

# Media's Influence on Early Learning, Memory, and Performance

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# Multi-methods approach

- Experimental studies
  - Imitation
  - Object search
- Physiological measures
  - ERP
  - Heart rate
- Observational studies
  - Parent-infant interactions

# American Academy of Pediatrics

- Recommendation: Children < 2 should not be exposed to screen media
- Exposure to screen media harmful to infant development
  - by decreasing **quality** & **quantity** of parent-child interaction

# Kaiser Family Foundation

(December, 2005)

- "Explosion" in media for young children
  - Baby videos
  - Computer programs
  - Video game systems
  - Interactive DVDs
  - BabyfirstTV

Christakis & Garrison (2005)

# Parents Not Following Recommendation

(Kaiser Family Foundation, 2003)

- For children < 2
  - 68% use some form of screen media
    - 2 hours each day
    - Most spent watching TV or videos/DVDs
  - 40% which is child-directed programming

(Rideout, Vandewater & Wartella, 2003)

# Experimental Studies: Imitation

- Non-verbal behavioral task
  - Ecologically valid direct measure
- Relation to memory development
  - 3-D objects must match attributes stored as part of the original representation formed from 2-D videotape display

# Barr & Hayne 1999

- Age
  - 12-, 15-, and 18-month-olds
- Manipulation
  - live model, video model, or control group.
- Delay
  - 24 hours



