Introduction

- Children’s strategies for equal sharing problems
  “Four students want to share 10 brownies equally. How many brownies will each student get?”
- Development of children’s thinking → quotient interpretation of fraction (Charles & Nason, 2000; Empson et al., 2006)
- Relationship between problem features and children’s strategies

Objectives

- Use research data to construct a theoretical model for testing the features of the to-be-partitioned items on children’s strategies

Background

Foster & Osana (2018)

Two Confounds

1. **Attribute (area/length):** The semi-familiar problems involved partitioning length models, whereas all the familiar problems involved partitioning area models
2. **Unit type (standard/arbitrary):** The semi-familiar problems involved standard units, whereas all the familiar problems involved arbitrary units
   - Children’s partitioning strategies and reasoning about measurement vary across attributes and differ depending on the type of unit used (e.g., Boulton-Lewis et al., 1996; Curry et al., 2006; Hiebert & Tonnessen, 1976; Lehrer, Jenkins, & Osana, 1998)

Familiarity and “Groundedness”

- Familiarity depends on students’ prior knowledge and experience (Mix et al., 2017)
- Grounded: Real-world referents (Goldstone & Son, 2005)
- Idealized: No direct reference to the physical objects they could represent (Koedinger et al., 2008)

Theoretical Model for Testing Features of Equal Sharing Problems

<table>
<thead>
<tr>
<th>Familiarity</th>
<th>Groundedness</th>
<th>Unit of Measure</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area</td>
<td>Length</td>
</tr>
<tr>
<td>Standard</td>
<td>A pan of brownies measures 10 cm². If Amanda wanted to share the pan of brownies equally among 4 people, how many square centimeters of brownie would each person get?</td>
<td>Four people want to share 10 cm of string equally. How many centimeters of string will each person get?</td>
<td></td>
</tr>
<tr>
<td>Arbitrary</td>
<td>Amanda has 10 brownies and she wants to share them equally among 4 people. How many brownies will each person get?</td>
<td>Four people want to share 10 pieces of string equally. How much string will each person get?</td>
<td></td>
</tr>
<tr>
<td>Idealized</td>
<td>Amanda has 10 porams and she wants to share them equally among 4 people. How many porams will each person get?</td>
<td>10 ÷ 4 = □</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

- Identifying the types of equal sharing problems that optimize the development of students’ problem-solving strategies and fractions knowledge is informative in the design and implementation of classroom instruction.