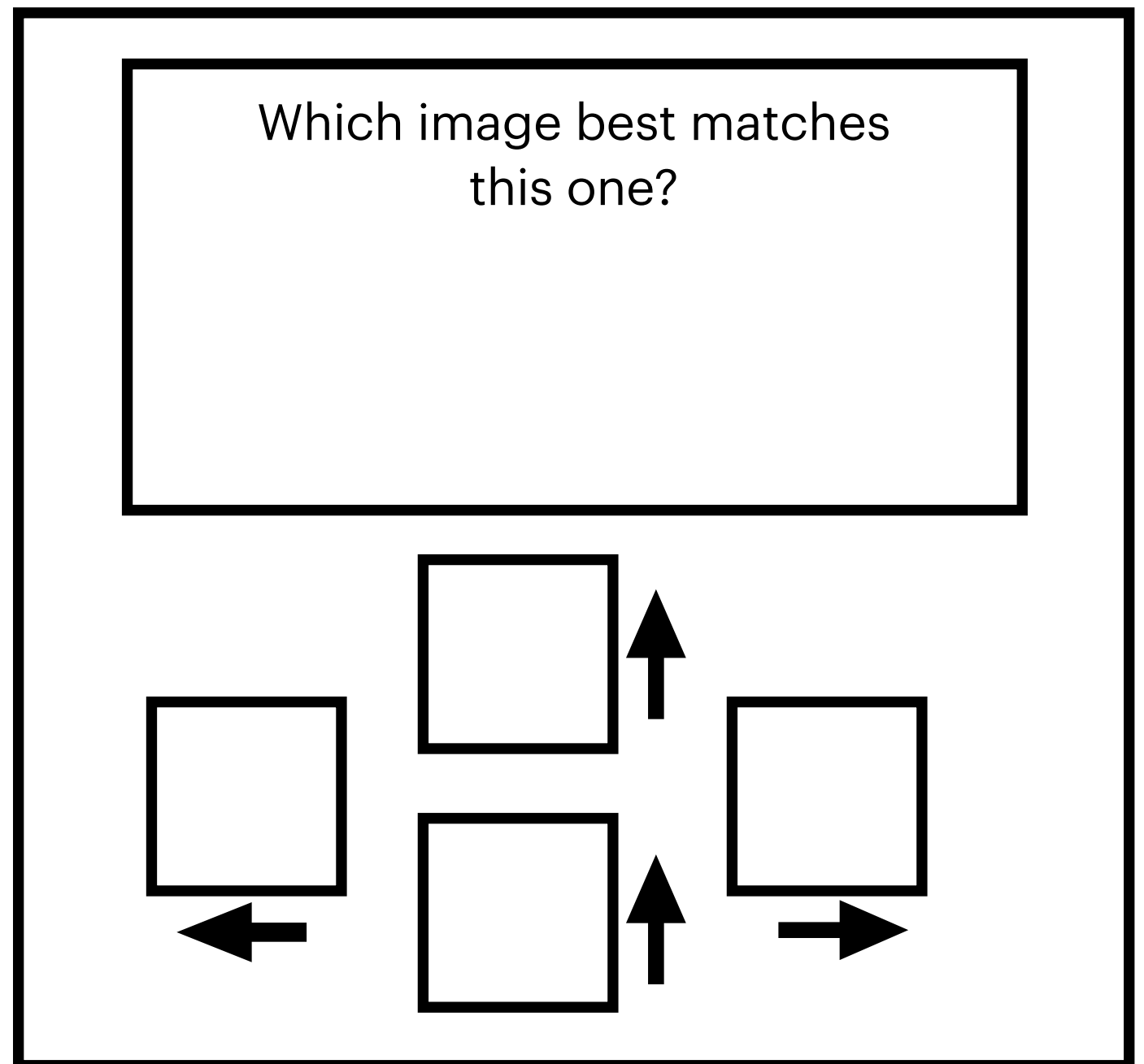
- RADIATE dataset (16 emotions, racially diverse, color / B&W) + parametric noise
- To do 4AFC, do we want to do match-to-sample?