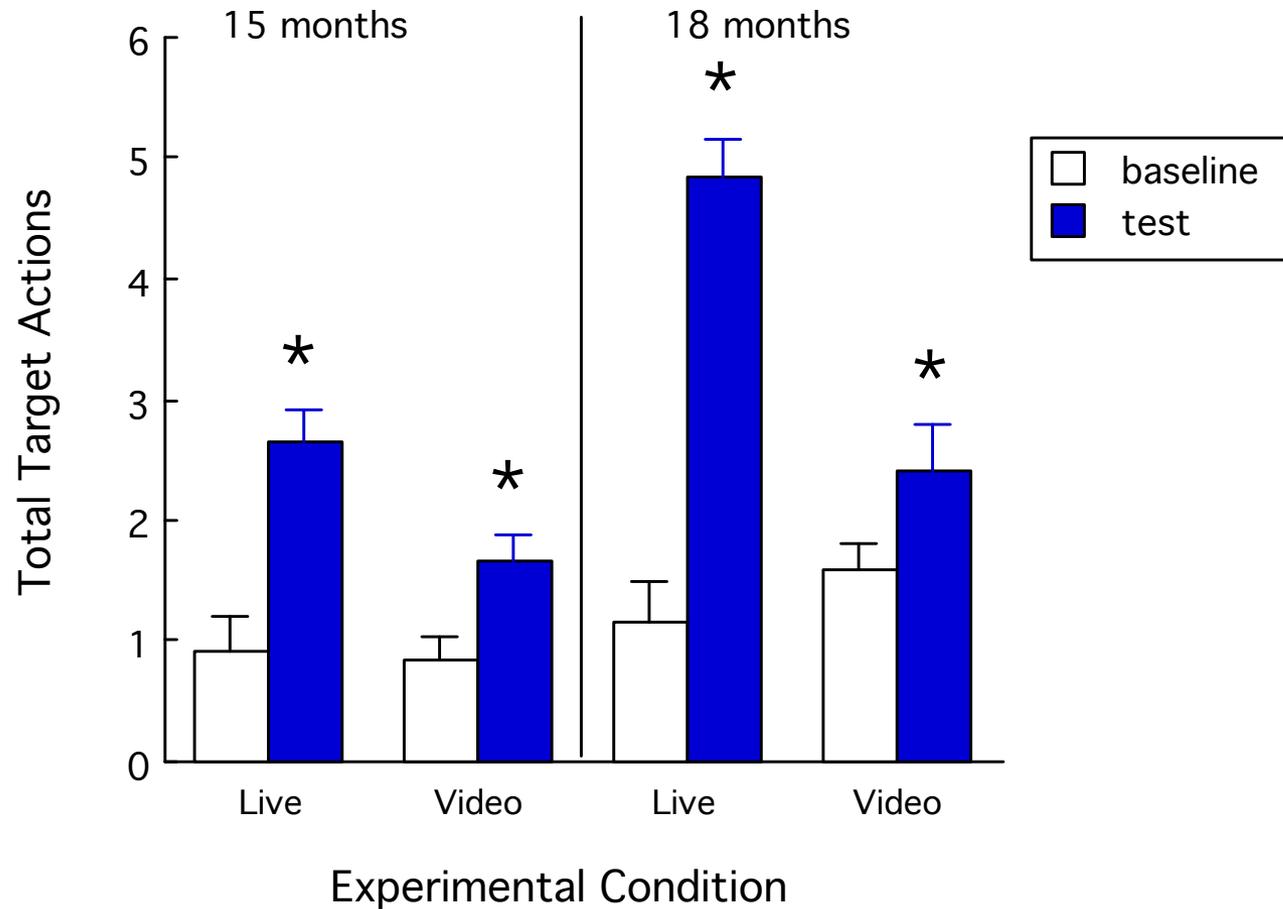








# Sequence: Rattle and