Emergence of Spatial Metaphor in Children
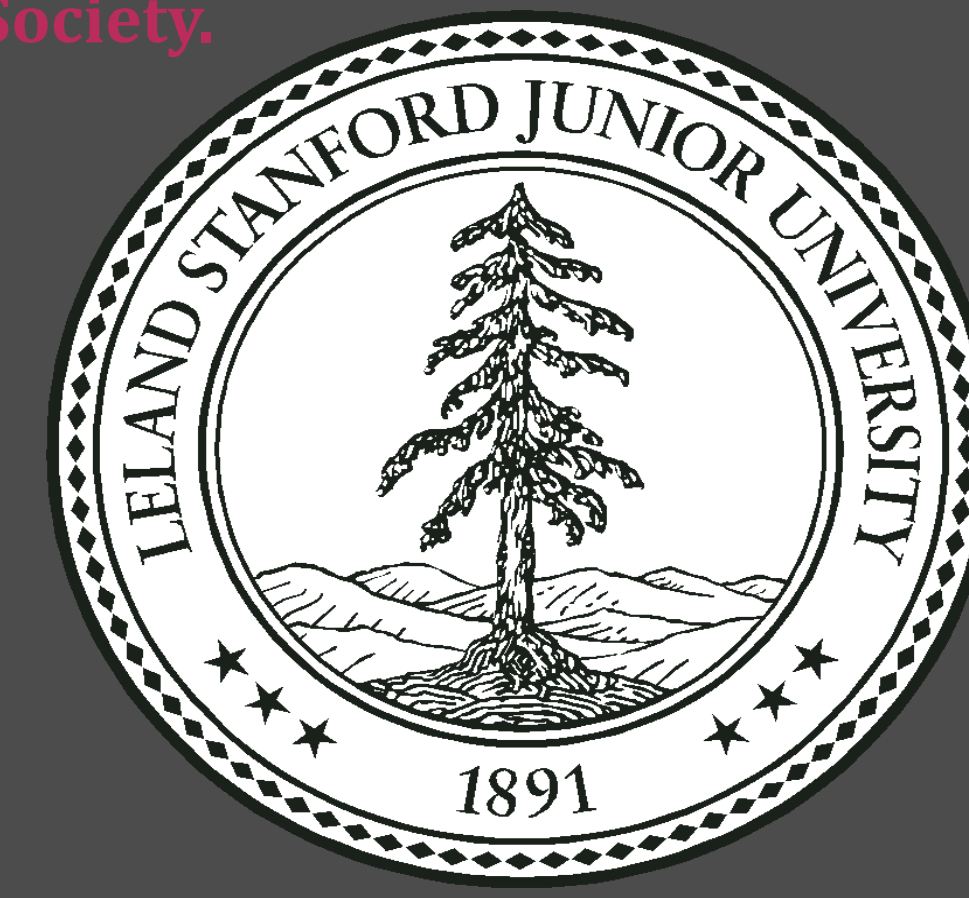
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EXPERIMENT ONE:

Do children have the mental metaphor 'Good is Up'?

Metaphors in language associate the abstract domain of emotional valence with the relatively concrete domain of vertical space:

Good is *up* and bad is *down*.

For instance, spirits can 'soar', hopes can 'plummet', students can rise to the 'top of the class' or sink to the 'bottom of the barrel'.

In adults, these linguistic metaphors correspond to implicit *mental metaphors*, which influence their behavior even on non-linguistic tasks (Casasanto, 2009).

Do children relate *up* with *good* and *down* with *bad*?

Previous experiments with children were suggestive but inconclusive, possibly because children's responses were underconstrained (Tversky, Kugelmass, & Winter, 1991).

Here we developed new diagram tasks to investigate whether 5- to 10-year old children have mental metaphors that link vertical space to emotional valence.

Methods

Participants. 114 English-speaking children completed two diagram tasks (*Mean Age*=7.4, *SD*=1.3), yielding analyzable data from 81 children in the first task and 95 children in the second task.

Procedure. Children responded to positively and negatively framed questions in both tasks. Diagrams were presented one at a time, oriented vertically against a table-top easel.

