

# 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?)

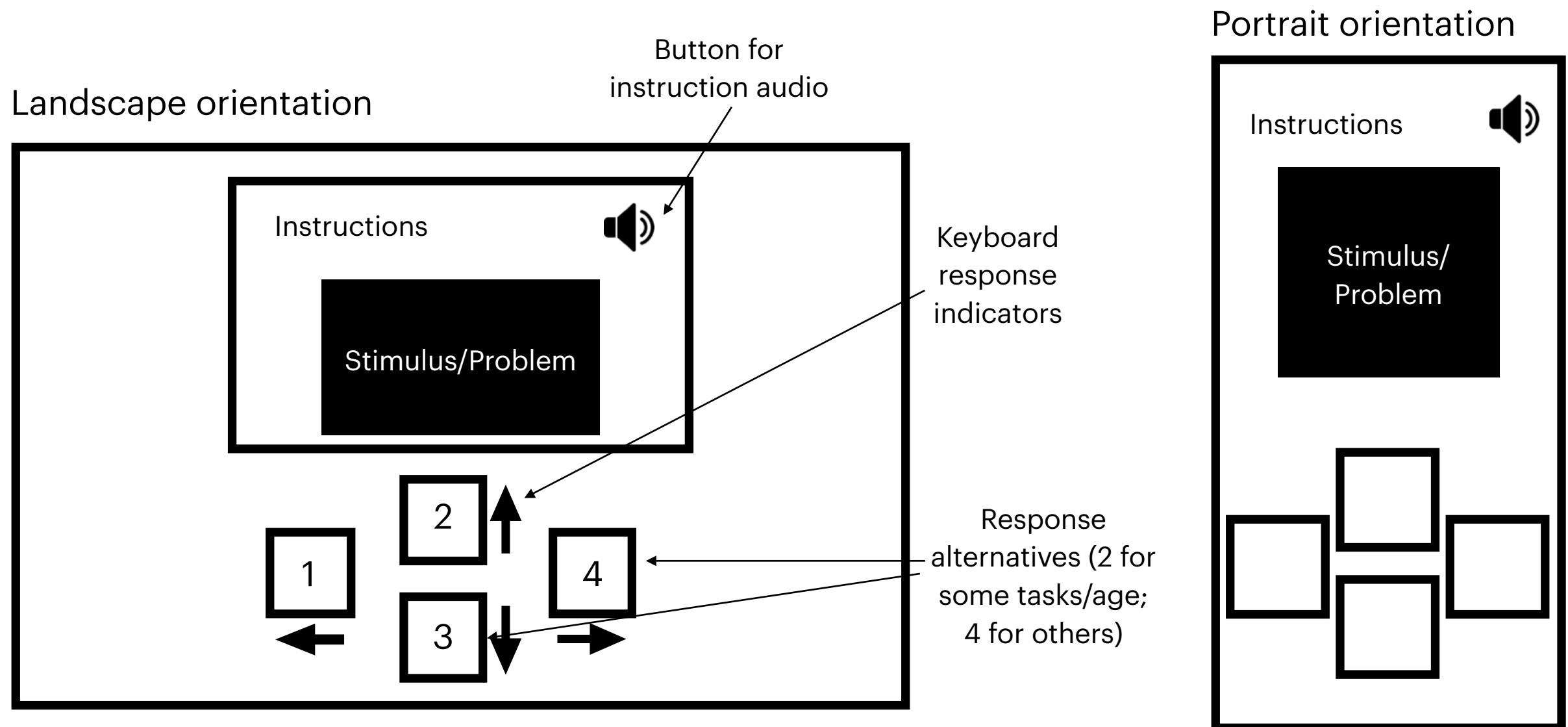
# Estimated Task Duration

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

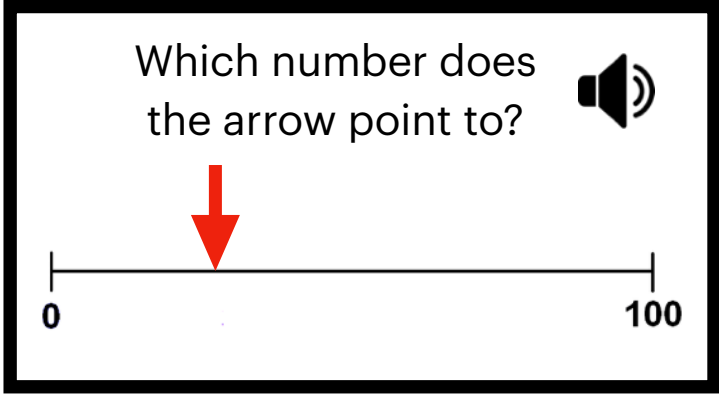
- Standardizing the interface reduces required learning, and reduces bias favoring children with more tablet/computer experience (e.g.: use 2AFC / 4AFC; no open-ended keyboard entry)
- **Desiderata:** support tablet (touch), computer (keyboard + mouse), and phone? (minimum resolution?)—portrait + landscape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

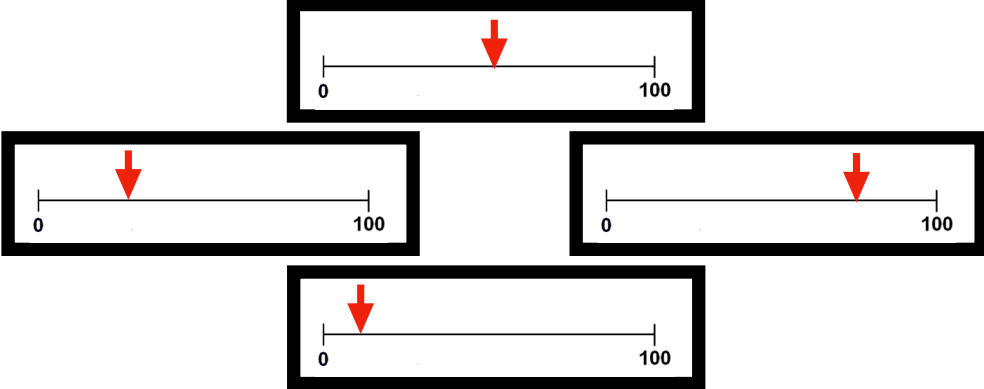
Variant B has the same prompt as C (given #, choose # line), but is only as informative as A (no?) — and the number line options may be quite small on tablets/smartphones.

