

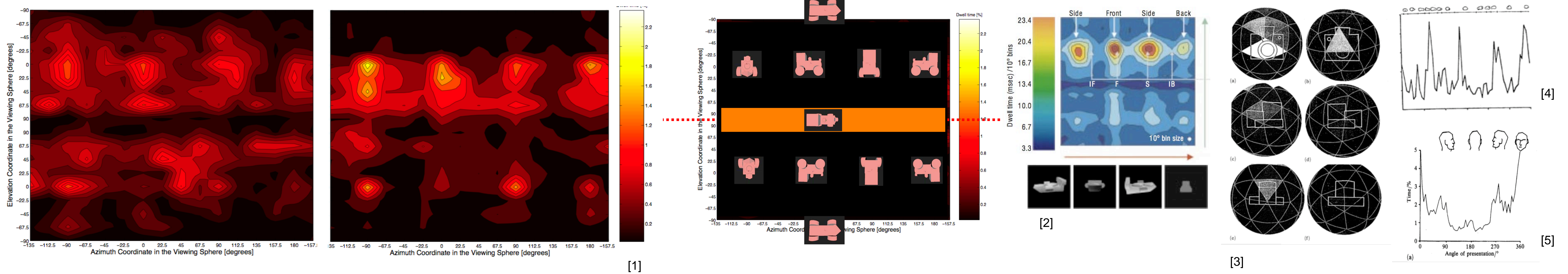
Main Axis of Elongation Dynamics and the Planar Bias in Active Object Inspection: A Developmental Approach

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Planar Bias Development in Active Learning

During active learning, preferred viewpoints are around on-axis views, where the principal axis of elongation is either perpendicular or parallel to the line of sight and flat surfaces are presented approximately perpendicular to the line of sight – so called **planar views**.



Study 1: Main Axis of Elongation



How is the main axis of elongation oriented?

- N = 21 infants (aged 18 – 24 months);
- Infants manipulated 5 new objects while wearing a head-mounted camera;
- 3D orientation of the object was coded (1Hz); main d.v. was the angle between the object main axis of elongation and Line of Sight.