animal



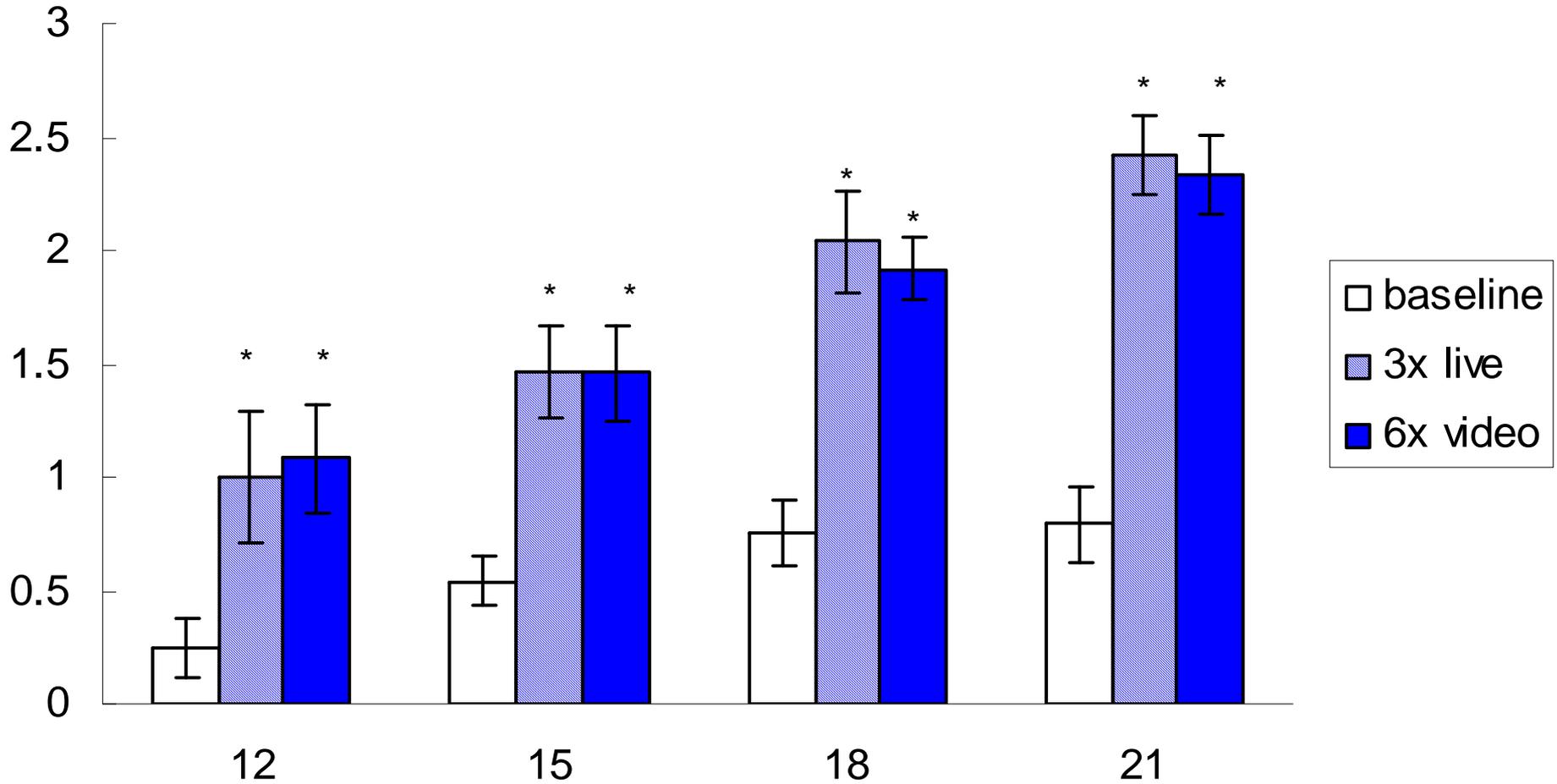
Barr & Hayne (1999)