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...

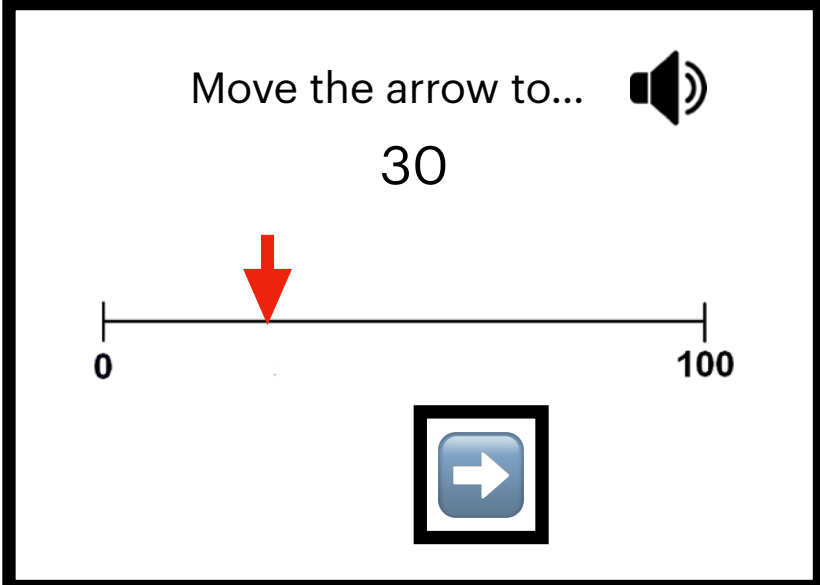
30



**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

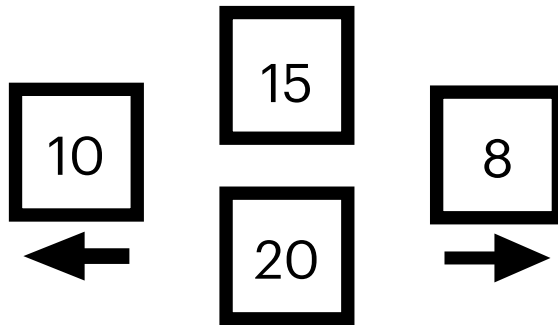
87

# Math: EGMA

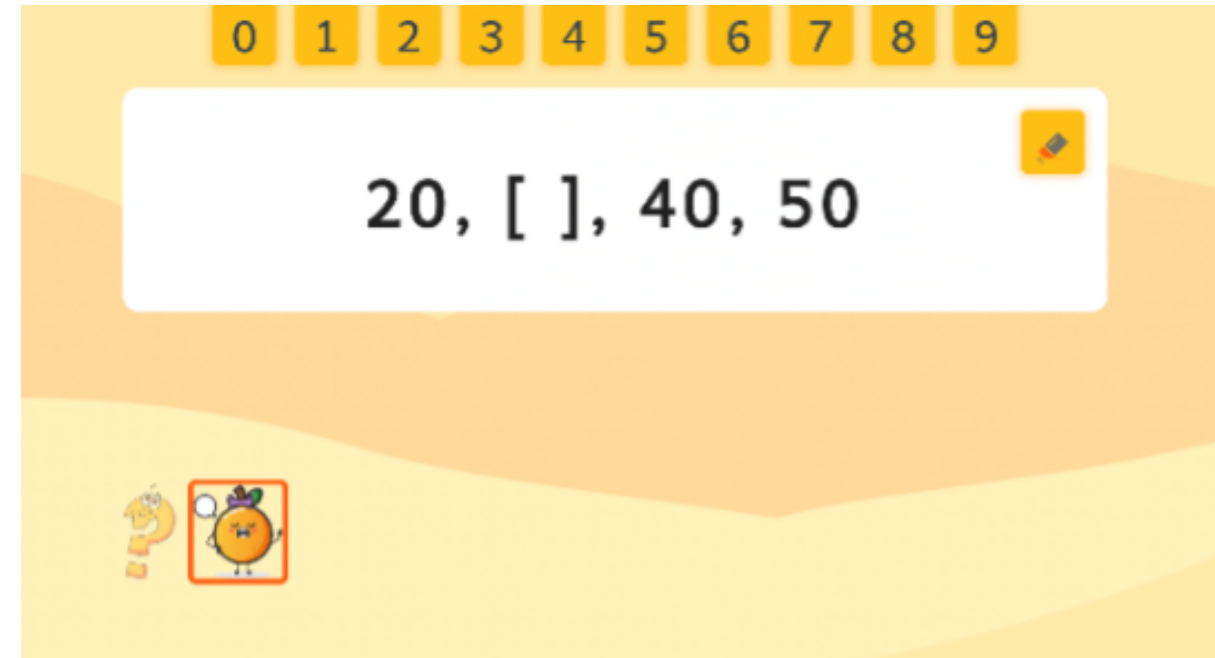
Missing number

Choose the best number  
to fill the blank.

