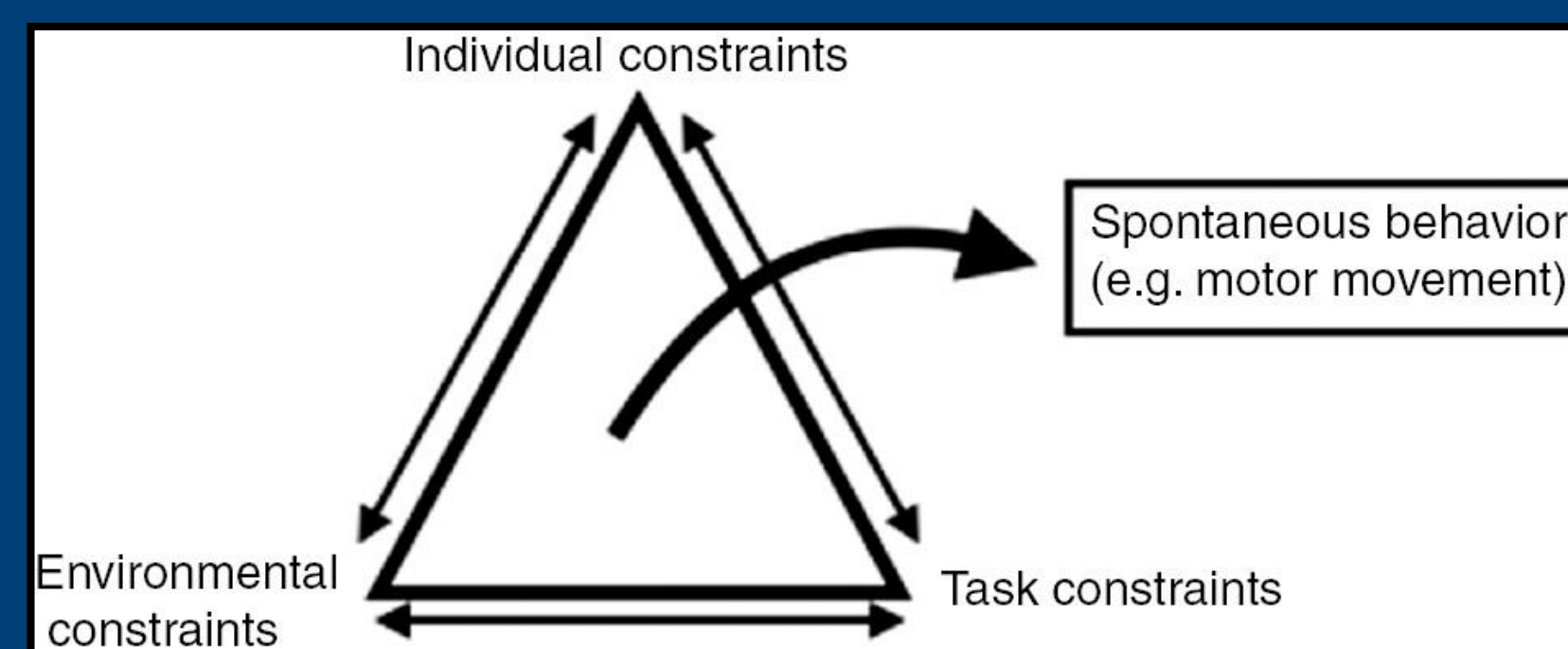


Tots on Bots: Looking at Intentional Movement in Young Infants Using a Robotic Mobility Device

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Background

- Thelen's dynamic systems theory- "physical and biological systems . . . appear to self-organize to produce ordered patterns" (Thelen, 2005, p. 260)
 - Thelen describes a developmental cascade, in which an infant develops new schemes of movement leading to greater opportunities within the environment, prompting further development (Thelen, 2005).
 - Motor exploration allows children to gain information about their environment. This acquisition elicits new actions and provides knowledge about objects, people, and places necessary for fostering perception, cognition and language skills (Molder, Oudgenoeg-Paz, Hellendoorn, & Jongens, 2015).
 - Patterns of behavior develop within the constraints of the infant's body within its environment.
 - The resources available to neuro-atypical infants—differs from those of typically-developing infants—stifle typical movement patterns, that result in a delay or failure- to-develop independent locomotion.



