# Educational Experiences Connect Symbolic Fractions to Parietofrontal Nonsymbolic Ratio Processing Systems

Isabella Starling Alves & Yunji Park, Priya B. Kalra, John V. Binzak,
Percival G. Matthews, & Edward M. Hubbard

Educational Neuroscience Lab
UW-Madison

WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

## Introduction

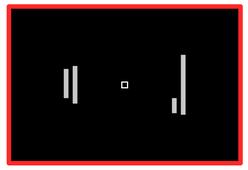
- The Ratio Processing System (RPS) represents nonsymbolic ratios and might serve as a foundation for symbolic fractions.
- How do frontoparietal regions for symbolic and nonsymbolic fractions processing develop prior to and after fractions instruction?

## Methods

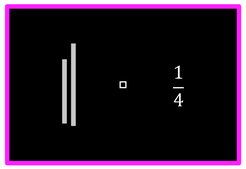
**Cross-notation Comparison Task (XFC):**

- 3 intermingled notations and 3 numerical distances. 6 runs of 36 trials each.

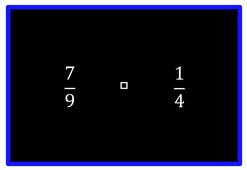
**Choose the larger:**



**Line ratio vs. Line ratio (LL)**




**Line ratio vs. Fraction (FL)**




**Fraction vs. Fraction (FF)**

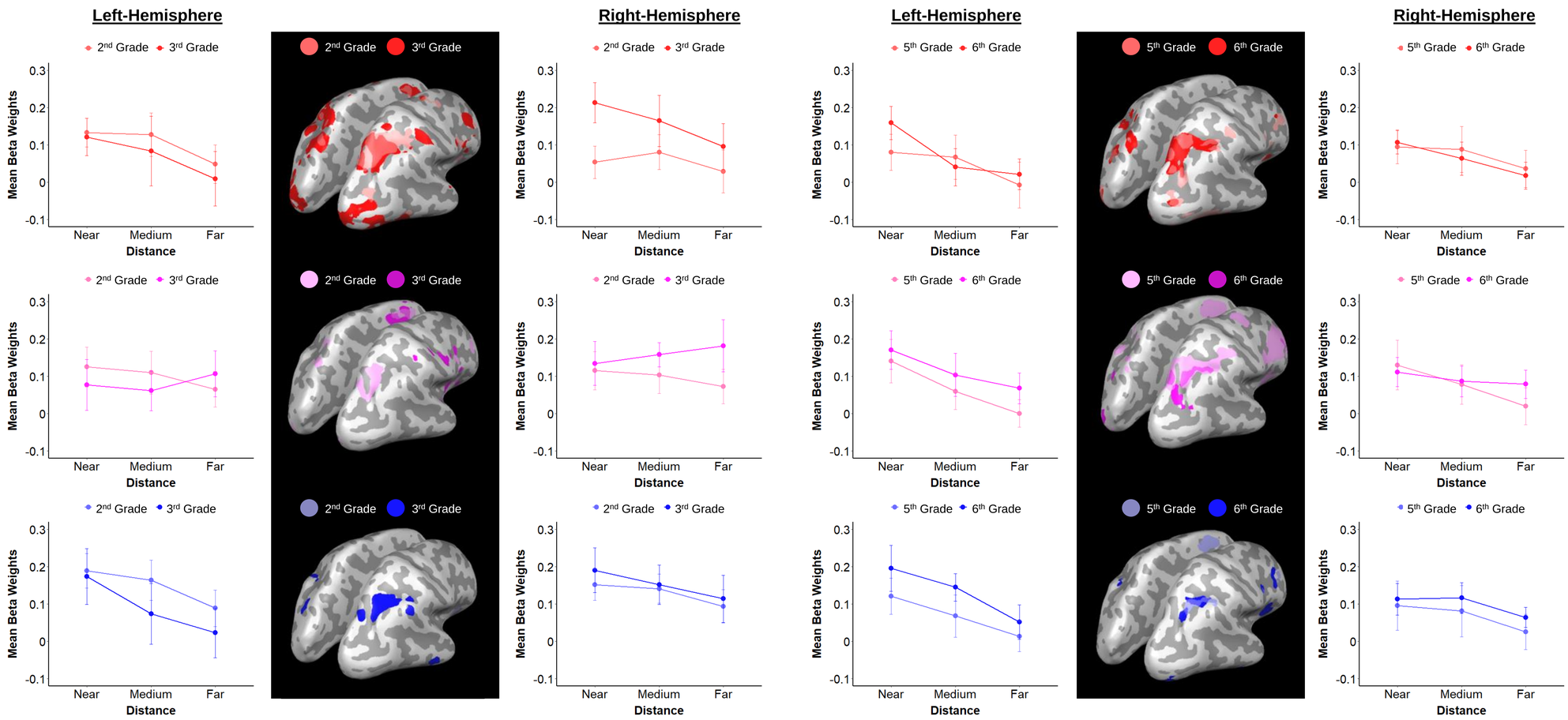
**Participants:**

- 18 2nd and 20 5th graders successfully completed an fMRI experiment in two consecutive years as part of an ongoing longitudinal study.
- All participants were from public schools.

## Results

### Behavioral Analysis


### Whole-Brain and ROI Analysis




## Conclusion & Discussion

- These data are consistent with three predictions of the RPS theory:

1) Nonsymbolic ratio processing develops prior to formal instruction with fractions.
2) Symbolic fractions processing builds on preexisting frontoparietal networks for nonsymbolic ratio processing.
3) Continued education/development refines these representations.

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