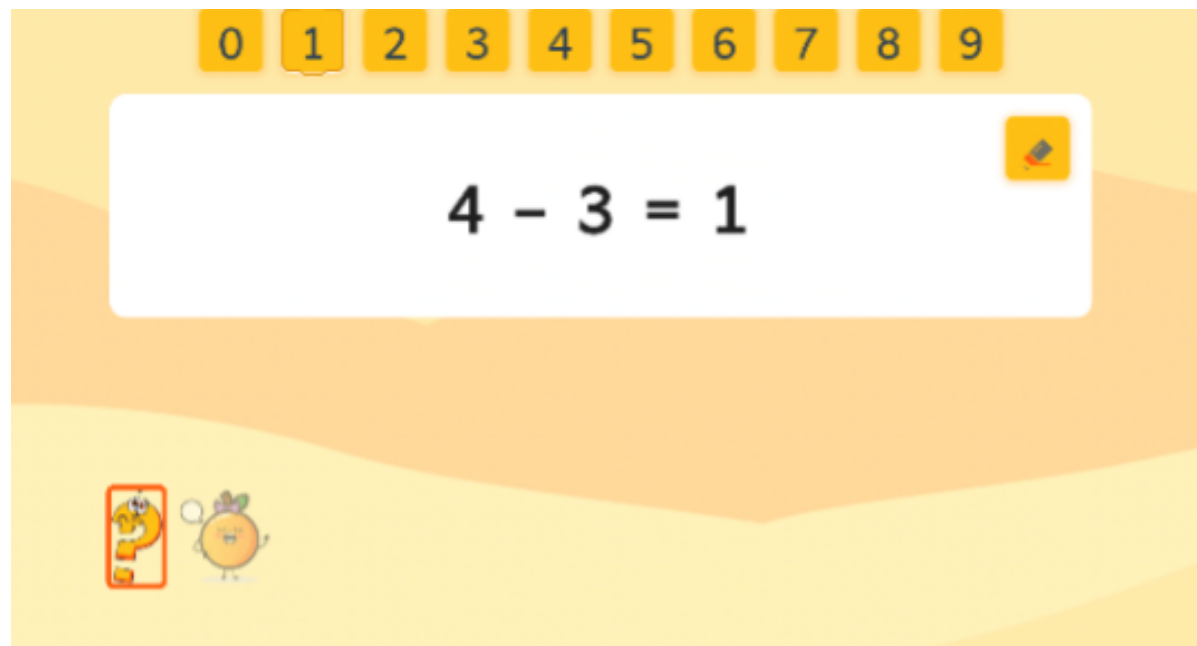
**20, \_\_, 40, 50**



(Android app)

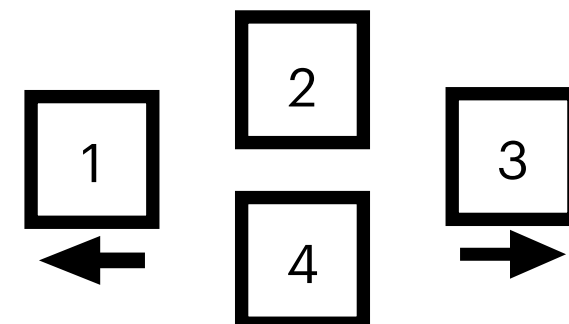


Addition/Subtraction



Choose the number  
to fill the blank.