Study 1: Results

Foreshortening was rare

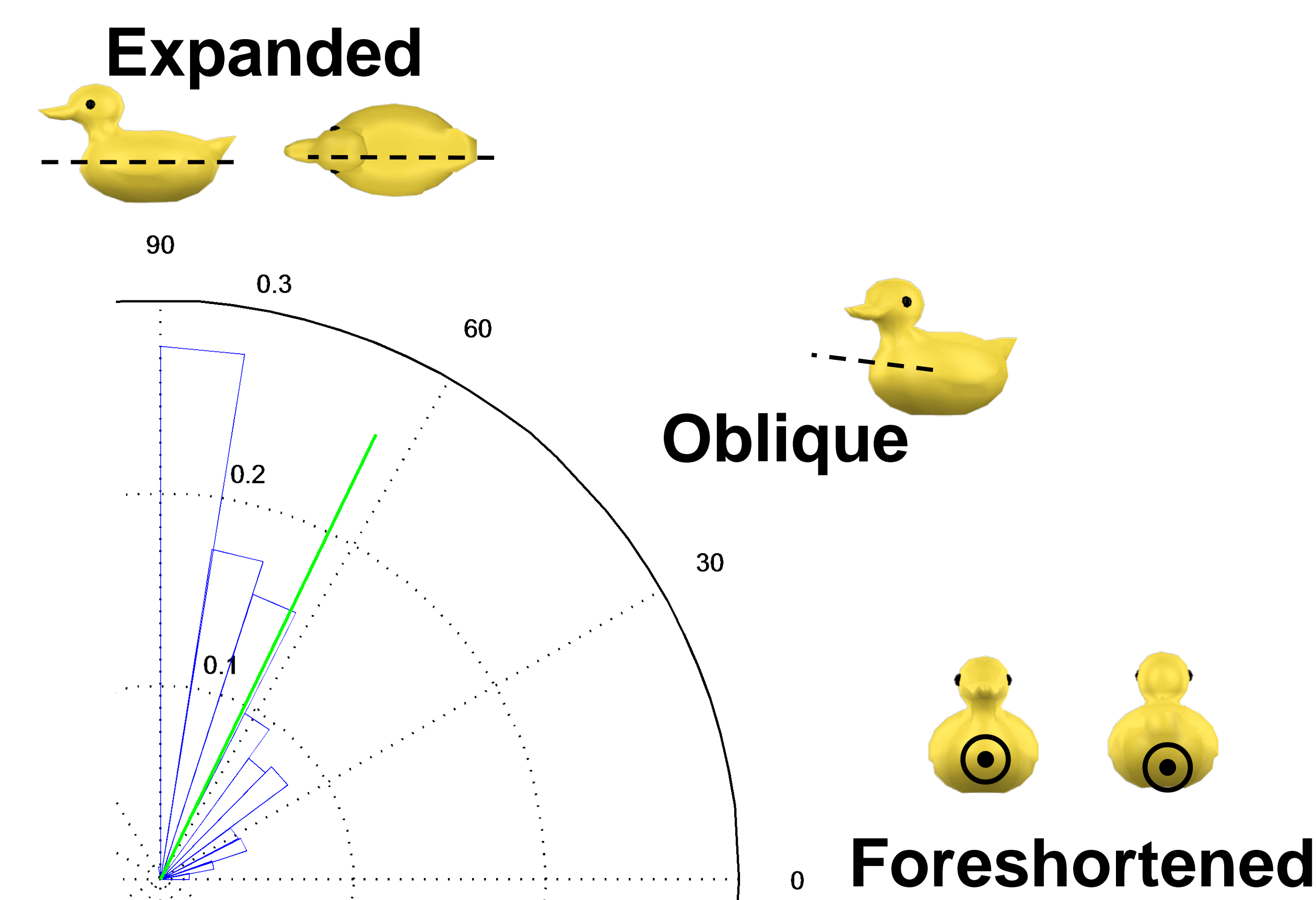