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

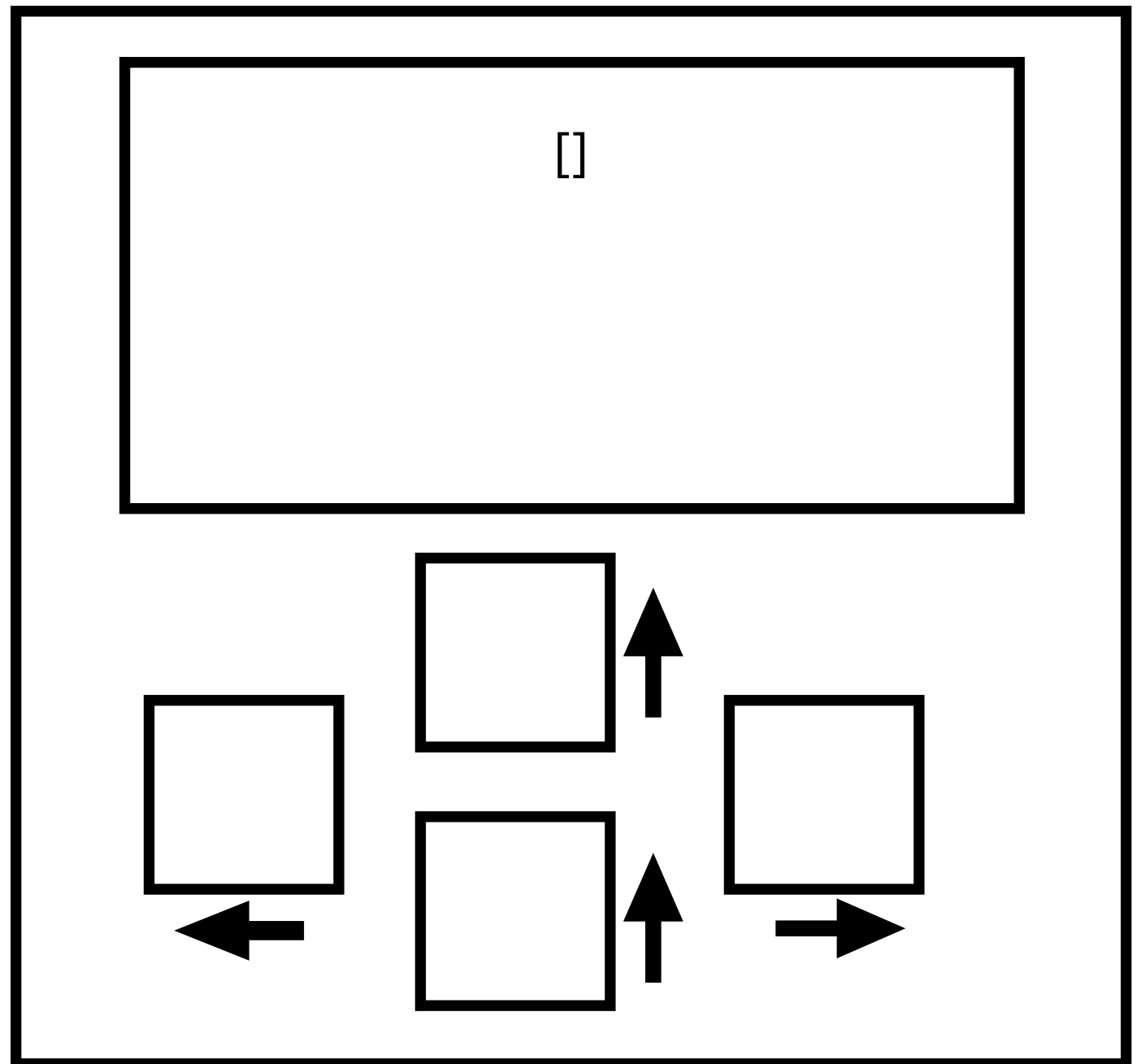
Social: Emotion Recognition

- Match to sample (with noise?)
- 2/4AFC?



Social: Theory of Mind

- mAFC



Language: TROG

Test for Reception of Grammar (Bishop, 1983)

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