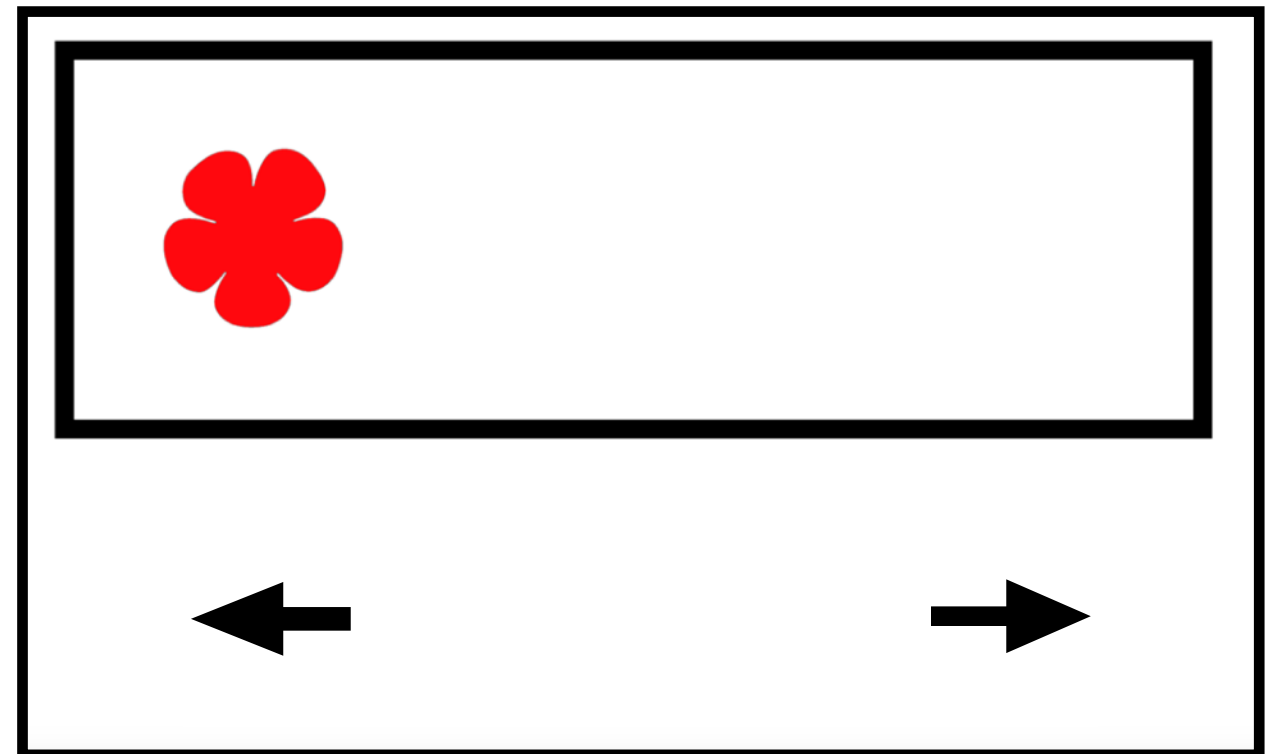
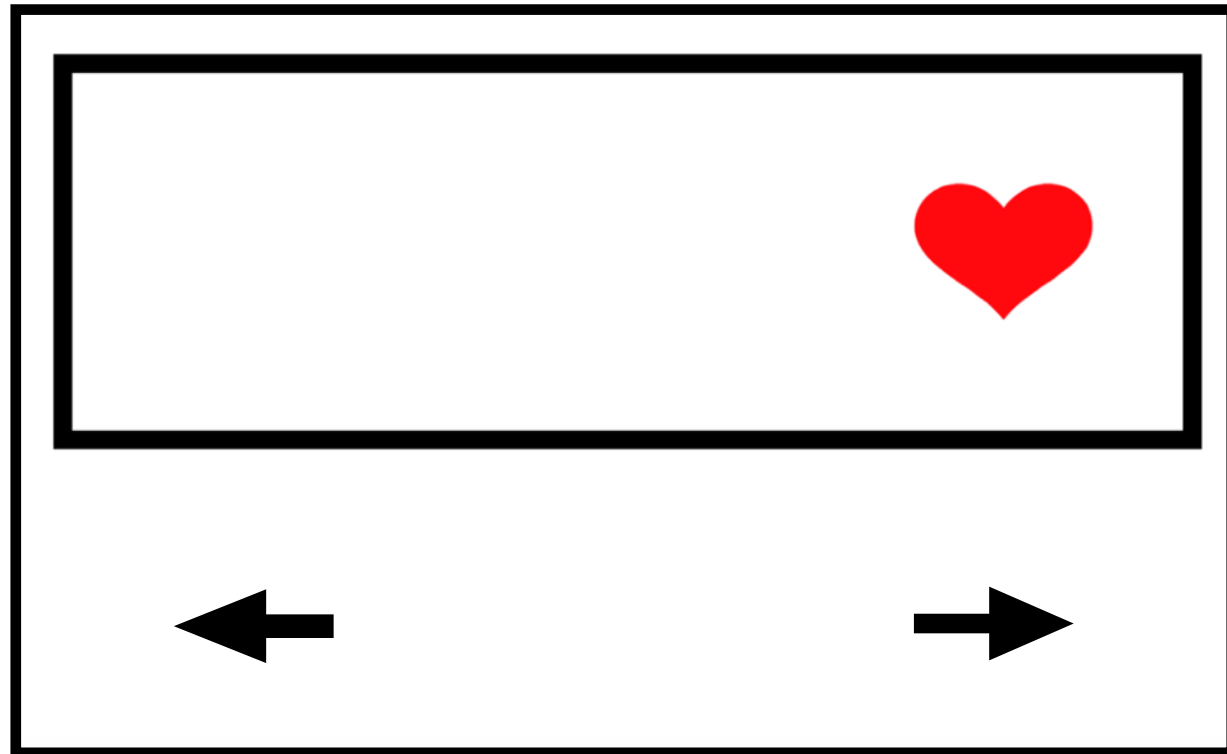
**4 - 3 = \_\_**





# 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.



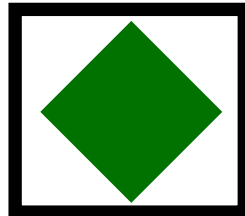
Could be sped up: if ceiling accuracy on 4-trial blocks, then make the trials faster (e.g. from 2s -> 1.5)

# EF: Same-Different Selection

The AMES lab proposal combines Something's the Same style trials with FIST-like trials, and is multiphase (with practice trials) and 3AFC.

See mock-up: [https://docs.google.com/presentation/d/16WpVP96Yvv55gMrPmba3mFvHgIEBqBs1nodEb\\_H10ZE/edit?usp=sharing](https://docs.google.com/presentation/d/16WpVP96Yvv55gMrPmba3mFvHgIEBqBs1nodEb_H10ZE/edit?usp=sharing)

Here are two pictures.  
Something's the same.  
They are both **green**.

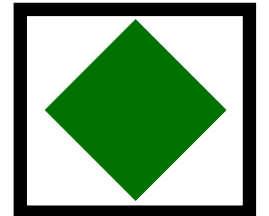


Pre-test: tests knowledge of dimensions.

"Touch the [shape1 / shape2 / shape3]."