#### Explicit Spatialization Task: Toy Boxes

A picture of a bookcase with two boxes along the vertical axis was presented, and the children were asked to point to the box where they would put (1) a toy they *like* to play with, and (2) a toy they *do not like* to play with (or vice versa)

Incidental Spatialization Task: Animals

Two pairs of animals drawn along the vertical axis were presented, and the children were asked to judge the animals' friendliness ("Which animal is nicer/meaner?") or intelligence ("Which animal is smarter/dumber?"). Animals' up/down location, order of presentation and property valence were counterbalanced across participants.
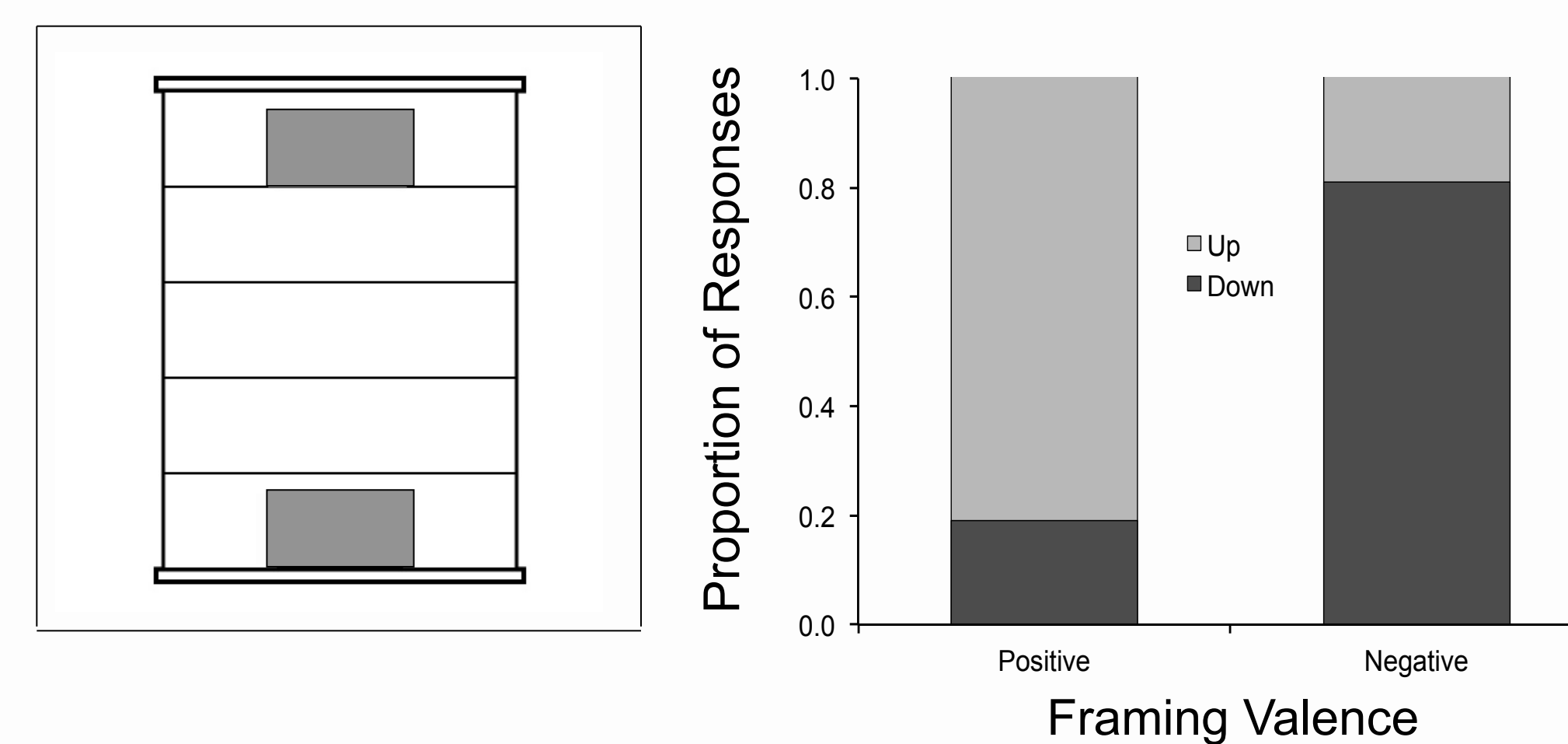
EXPERIMENT ONE RESULTS