- Children with delayed or absent independent locomotion may benefit from technology to provide an alternate form of early mobility.
- The purpose of this study is to describe the development of driving skills using the WeeBot, a robotic mobility device controlled by weight shifting.

Methods

- **Design:** Quasi-experimental study (pre/post)
- **Participants:** 30 typically-developing 5-month-old infants recruited using campus intercom and local parent website; \$25 incentive per session
- **Equipment:** WeeBot—robotic mobility device controlled by infant weight-shift
- **Measures:** Prompted driving: Success in 9 trials for infants to "come get the toy"



Prompted Driving

Measures (Cont'd): Free Play driving behaviors coded from digital video using ELAN annotation software

- Intentional Goal-Directed movement of the robot
- Nonintentional movement of the robot



Goal Directed Driving



Non Intentional Driving

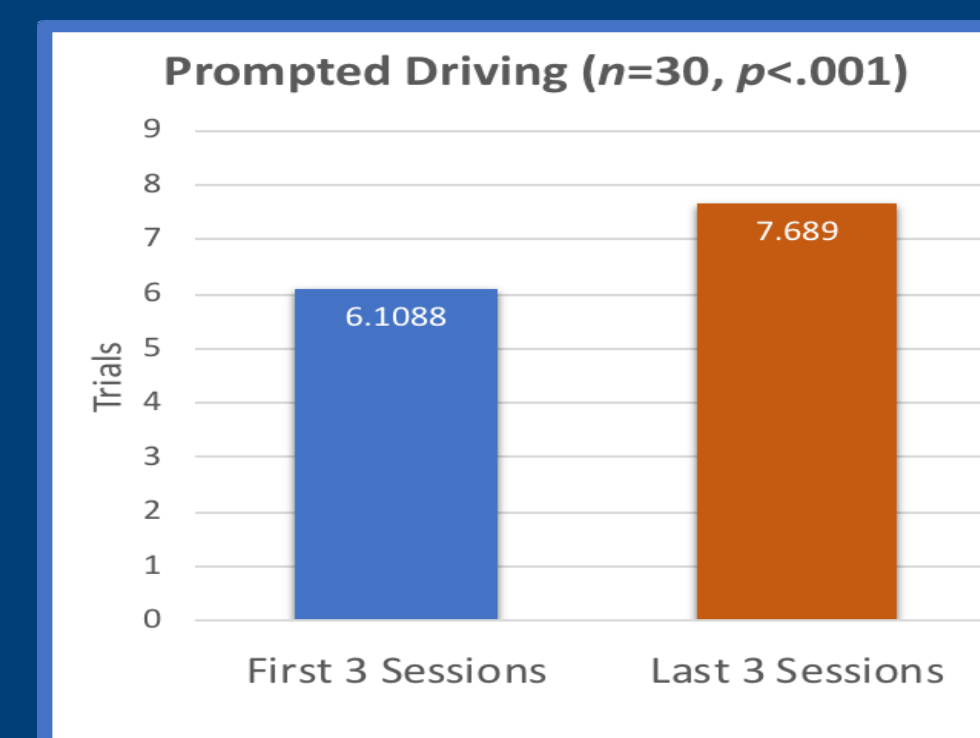
Procedures: 12 mobility sessions, 16 minutes long

- 3 minutes free play
- 10 minutes prompted driving
- 3 minutes free play

Results:

From early to later Driver Training sessions:

- Infants' ability to drive to offered toys increased significantly ($p < .001$)



- Prompted driving was significantly and negatively associated with non-intentional movement

