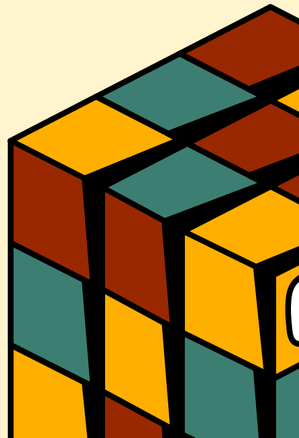
Piaget Dive

Elkind, 1961; Gelman, 1972

12 September, 2025



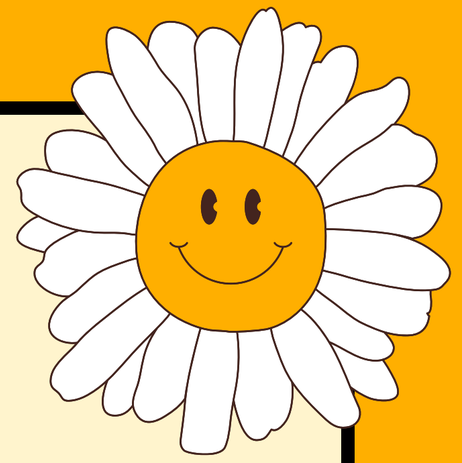
Presentation Outline

Overview of Elkind, 1961

Overview of Gelman, 1972

Bridging Themes

Introduction



- Replicate Piaget's conservation task
  - “Sausage” experiment
  - Two clay balls of same size & shape
  - Changed 1 into sausage shape
  - Asked children to predict if they would be the same
  - Claimed that **mass, weight, volume conservation followed stages and occurred in that order**

- Elkind—same procedure as Piaget EXCEPT:
  - Used cross-sectional sample of 175 children (grades K-6; ages 5-12) from school in MA
  - Had structured questions that were the same for each child

Elkind, 1961

Piaget's findings

- Mass conserved @ 7-8 yrs
- Weight conserved @ 9-10 yrs
- Volume conserved @ 11-12 yrs

Elkind's findings

TABLE 1

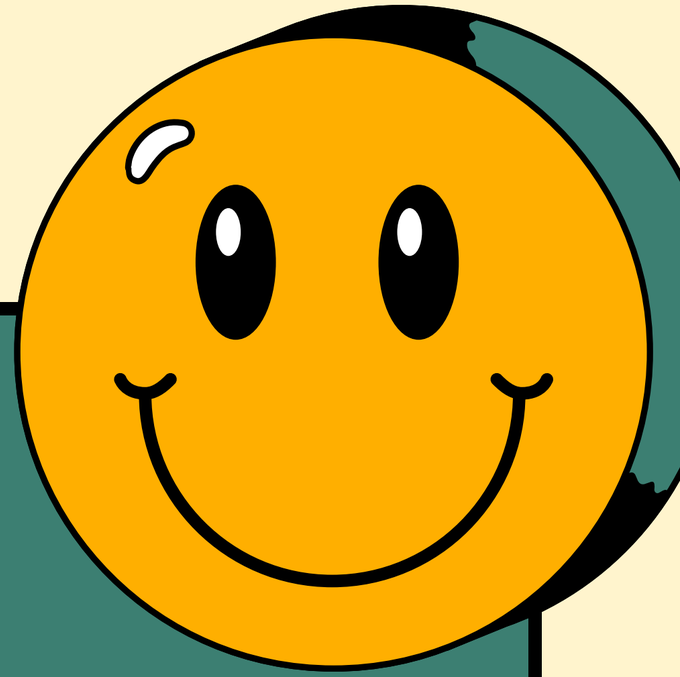
PER CENT[a] OF CONSERVATION RESPONSES FOR MASS, WEIGHT, AND VOLUME AT SUCCESSIVE AGE LEVELS
(N = 25 at each Age Level)

Type of quantity	Age level 5	6	7	8	9	10	11
Mass	19	51	70	72	86	94	92
Weight	21	52	51	44	73	89	78
Volume	0	4	0	4	4	19	25

[a] Of 75 possible responses.

Elkind, 1961

Why?



- The children's patterns of explanation/thought processes changed based on age
  - Romancing: "my uncle said so"
  - Perceptual: "it's longer, thinner vs. thicker, wider"
  - Specific: "you didn't add or take away"
  - General: "no matter the shape, it doesn't change the amount"
- Piagetian term: logical multiplication=ability to find the point of intersection between two things that are different

TABLE 2

PER CENT FOR EACH OF FOUR TYPES OF EXPLANATION GIVEN AT SUCCESSIVE AGE LEVELS (N = 25 at each Age Level)

Type of explanation	Age level 5	6	7	8	9	10	11
Romancing[a]	4	3	7	7	0	1	0
Perceptual[a]	85	64	53	57	36	32	33
Specific[b]	11	33	40	36	60	51	49
General[b]	0	0	0	0	4	16	18

[a] Explanation of non-conservation.
[b] Explanation of conservation.