# Video Deficit effect

- Infants consistently imitate fewer actions from television than from a live demonstration until 3 years of age

(McCall et al., 1977; Barr & Hayne, 1999, Hayne et al., 2003).

# Television and repetition effects



# Conclusions

- Increasing the number of repetitions strengthens the weaker memory representation

Anderson & Schmitt, 2002; Carver, Meltzoff & Dawson, 2006;  
Suddendorf, 2003

# Can even younger infants imitate from television?

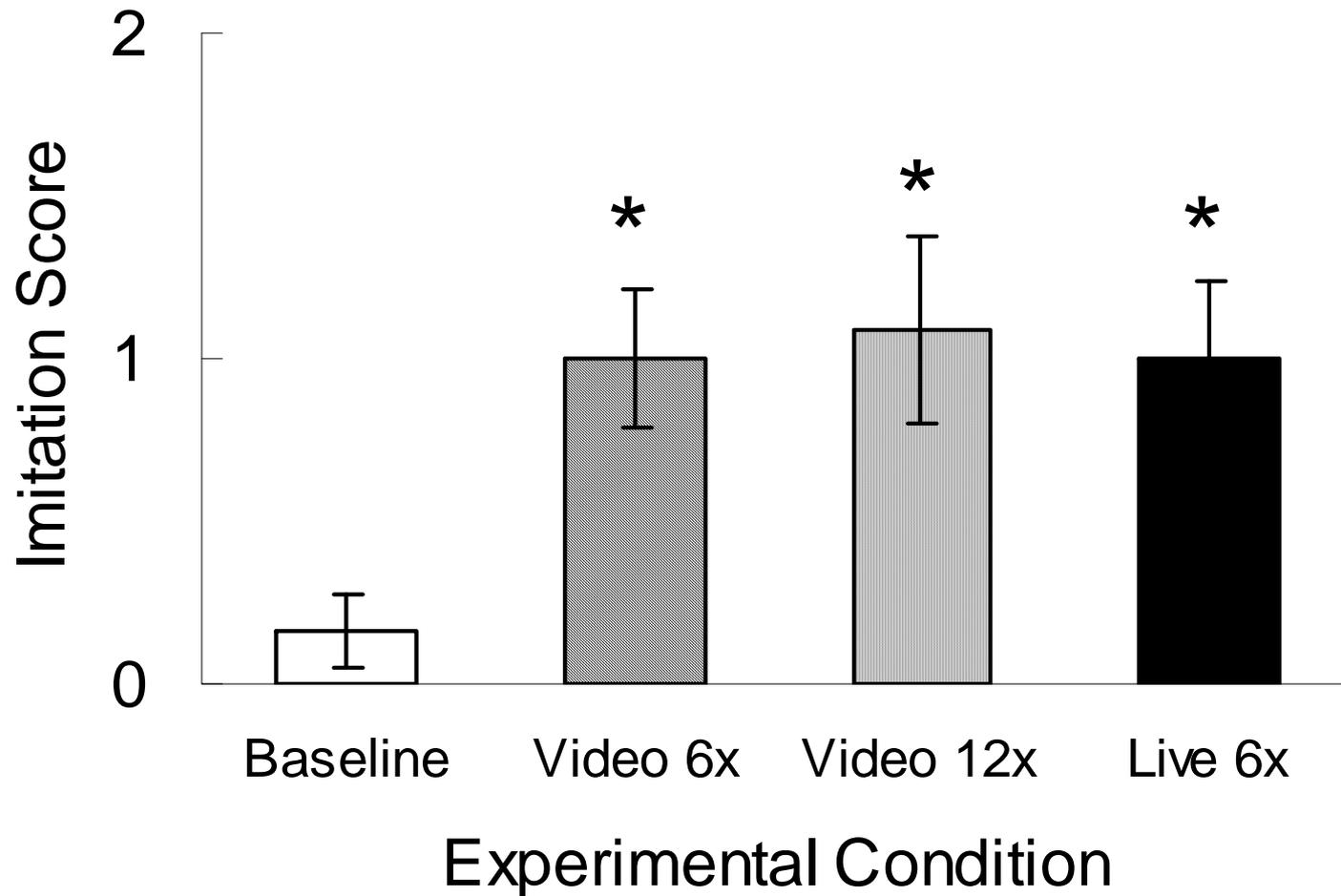


Barr, Muentener & Garcia (under revision)





# 6 month-olds



# Physiological measures-ERP

- 18-month-olds
  - Shown familiar and unfamiliar toy
  - Matched size, shape, color
- Recognized familiar 3D objects more rapidly than familiar 2D objects
- Processing 2D information is complex

Carver, Meltzoff, & Dawson (2006)

# Physiological measures-heart rate

- Measure
  - respiration, heart deceleration and heart rate variability
- Find that heart rate deceleration correlates with looking time during Sesame St. presentation
  - Richards and Casey (1991, 1992)

# Physiological measures-heart rate

- Differences as a function of age
  - Older infants discriminate between Sesame St. story and screen savers
    - Richards & Cronise (2000)
- Individual differences
  - Higher vagal tone more likely to process more complex stimuli v. screen savers by 1 yr of age
    - Courage, Reynolds, and Richards (in press)

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# Social functions and contingency

- Object search task
- Standard conditions 2-year-olds typically do not solve object search task
- Contingent 5 min online social interaction v. non-contingent pretaped interaction

# Social contingency conclusions

- Contingent group found toy
- Toddlers expect contingent social interactions
- Lack of contingency disrupts informational value of information presented on television.
  - » Troseth, Saylor & Archer in press
  - » See also Kuhl, Tsao & Lui, 2003

# What Happens During Infant Media Exposure?

- We know very little about infants'
  - Attention
  - Interaction

# Cognitive Functions Develop Through Social Experiences

(Vygotsky, 1978)

- Master skill in supportive social context
  - Skill internalized
  - Apply skill in new contexts

# Fitting with Vygotsky's Theory

- Social interaction with parents & adults helps shape cognitive development during infancy & early childhood

# Parent-Child Interaction in the Context of Book Reading

(DeLoache & DeMendoza, 1987)

- Verbal & nonverbal behavior
  - 12-, 15-, or 18-month-olds
- How interactions change with age

# Parent-Child Interaction in the Context of Book Reading

(DeLoache & DeMendoza, 1987)

- 12-, 15-, or 18-month-olds
- 75% of utterances were simple information
  - 60% of which were labels
- Reduce scaffold & increase demands as infant language abilities increase

# Interaction Patterns Similar In TV Viewing

(Lemish & Rice, 1986)