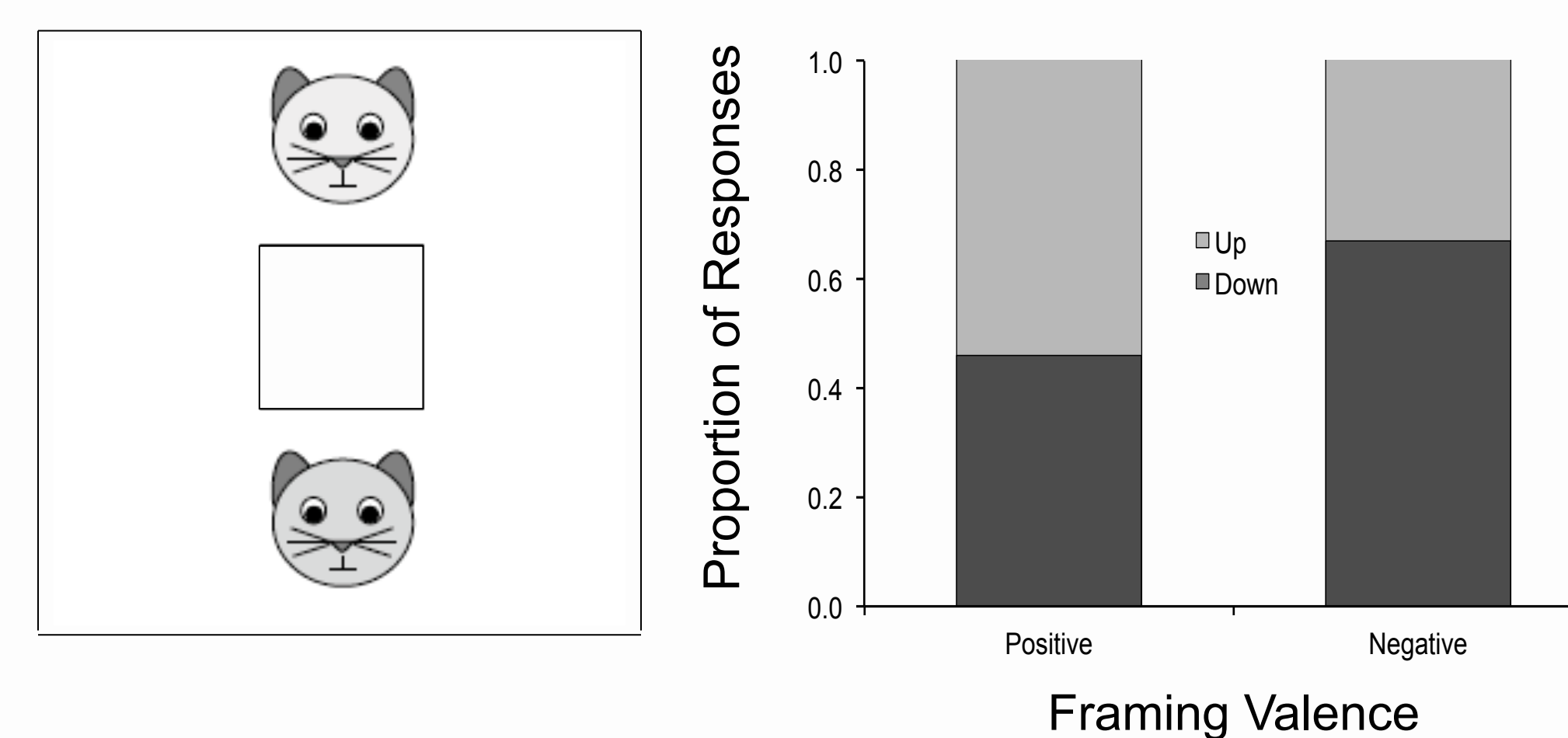### Kids' *vertical* valence metaphors mirror patterns in language and bodily experience.