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

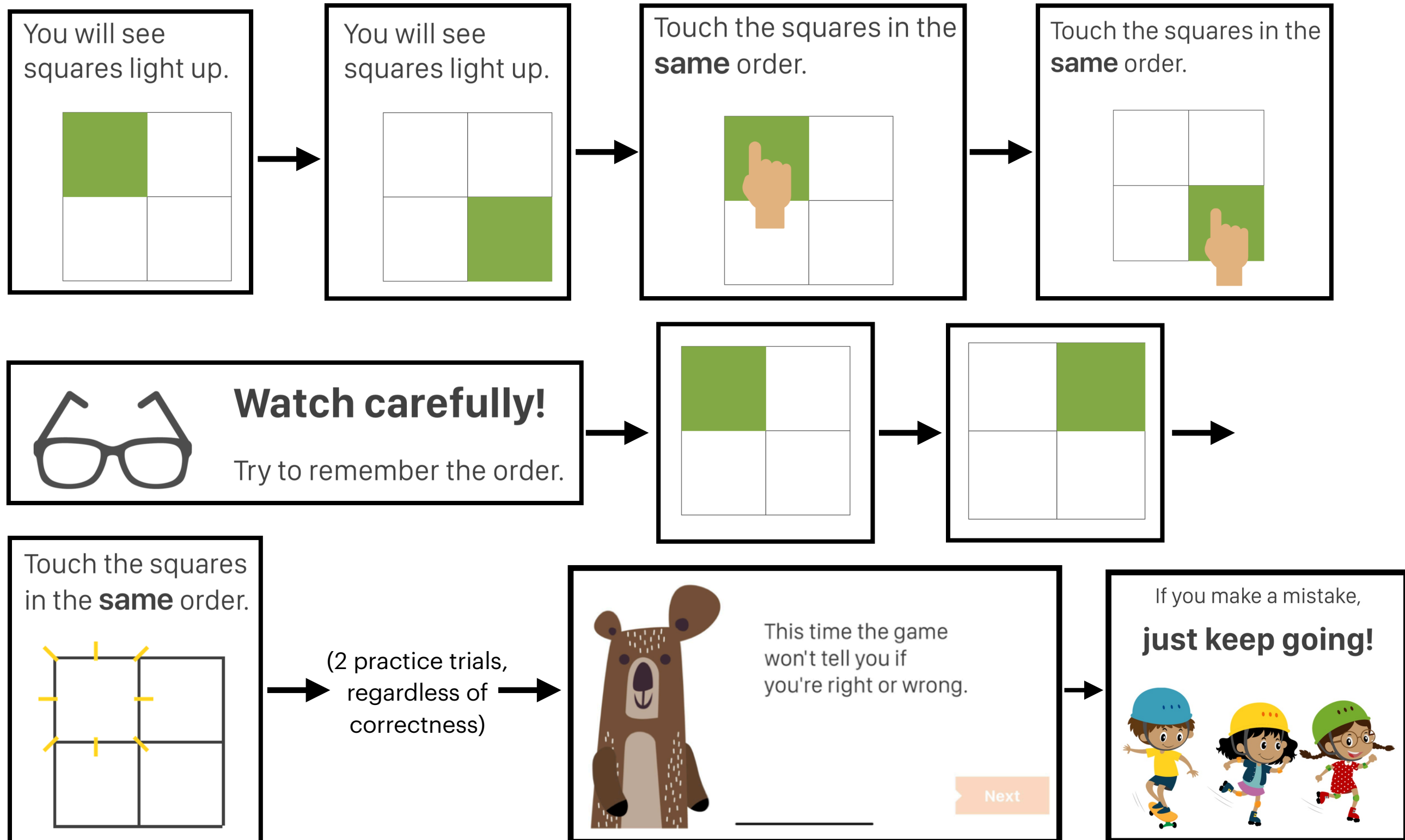
Here is another picture. Which  
of the two pictures is the same  
as the new picture?




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.

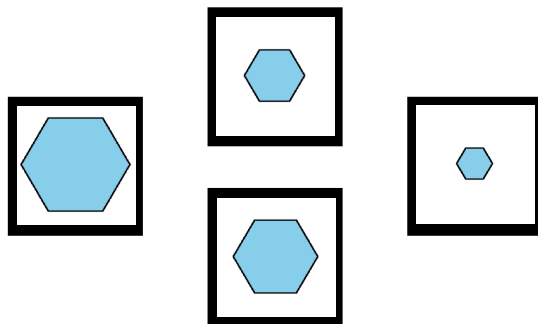
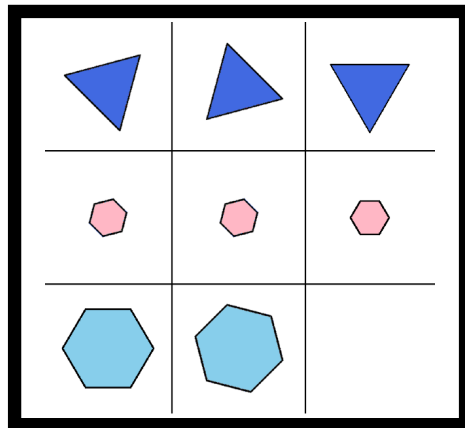
# EF: Dot Matrix Memory Game