Elkind, 1961

Introduction

- Piaget's conservation tasks suggest young children fail to conserve number
  - Alternative view: failure may stem from language, attention, or estimation problems, not logical incapacity
  - Approach: Use "magic show" to test number invariance without relying on verbal questions/estimation
- Invariance Rules
  - *Relevant operations*: addition, subtraction (change number).
  - *Irrelevant operations*: displacement, rearrangement (do not change number)
  - Use these rules to correctly classify which transformations affect number

Gelman, 1972

Experiments

Gelman, 1972

Experiment 1:
Subtraction vs. Displacement

- 96 children (ages 3–6)
- Subtraction → strong surprise, search, “missing mouse”
- Displacement → little/no surprise, explained as movement
- Children recognized reversibility

Experiment 2:
Addition vs. Displacement

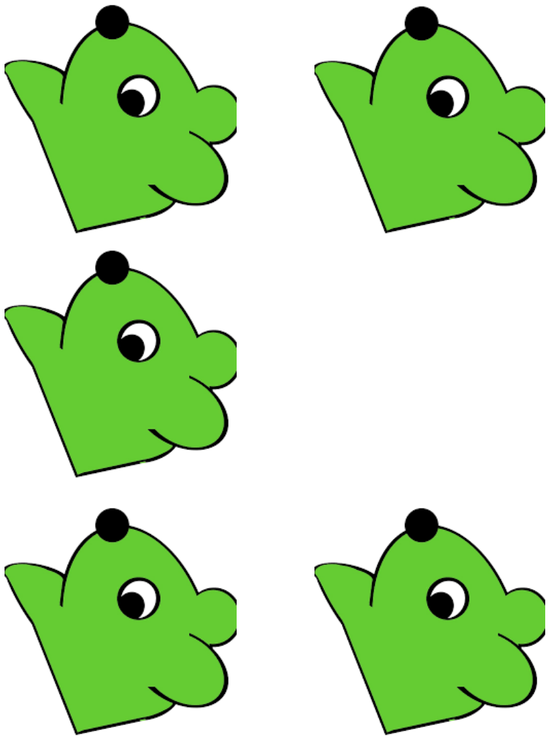
- 32 children (ages 3–4.5)
- Addition → surprise, doubt, “extra mouse”
- Displacement → still winner, no surprise
- Explanations used addition/subtraction logic
- Children recognized reversibility

Control:
Standard Conservation Task

- Classic Piaget rows of 3 chips
- 3-year-olds: almost always judged unequal
- 4-year-olds: often failed too
- Correct answers rare, explanations not logical
- Shows conservation failure even for small numbers

Experiments

Gelman, 1972



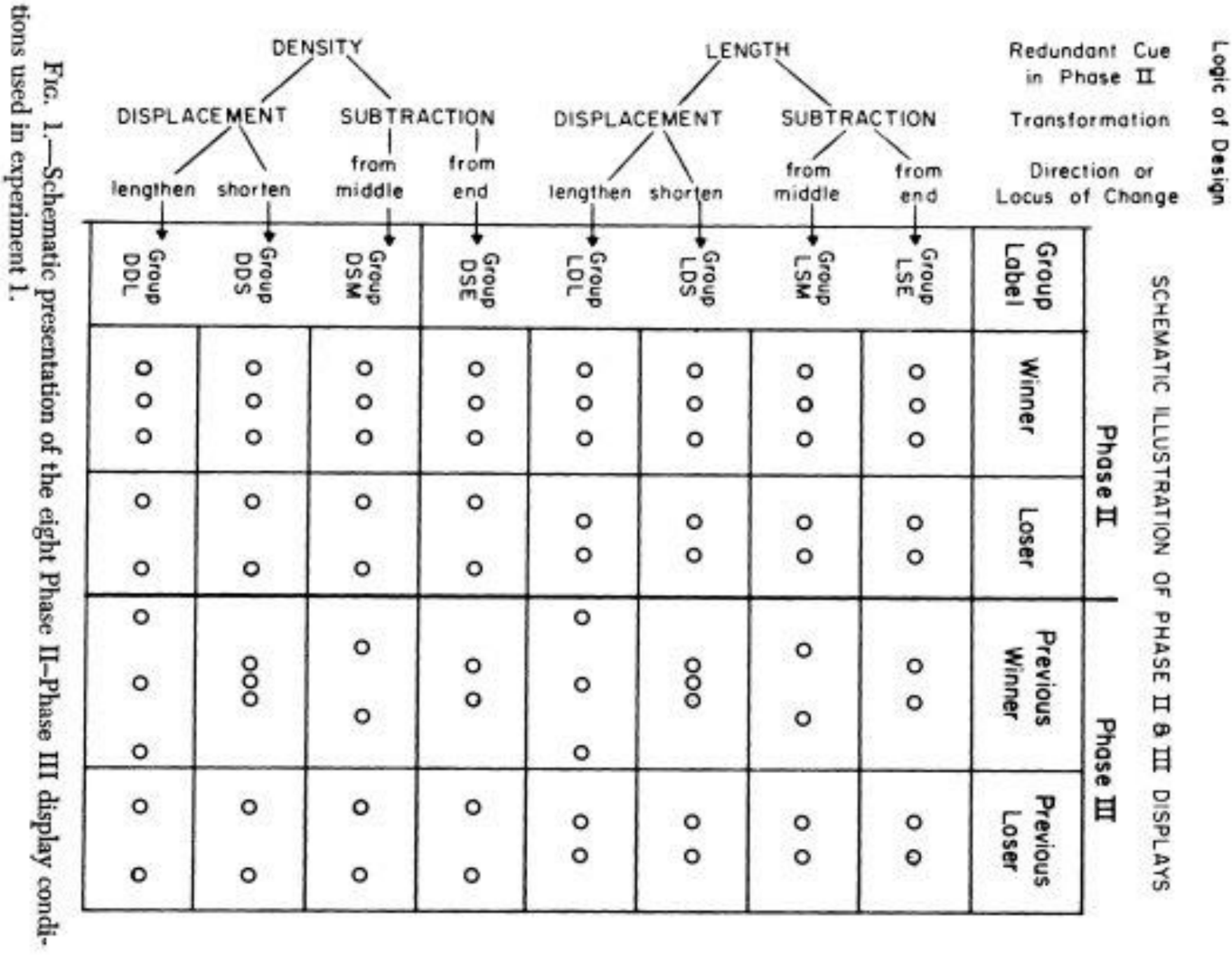
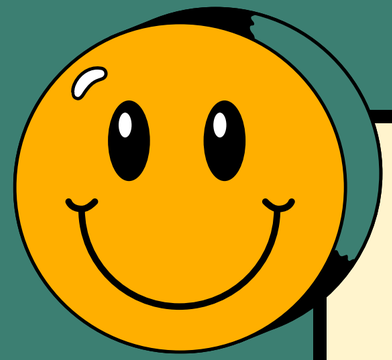