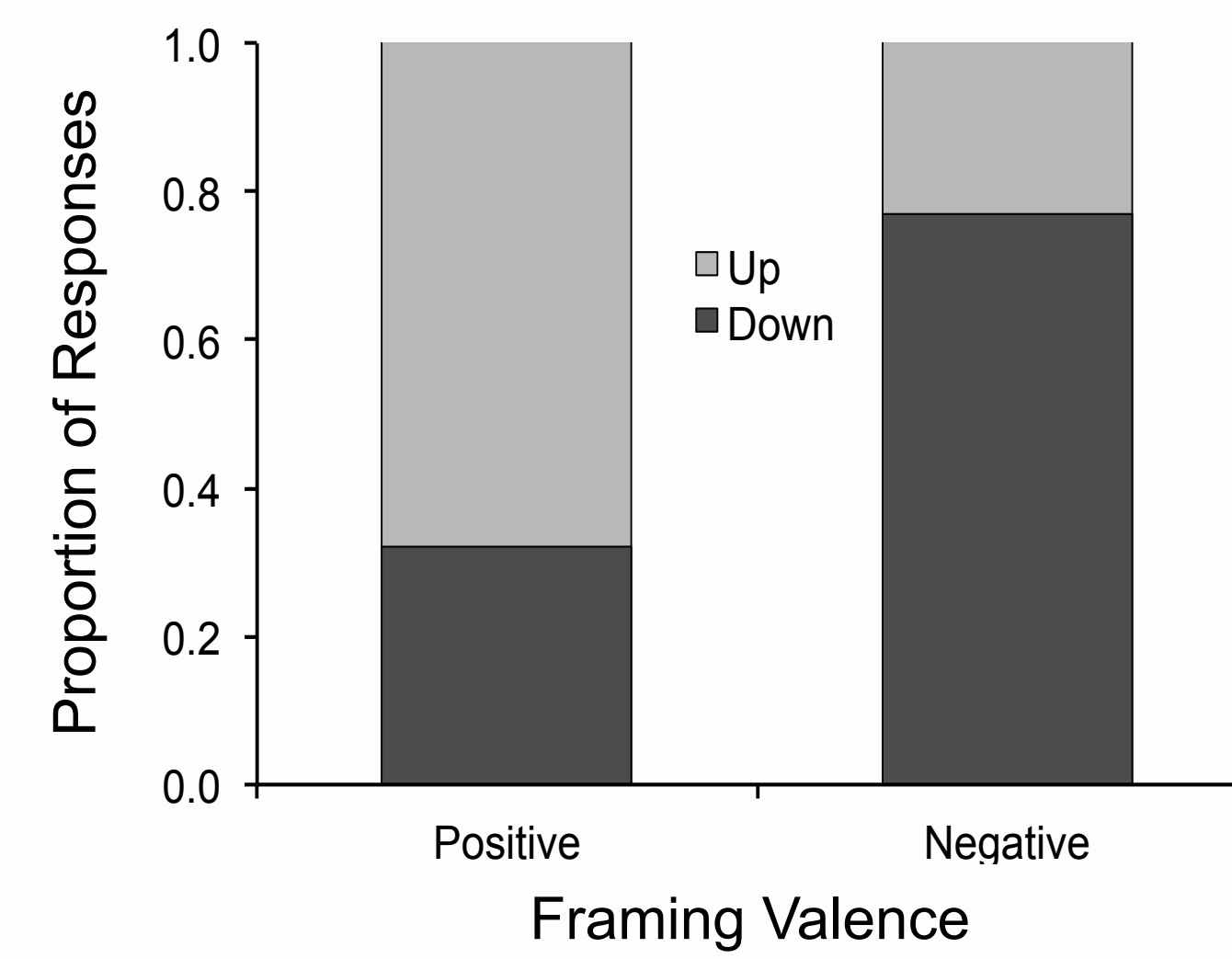
Across Tasks: 72% of responses followed a good=up pattern. Wald X^2=24.4, df=1, p<.0001.