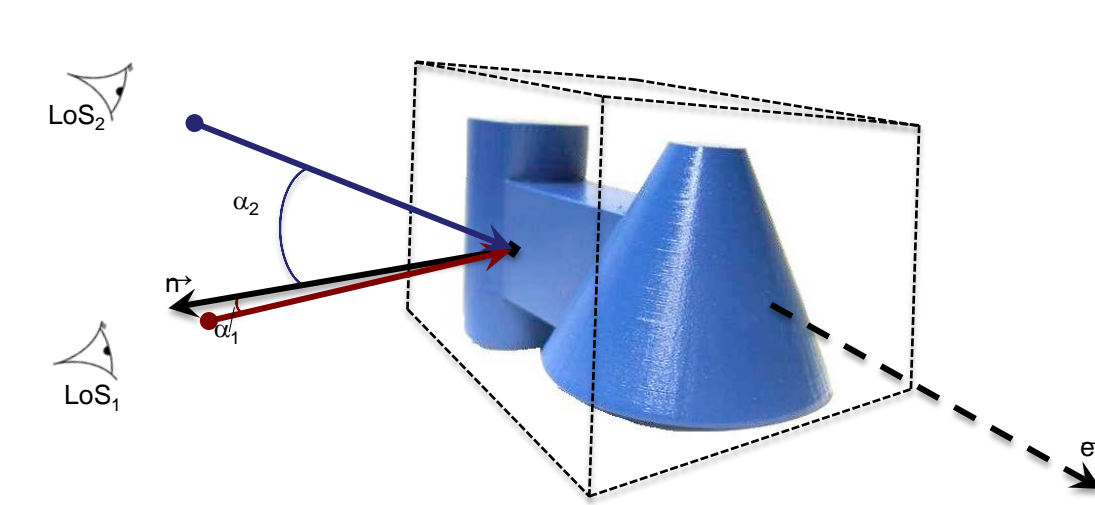
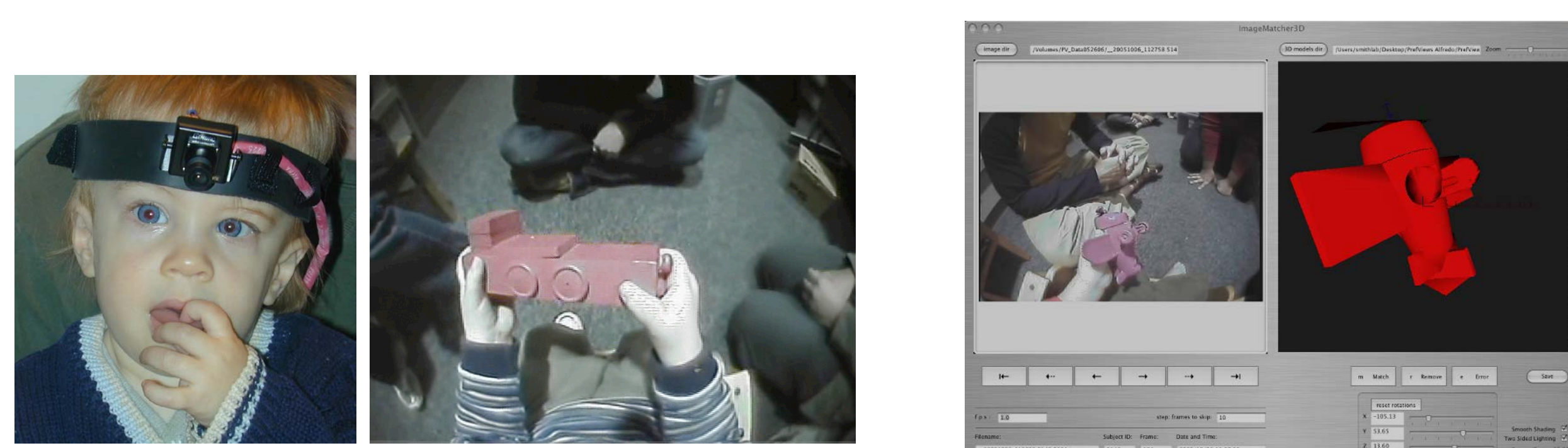