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

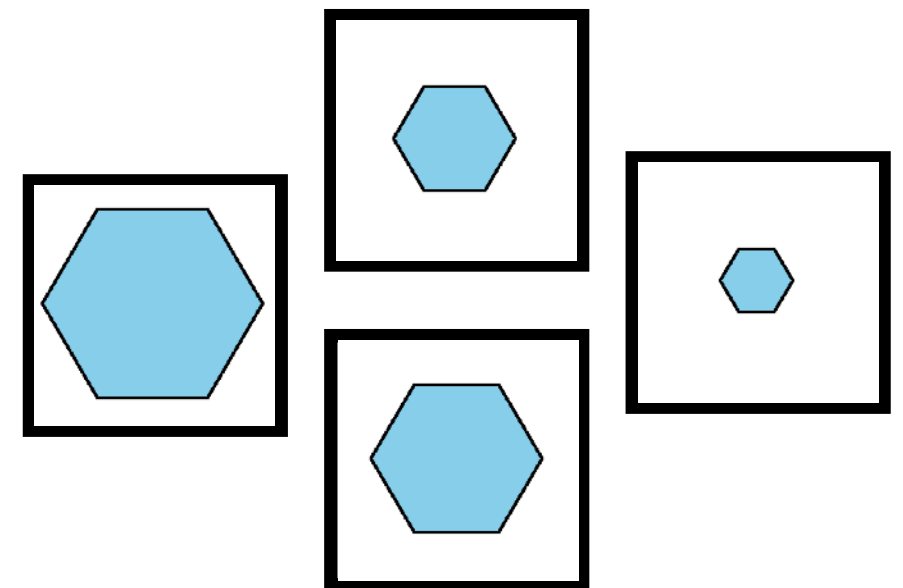
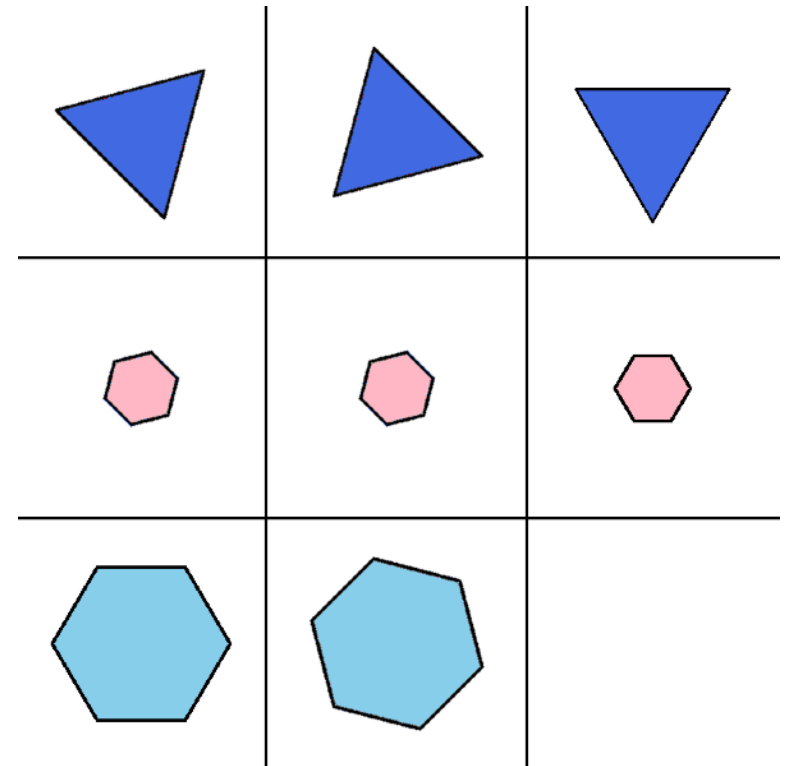


# Reasoning: Matrix Reasoning

Choose the best pattern to fill in the blank. 



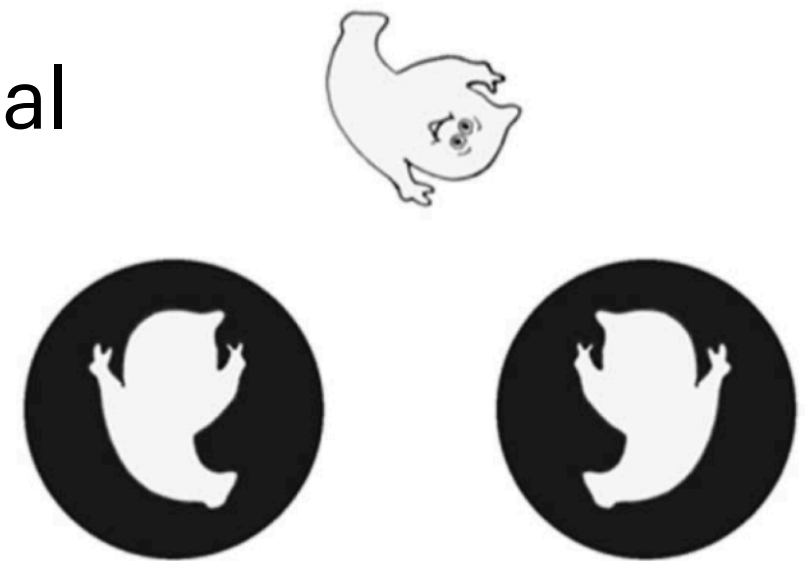
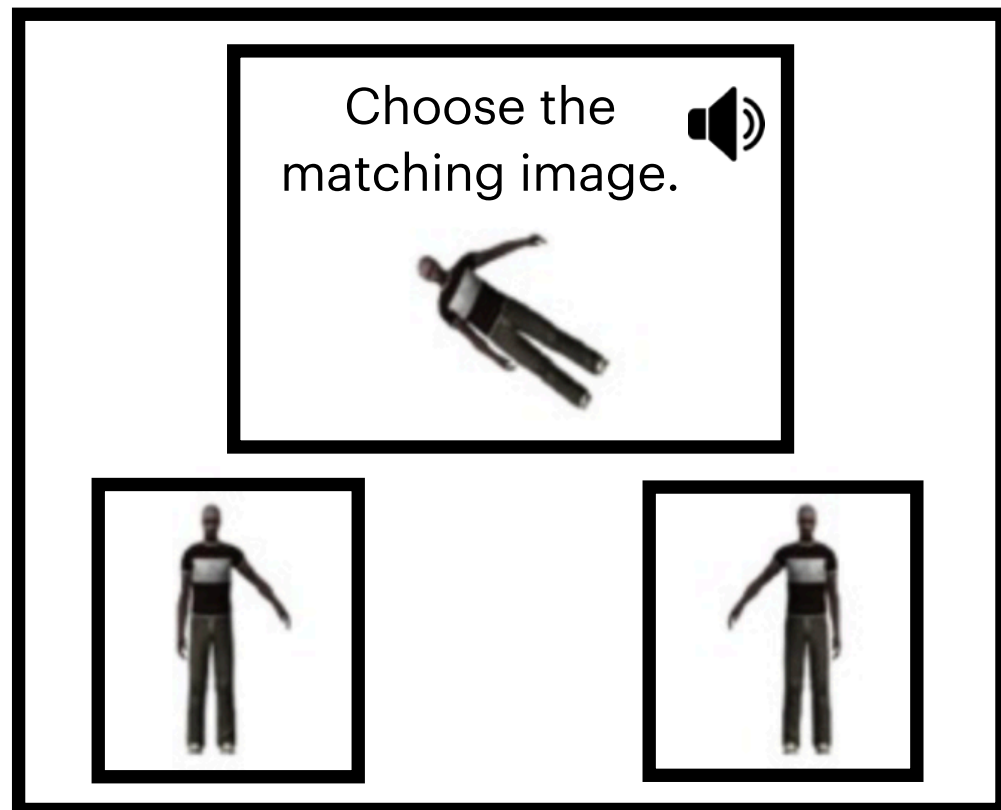
Choose the best pattern to fill in the blank. 