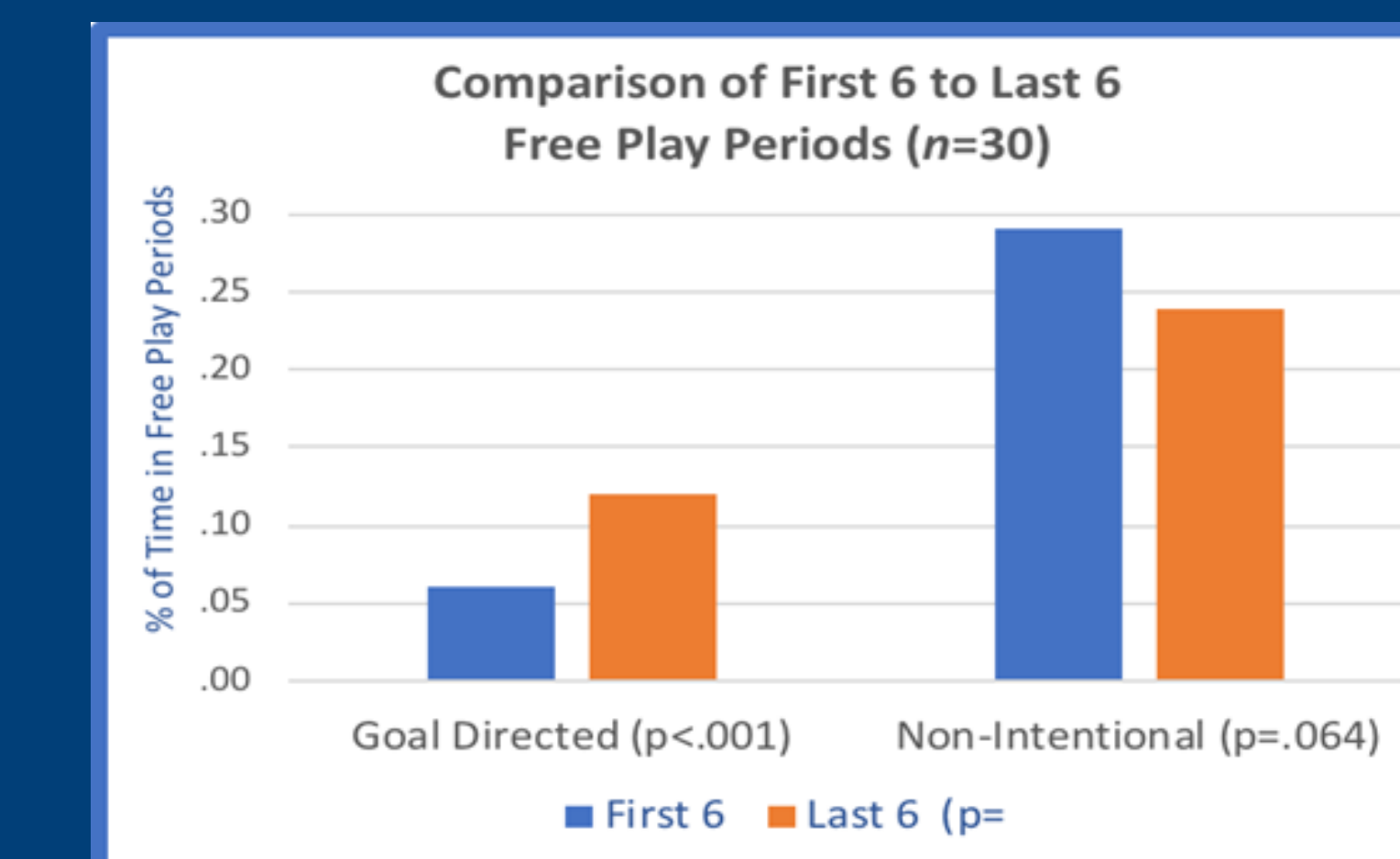
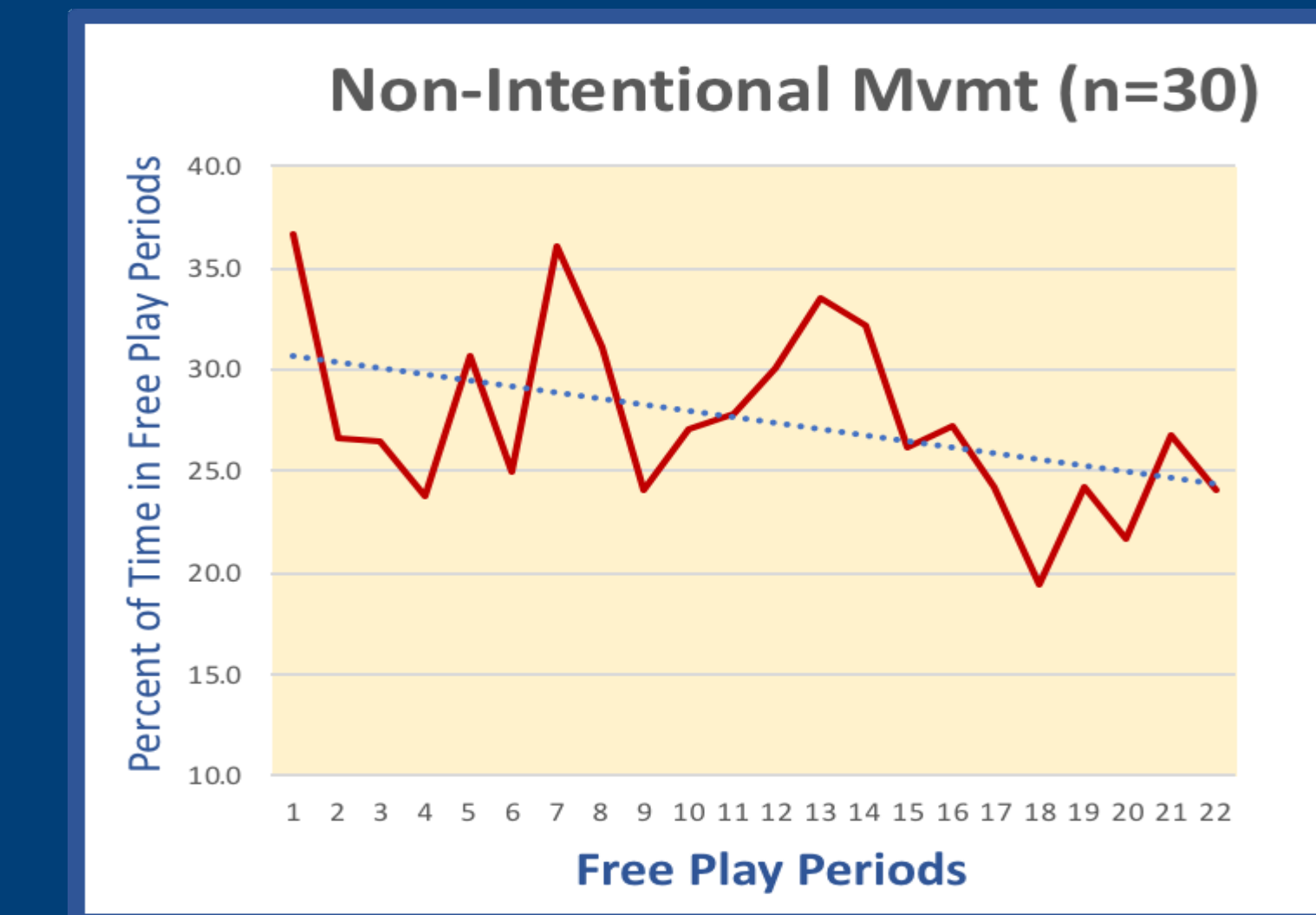
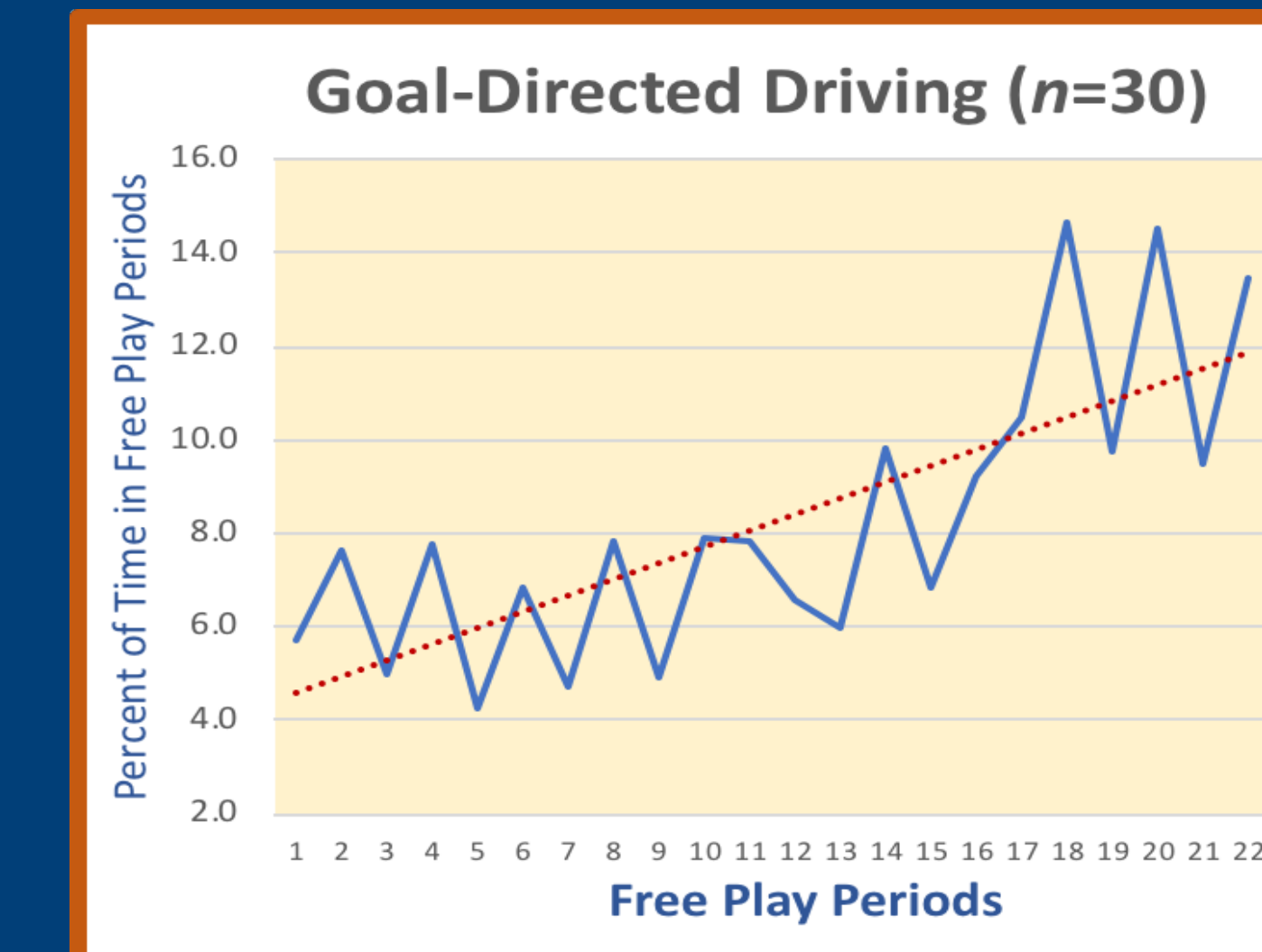
	1	2	3
1 Prompted Driving	—		
2 Goal-Directed Driving	-.34	—	
3 Non-Intentional Movement	.40*	-.22	—

* $p < .05$ (Pearson correlations)

Results (Cont'd):

➤ **From early to later Free Play periods:**

- Time spent in intentional goal-directed movement increased significantly
- Time spent in non-intentional movement decreased, approaching significance



Discussion:

- Increased voluntary, intentional movement and decreased nonintentional movement supporting Thelen's dynamic systems theory (2005).
- Correlations in the anticipated direction between prompted driving trials and free play trials suggesting generalizability of functional skills.

Application to Practice

- Providing mobility may increase opportunities for young infants to explore, interact with, and learn from the physical and social environment, thus promoting development in cognitive, social, and language skills.
- This can be generalized to the importance of providing mobility opportunities to infants of all abilities at developmentally appropriate times.

Acknowledgements:

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