# What Children's Sharing can Teach us about their Understanding of Rational Numbers

Presented By:

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# Background Information

- There is little research on young children's understanding of division
  - The limited research on this topic looks at division of whole numbers (e.g., 4 brownies shared with 2 children)
- There is very little research on rational number understanding (e.g., 4 brownies shared with 3 children)
- Children (and even adults) have a difficult time understanding rational numbers (Chen, 1999; Charles & Nason, 2000)
- Educators have stated that the learning of fractions is one of the most serious obstacles to the mathematical maturation of children (Charles & Nason, 2000)
- Some researchers even suggest that teaching fractions should be eliminated from the primary mathematics curriculum (Watanbe, 2001)

# Background Information

- Evidence suggests that children come to school with an intuitive understanding of equal sharing
  - Children as young as 3 can demonstrate an understanding of division through sharing activities (e.g., 4 brownies shared with 2 people) (Chen , 1999; Roberts, 2003)
- Children's invented equal-sharing strategies lay the foundation for reasoning about equivalence by connecting ideas of multiplication, division and fractions (Empson, 2001)

# Purpose

- Based on the fact that children have an intuitive understanding of sharing, but have difficulty understanding rational numbers, our study used the concept of sharing as a scaffold to elicit children's level of rational number knowledge
- The focus of our study was to examine how young children approach dealing with rational numbers through sharing activities

# Measures: The Bobby Test

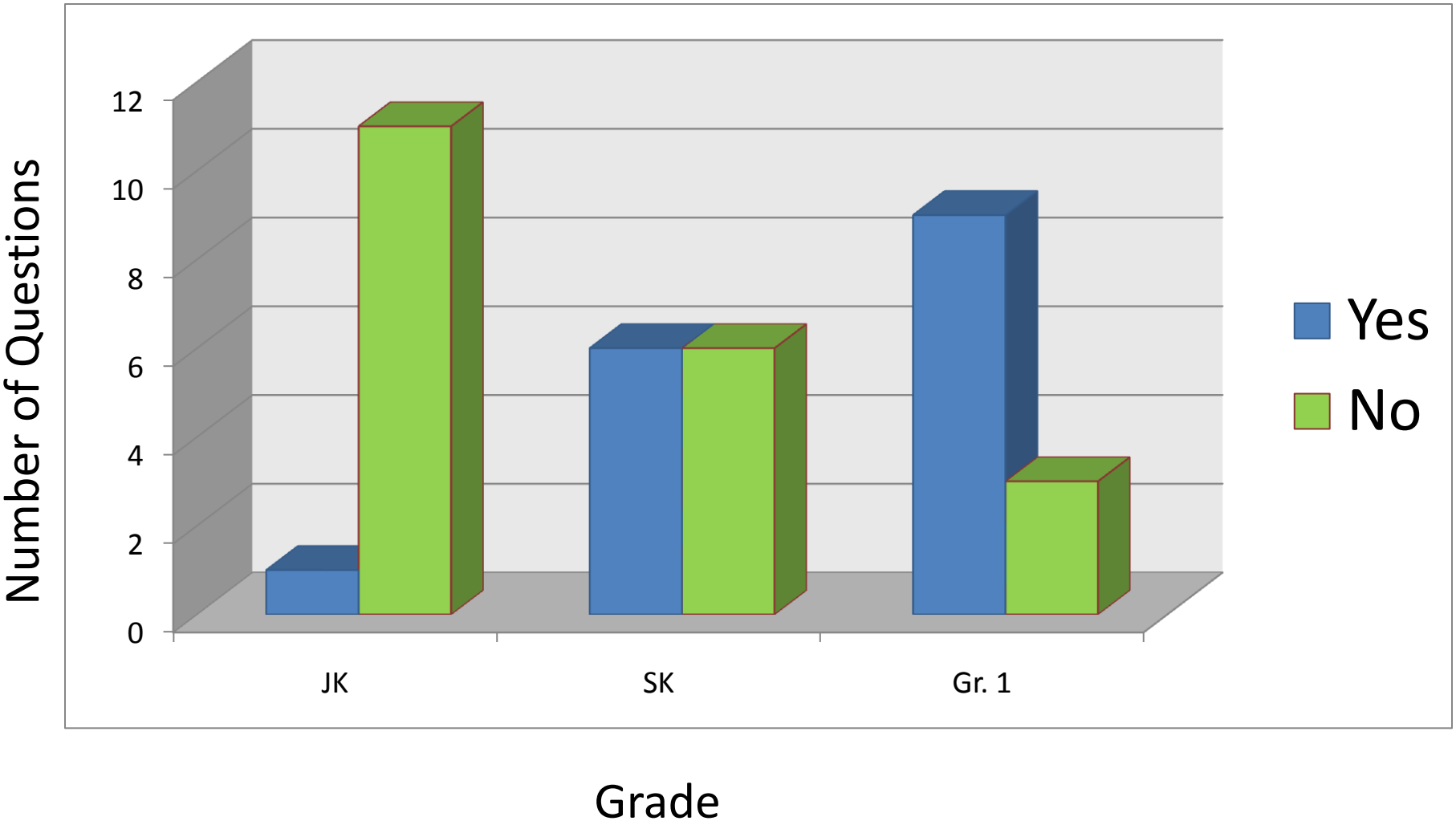
- The Bobby Test:
  - Pre-test – Division of whole numbers
  - Concept of ½
  - Concept of ¼ and ¾
  - Concept of 1/3 and 2/3
  - Comparison Questions
- Questions we asked:
  - Can you share the brownies fairly?
  - How much did everyone get?
  - Is it actually fair?
  - Does everyone get more or less than a whole/half?

# Measures: Materials

- Brownie

- Children

# Findings: Overall Concept of Sharing With Rational Numbers



# Findings: JK

- Underdeveloped number sense
- Focused on number of pieces, not size
- Unsure of what to do with remainders
- Disconnect between what they said and did
- Emerging understanding of a half

# Findings: SK

- Good number sense
- Starting to grasp that size matters, not just the number of pieces
- Sometimes required prompting to deal with remainders
- Understand the difference between a half and a whole
- Used the term “half” but over generalize it
- Relied on halving strategy
- No concept of 1/3 and 2/3
- Difficulty approaching problems with big numbers

# Findings: Grade 1

- Focus shifted from the number of pieces to the size
- Solid concept of a half and "half of a half"
- Used the term "half" & "quarter" but over generalized it
- Sometimes required prompting to deal with remainders
- Understand that ¼ and 1/3 are less than a half, and that ¾ and 2/3 are more than a half
- More flexible in their approaches

# Conclusion

- Developmental progression from JK to SK to Grade 1
  - Language used
  - Understanding the importance of size (not just quantity)
  - Dealing with remainders
  - Dealing with big numbers
  - Understanding the concept of ½, ¼, and 1/3
- Young children demonstrate an emerging understanding of rational numbers through sharing
- They lack the language to explain their thinking
- They are able to show but not tell
- Manipulatives and context help elicit their understanding

# Implications

- How can we use children's intuitive understanding of sharing to extend their understanding of rational numbers?
  - Give students opportunities to show their understanding
  - Do not assume that children lack an understanding of rational numbers just because they do not have the language
  - Rational numbers should be introduced earlier
    - If we wait too long, children's knowledge of whole numbers becomes a predominate scheme and seems to hinder their ability to develop a concept of rational numbers

# References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# And now….