- Descriptive study
- Limited sample
  - 16, 6 month to 2.5-year-olds

# Interaction Patterns Similar In TV Viewing (Lemish & Rice, 1986)

- Descriptive study
- Limited sample
- No infant-directed programming

# Parent-infant interaction study

- 120, 12-, 15-, & 18-month-olds & their parents
- 2 infant-directed programs
  - Baby Mozart
  - Kids Favorites 2
- $\frac{1}{2}$  had prior exposure

Barr & Zack (in prep)

# Coding Transcripts

(Adapted from Potter & Haynes, 2000)

## **Descriptions/Labels:**

- Up and down
- That's a seal

## **Abstractions:**

## **Questions:**

# Coding Transcripts

(Adapted from Potter & Haynes, 2000)

**Descriptions/Labels:**

**Abstractions:**

- This is your favorite song
- That looks like the new ball you just got

**Questions:**

# Coding Transcripts

(Adapted from Potter & Haynes, 2000)

**Descriptions/Labels:**

**Abstractions:**

**Questions:**

- What does a cat say?
- Does the music make you want to dance?

# Utterances by Age & Type

	12	15	18
Labels/ Descriptions	15.0	17.2	13.1
Abstractions	4.7	6.7	5.8
Questions	9.4	16.9	17.8

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	12	15	18
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# Regression Analysis

Model	Unstandardized Coef		Stan Coef		
	B	Std. Err	Beta	t	Sig.
Constant	.455	.100		4.534	.000
Exposure	.131	.035	.289	3.771	.000
Gender	.030	.036	.066	.823	.412
Adult TV	-.023	.015	-.164	-1.567	.120
Infant-Directed	.016	.030	.056	.526	.600
Age	.005	.005	.085	.978	.330
Program Type	-.073	.040	-.159	-1.821	.071
Prop Questions	.551	.144	.310	3.830	.000
Prop Labels	.294	.137	.182	2.152	.033
Prop Atten Vocs	-.043	.130	-.026	-.332	.740
Prop Abstract	.588	.263	.177	2.231	.028
Prop Repetitions	-.132	.182	-.056	-.721	.472

# In Conclusion

- Increasing exposure to video increased looking time
  - Televised info involves complex cognitive processes

# In Conclusion

- Parent-infant interaction styles
  - Variable with media
  - Similar to book reading styles
  - Interaction during reading related to literacy outcomes
  - ? Long-term effects of co-viewing styles

# Implications for television producers

- Processing information from television during infancy
  - Involves complex cognitive processing
  - Changes very rapidly over development
  - Is influenced by repetition
  - Is influenced by Co-viewing

# Implications for researchers

- Multi-modal approach
  - provides rich description of the current data,
  - provides interdisciplinary framework
  - provides converging data
  - increases ecological validity while maintaining some experimental control
- Future directions also should take this approach

# Theoretical implications

- For understanding 2-D to 3-D transfer of information
- Mechanisms of memory representation
- Learning from television is complex
  - 2D to 3D processing develops slowly over early childhood
  - Heart rate and ERP differences

# Discussion points

- Potential of television
  - Learning as early as 6 months but changes rapidly
  - As a means for educational enrichment during infancy?
  - As detrimental to learning?