Figure 1: Histogram of the angle between the object main axis of elongation and the infant's line of sight. Average value

Study 2: Stability of the Main Axis

Developmental changes in main axis orientation?

Do planar views correspond to more or less stable main axis pose?



- N = 54 infants (12 – 36 months; 4 age groups);
- Infants manipulated 8 known objects;
- Measures: angle between the main axis and the line of sight (1Hz), angular velocity and acceleration – the last two were coded at 10Hz but only for infants of 30-36 months.

Study 2: Results

Foreshortening was rare; Angle with LoS increased (12-18 vs. 18-24 largest changes); Main axis is more stable around planar views

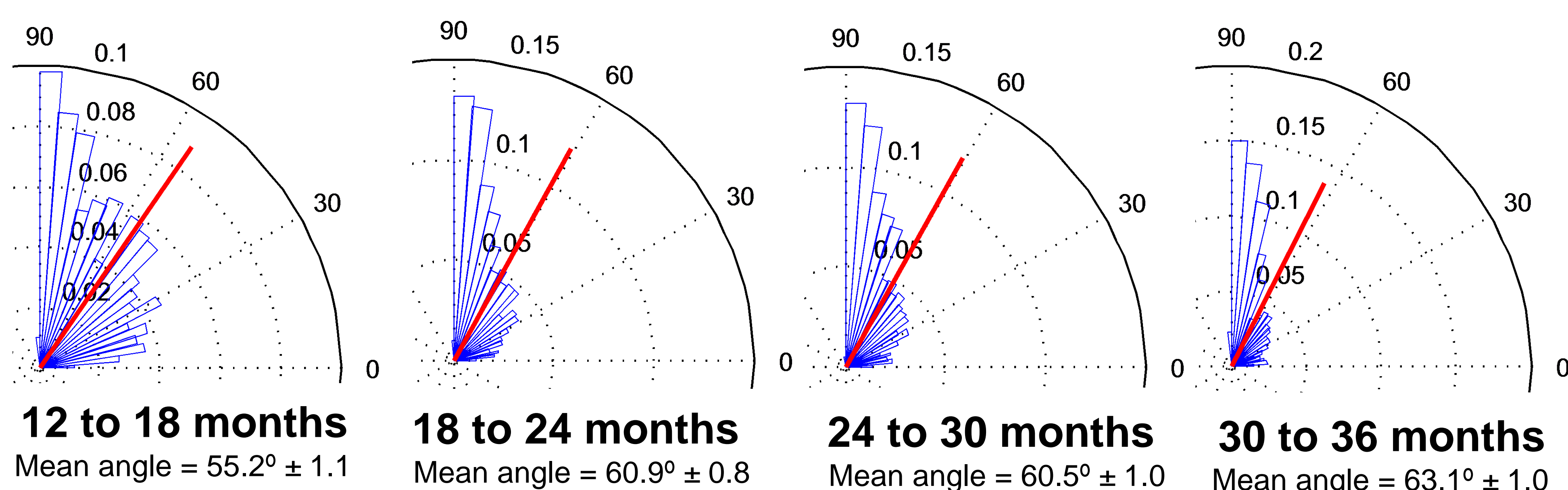
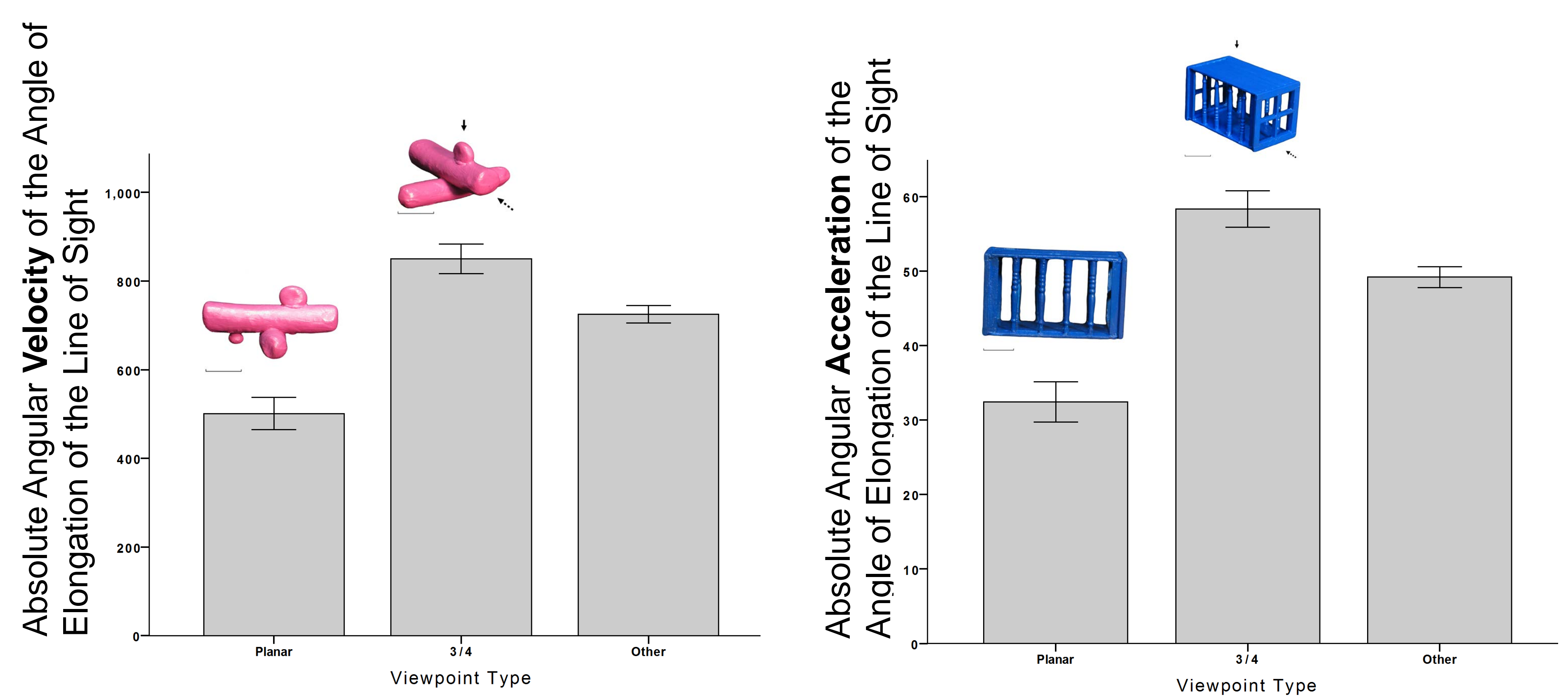


Figure 2: Angular distribution histograms across the four age groups. Mean effect of age group on angle, $F(3, 12878) = 46.07, p < .001$, Watson-Williams Test



Discussion

Study confirms importance of elongation and main axis expansion during active learning; Planar views correspond to more stable periods of the object manipulation – this suggests that sampling planar views corresponds to moments of focused attention to a particular view and perhaps learning of a static view is occurring, leaving open the question of view integration

References and Acknowledgements

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