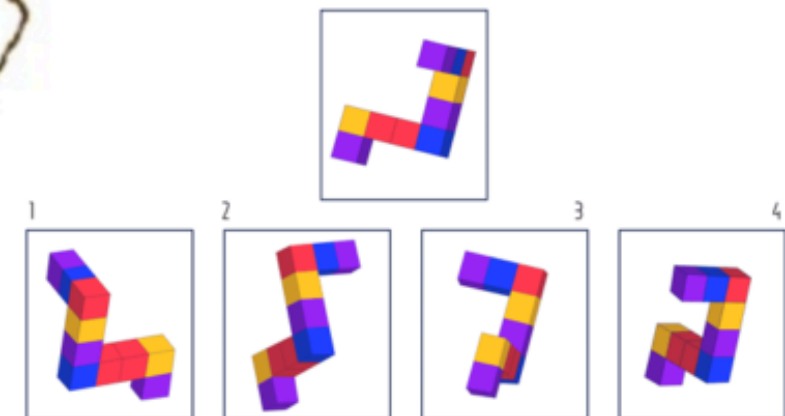
12/15/23 Rogier Kievit and Nick Judd have created 56 stimuli for us to pilot (in adults, and hopefully school-aged children).

# 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

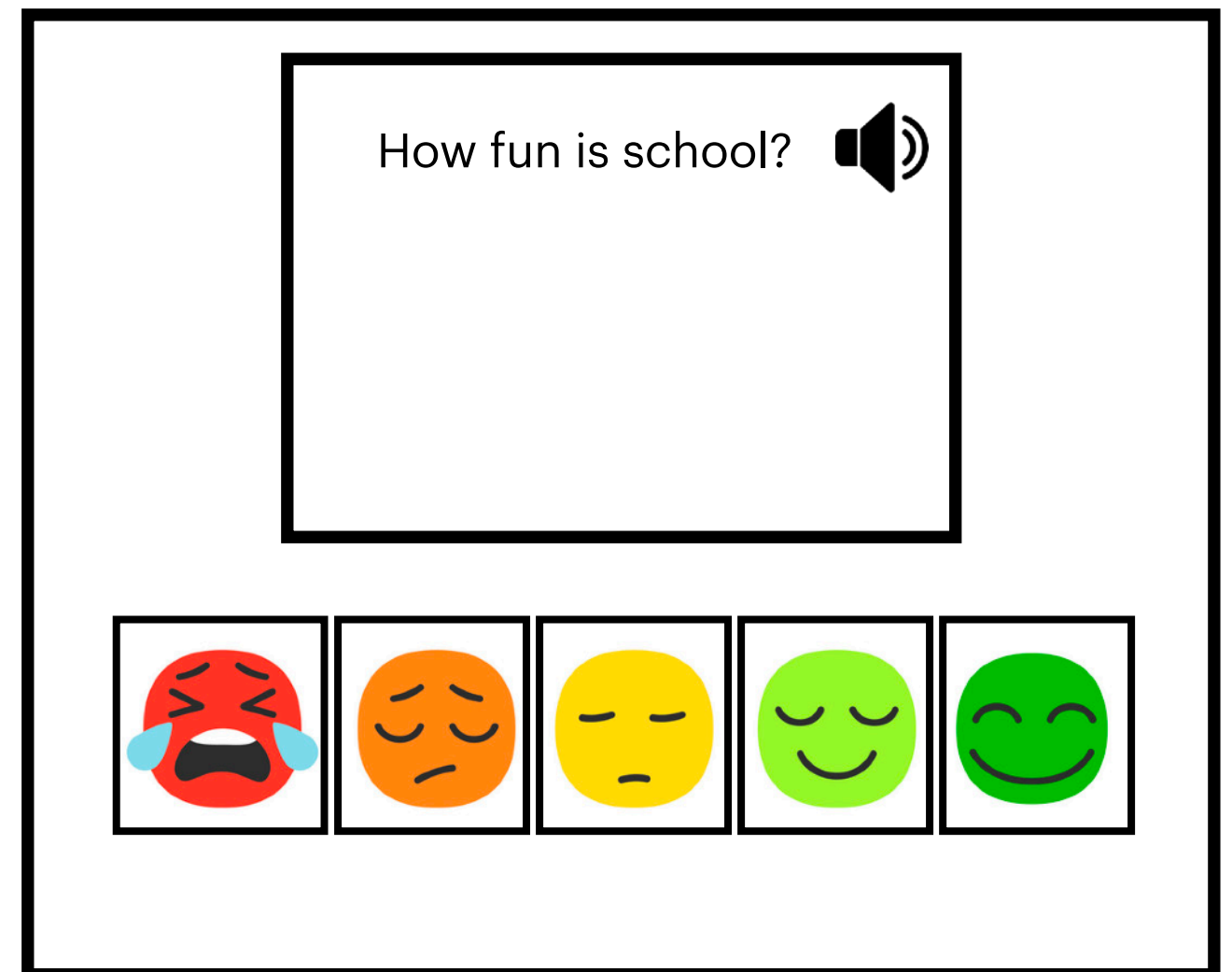
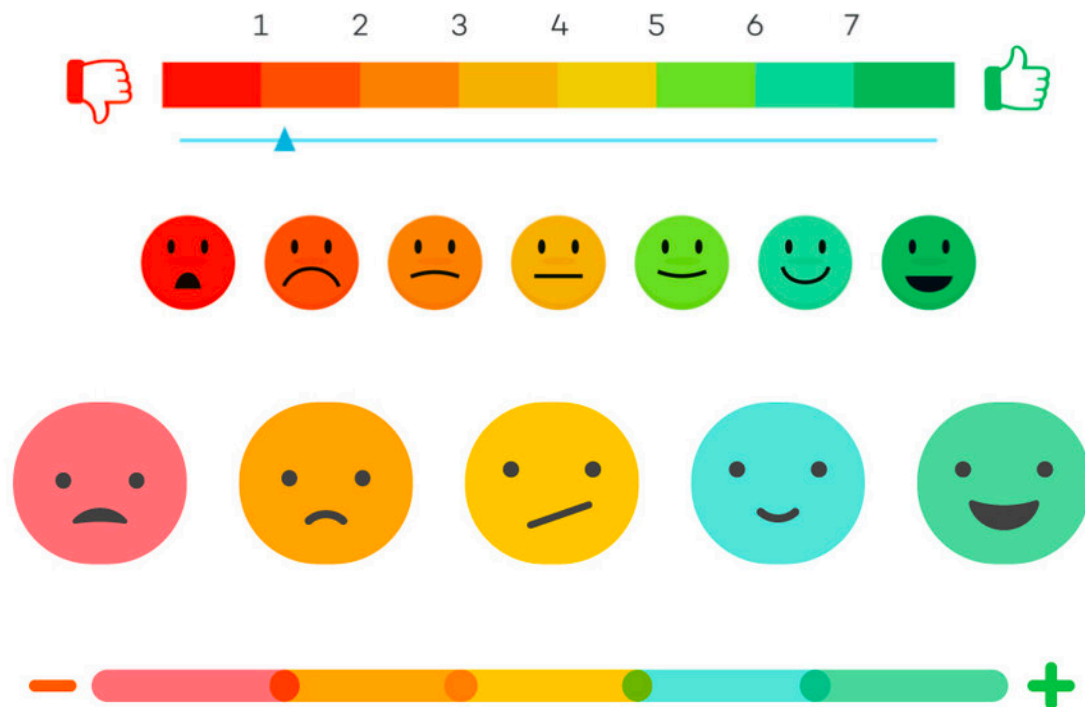
- 2D: 2AFC, 3 types of stimuli
- 3D: 2AFC or 4AFC?
- Universality of thumbs up/down? Check mark/X?
- Red/green problematic...

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: Theory of Mind + Hostile Attribution


- Narrative slides + 2-4AFC questions