Vertical Boxes Task

Boxes: 81% of responses followed an up=good pattern. Wald X^2=14.5, df=1, p<.0001.

Vertical Animals Task

Animals: 55% of responses followed an up=good pattern. Wald X^2=7.39, df=1, p=.007.

Children implicitly associate *Good* with *UP*.

EXPERIMENT TWO:

Where do mental metaphors come from?

Two potential sources:

Correlations in Linguistic Experience:
We talk about being 'on top of the world' or feeling 'down in the dumps'.

Correlations in Bodily Experience:
We stand upright when happy and slouch when sad.

Linguistic and bodily accounts make the **same prediction** for vertical mental metaphors: Up = good in both our language ('high spirits') and body (upright posture).

Can we distinguish possible effects of Linguistic Experience and Bodily Experience?

For mental metaphors that link valence with vertical space, these sources of experience seem inextricable.
To tease them apart, we investigated mental metaphors that link valence with *horizontal* space, comparing right- and left-handers.

In language, good is associated with right (e.g., 'my right hand man', 'two left feet').

In bodily experience, we interact with our environment more fluently with our dominant hand. Do we come to associate good things with our dominant side?

Predictions

If children's mental metaphors from horizontal space to valence are based on linguistic experience, then they will show a *good is right* bias.

But if mental metaphors for valence are based on bodily experience (asymmetries in motor fluency), then righties will show a *good is right* bias but lefties will show a *good is left* bias.
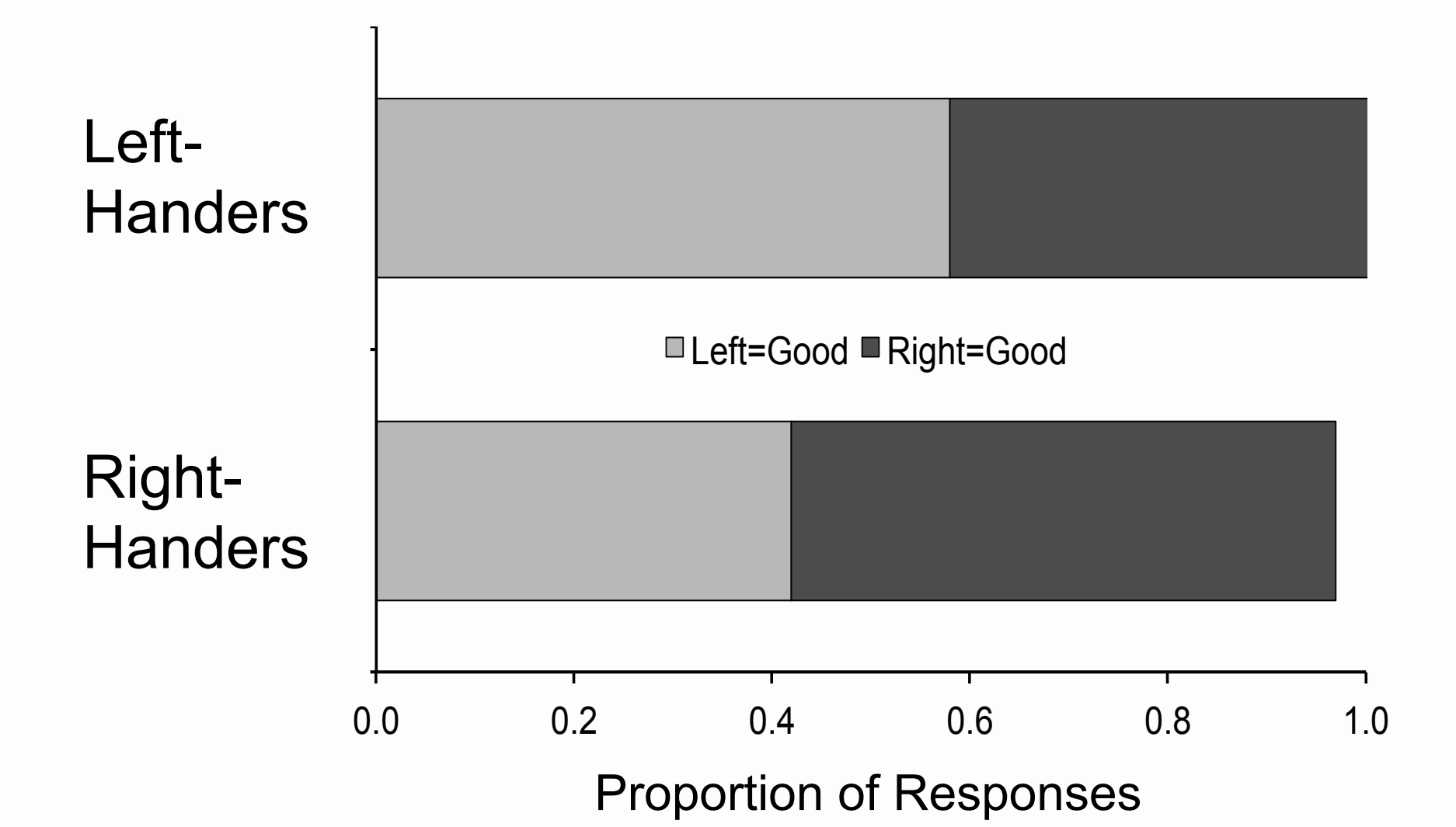
Methods

Participants. Children from Exp One (12 lefties,102 righties)

Procedure. Identical to Exp One except the toy boxes and animals were arranged left-right within each diagram.