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# Formal features

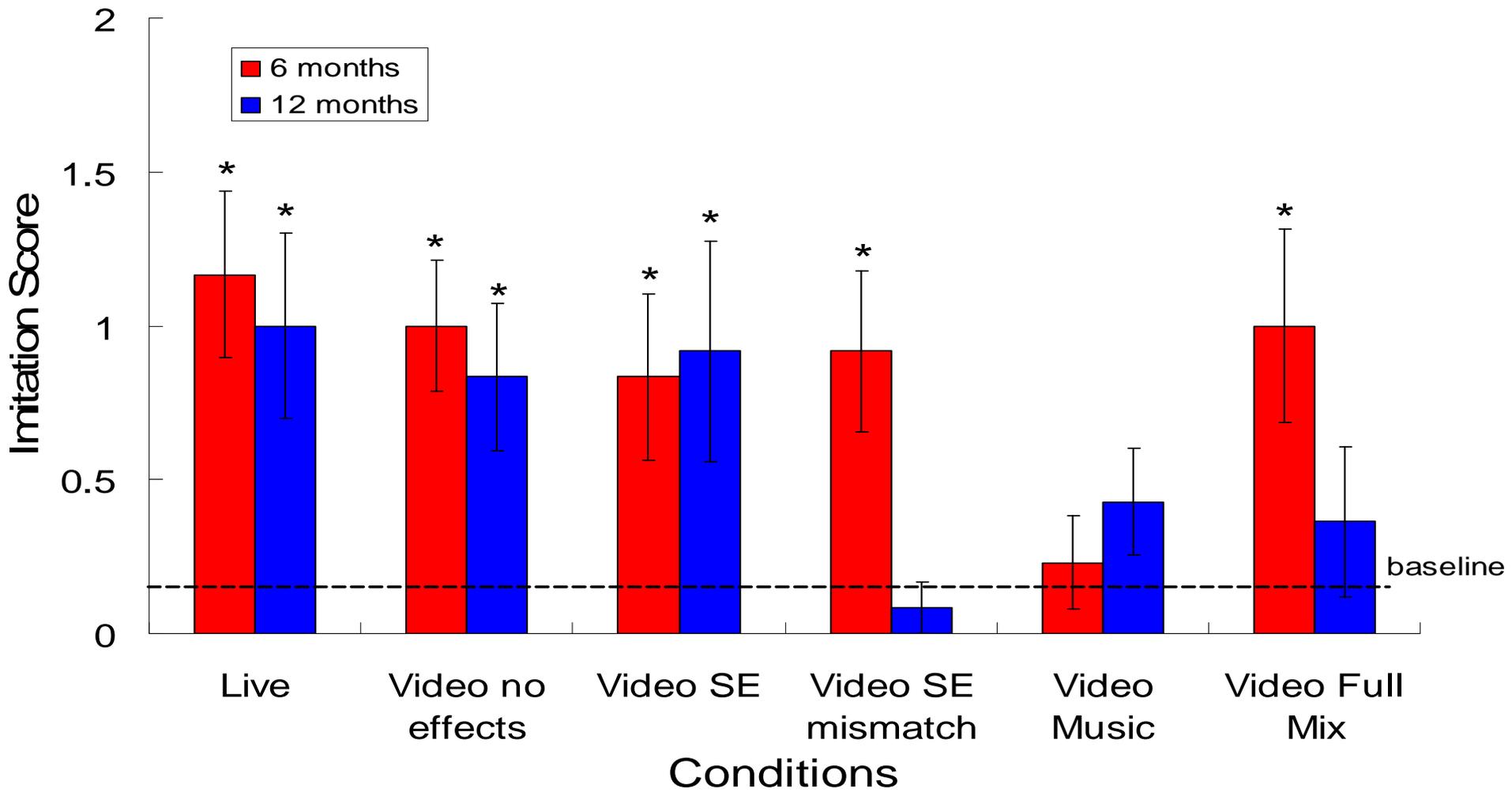
- Features that increase toddler attention
  - character action
  - children
  - puppets
  - active movement (including dancing and repetition)
  - singing and lively music
  - sound effects
- Formal auditory effects enhance the attention of preschoolers more than formal visual features
- Anderson & Levin (1976); Calvert, Huston, Watkins, & Wright (1982); Schmitt et al. (1999); Smith, Anderson, & Fischer (1985); Wright & Huston (1983).

# Sound Effects and Music

- Add formal features to Puppet 6x Video Demonstration
- Conditions
  - Matched
  - Mismatched
  - Music
  - Music + Sound Effects

Test 6- and 12-month-olds

Barr, Somanader, & Miller (in prep)



# Conclusions

- Sound effects add perceptual salience
- Imitation again as early as 6 months
- Music may at times provide cognitive overload
- Between 6 and 12 months infants develop expectations about formal features