- Plan is to create new illustrations (early January) and incorporate novel emotion attribution questions (e.g. How does Madison feel when she doesn't find her book?)

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



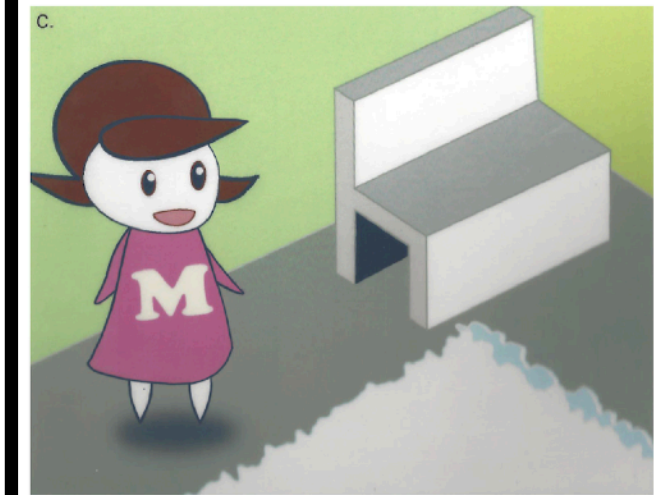
→

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



→

2. 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?



[Chair pic]

[Rug pic]

← →

# Language: TROG

## Test for Reception of Grammar (Bishop, 1983)

- Original TROG: 80 4AFC items, ordered by difficulty
- Recreating stimuli (1/5/24)