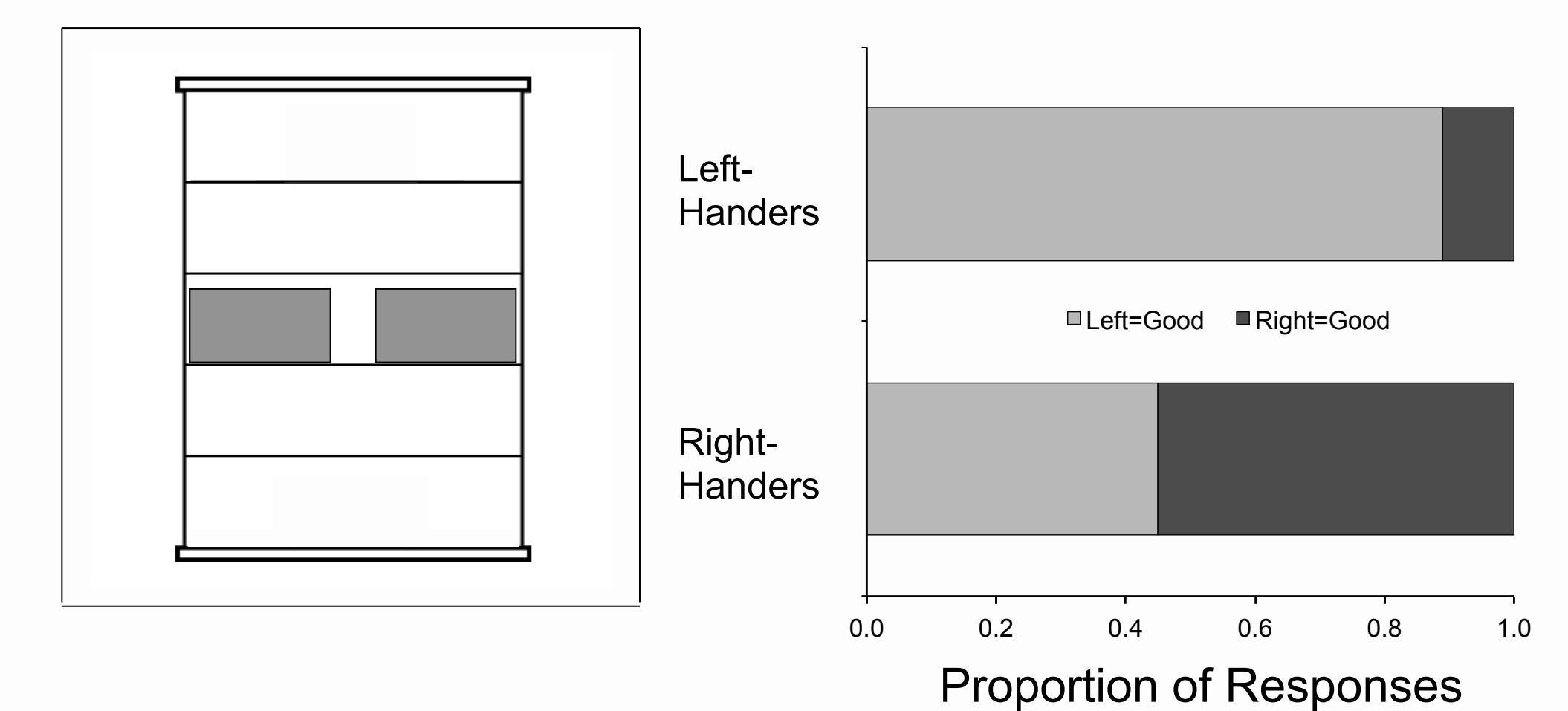Handedness was determined by both teacher report and pointing behavior.

