TITLE
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CHILDREN’S DEVELOPING THEORIES OF MOTION:
SUBJECTIVITY AND SHIFT

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INTRODUCTION

Younger children believe a light ball will roll down an incline faster than a heavy ball – matching their beliefs about horizontal motion – but older children believe the heavy ball will roll down faster – matching their conceptions about fall (cf. Hast & Howe, 2012, 2013).

Why does this shift occur?

1. Do children perceive speeds for a heavy and a light ball down an incline to be as great as for horizontal motion or fall, and how might this change with age?
2. Does the height of the incline play any role; do children believe there is an incline height where the balls behave differently from the initial prediction?

Two studies conducted with primary school children from Years 1 (5-6 years), Year 2 (6-7 years), Year 4 (8-9 years) and Year 6 (10-11 years) addressed these key questions.

STUDY 1

Method

Children (N = 210) asked to make paper-based predictions about speeds of two balls of different mass along a horizontal, down an incline and in fall.

1. Asked to identify position of one ball along the trajectory at the same time as the shown ball.
2. Both disparity (how much faster or slower is the drawn ball?) and direction (which ball is predicted to be faster?) measured.

STUDY 2

Method

Children (N = 144) asked to make predictions about speeds of two balls of different mass down an incline.

1. Asked to compare speeds and to indicate whether incline can be manipulated so that speeds are same.
2. Asked to indicate height where the two balls would have the same speed and asked to predict what would happen beyond that point.

RESULTS

Absolute disparity (i.e. regardless of positive or negative direction):

1. No significant dimension or age effects.
2. Relative disparity:
   - Significant main effects of dimension, F(2,412) = 96.41, p < .001, \( \eta^2_p = .32 \), and age, F(3,206) = 5.61, p < .05, \( \eta^2_p = .08 \), and significant dimension x age interaction, F(6,412) = 3.08, p < .05, \( \eta^2_p = .04 \).
   - Significant age changes for horizontal motion, F(3,206) = 5.13, p < .05, \( \eta^2_p = .08 \), and for incline motion, F(3,206) = 5.57, p < .05, \( \eta^2_p = .07 \), but not for fall.
   - Incline disparity never as extreme as for horizontal (Years 1 and 2) or fall (Years 4 and 6) – consideration of both horizontal and vertical in incline reasoning likely.
   - Fall stable across age – horizontal element becoming less salient with age for incline motion?

CONCLUSION

Together, the two studies explored reasons for the shift in incline motion observed in previous research.

1. Indication that both horizontal and vertical elements play a role in making predictions about incline motion across all age groups.
2. But shift is evident in shifting role of horizontal and vertical elements, with horizontal becoming less salient and vertical becoming more salient.
3. Findings contribute towards a clearer understanding of how commonsense theories of motion develop in childhood.

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REFERENCES


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