FIG. 1.—Schematic presentation of the eight Phase II–Phase III display conditions used in experiment 1.



Discussion

- Findings:
  - Very young children **can**:
    - Treat small numbers as invariant under displacement
    - Correctly classify addition/subtraction as relevant operations.
    - Suggest reversibility (e.g., adding undoes subtraction).
- Contradiction with Piaget:
  - Conservation failure ≠ absence of logical capacity
  - Likely due to language confusion, attentional shifts, or estimation demands
- Implication:
  - Children possess logic system for small-number invariance before reaching “concrete operations”

Gelman, 1972

Bridging Themes

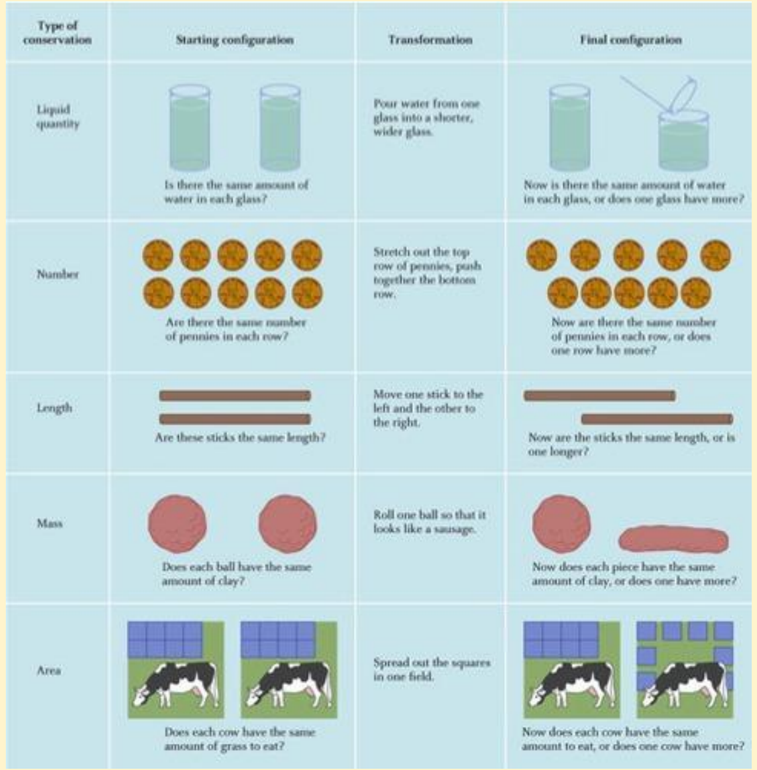
Cross cutting theme=building on Piaget's conservation tasks

Elkind, 1961:

- True replication of Piaget
- Used verbal learning and recall
- Focused on explanations and reasoning

Gelman, 1972:

- Challenged Piaget's methods and findings
- Used reinforcement and took out verbal recall
- Focused on logic rules "built-in" to the task



"Sausage" Experiment Activity

- Get into groups of 3-4
- Shape your clay into two equal/identical balls
- Roll one ball into a "sausage" shape and keep the other the same
- As a group:
  - Reflect on what kinds of explanations children of different ages might give
    - Romancing: “my uncle said so”
    - Perceptual: “it’s longer, thinner vs. thicker, wider”
    - Specific: “you didn’t add or take away”
    - General: “no matter the shape, it doesn’t change the amount”
  - Discuss the rules/logic needed to understand the task