EXPERIMENT TWO RESULTS

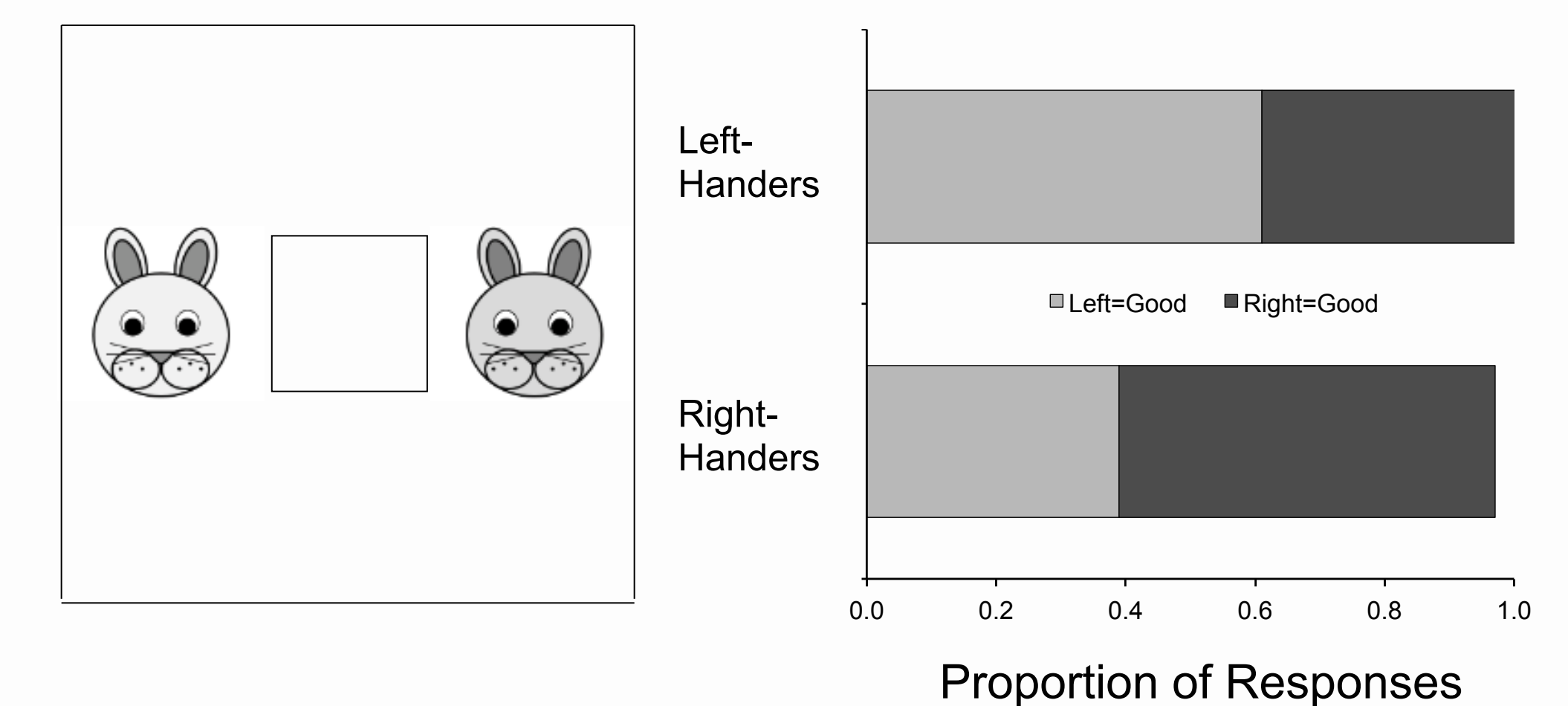### Kids' *horizontal* valence metaphors are *body-specific.*

Across Tasks: Handedness predicts direction of space-valence mappings. Wald X^2=7.69, df=1, p=.006.

Horizontal Boxes Task

Boxes: Handedness predicts direction of space-valence mappings. Wald X^2=6.84, df=1, p<.0001.

Horizontal Animals Task

Animals: Handedness modestly predicts direction of space-valence mappings. Wald X^2=3.3, df=1, p=.07.

Righties associate *Good* with *Right*.
Lefties associate *Good* with *Left.*

CONCLUSIONS

Vertical Mental Metaphors
- Children implicitly associate good with up and bad with down.
- This mapping could arise due to patterns of linguistic experience or bodily experience (or both).
- The relative contributions of linguisitic/cultural and bodily experience remain unknown.

Horizontal Mental Metaphors
- Right-handed children implicitly associate good with right, but left-handers associate good with left.
- The lefties' data (and the interaction) cannot be explained by patterns in language or culture.
- Some mental metaphors are *body-specific* (Casasanto, 2009), varying with body-world interactions.

REFERENCES
Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in right- and left-handers. *Journal of Experimental Psychology: General. 38*(3), DOI: 10.1037/a0015854.
Tversky, B., Kugelmass, S. & Winter, A. 1991. Cross-cultural and developmental trends in graphic productions. *Cognitive Psychology 23*: 515-557.