



Engineering of an Eye Gaze Contingent Paradigm

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Introduction

We are interested in the development of prosocial motivations in young infants. 2-year-olds demonstrate prosocial motivations, but we do not know if younger children have prosocial motivations.

Children younger than 2 years understand goals and goal oriented behaviors, which implies that they may have a desire to help others achieve their goals, a form of prosocial behavior.

Ultimately we would like to answer the question: do young infants have prosocial motivations?

Challenge

The issue at hand is that, currently, most measures of prosocial motivation require verbal and motor skills that have not fully developed in young infants.

However, four-month-old infants are able to engage and disengage their gaze on a target at will and anticipate movement (Johnson, Posner, and Rothbart, 1991). For this reason, we engineered a paradigm that allows participants to fluidly make decisions based on their eye gaze values to play one of two videos.

By engineering an eye gaze contingent experiment we hope to investigate the presence of prosocial motivation in this population. Further, before developing an experiment designed for infants we first had to create a basic, functioning eye gaze contingent paradigm for adults.

This project focuses on the engineering and verification of an eye gaze contingent paradigm.

Methods/Engineering

This paradigm was created using the Tobii eye tracking system Tobii-studio and E-prime.

The Tobii eye-tracker (TET) was interfaced with the E-prime program and the Tobii-studio program so that they could exchange data with each other.

This allowed us to create and run an eye gaze contingent experiment within E-prime-studio while using Tobii-studio to record the participant's eye gaze data.

Then, we developed the paradigm in E-prime so that we could determine whether or not participants could learn, through discovery, how to use their eye-gaze to control the events on the screen.

Procedure/Validation

In order to validate the functionality of the paradigm, the following procedure was created so that adult college participants could practice using their eye gaze to control events and demonstrate that they can carry out tasks that require using their eye gaze.

Practice phase:

- 4 trials of instructing participants to "Look at the circle" which triggered a ball to sparkle, only the circle was present.
- 4 trials of instructing participants to "Look at the square" which triggered a ball to roll, only the square was present.

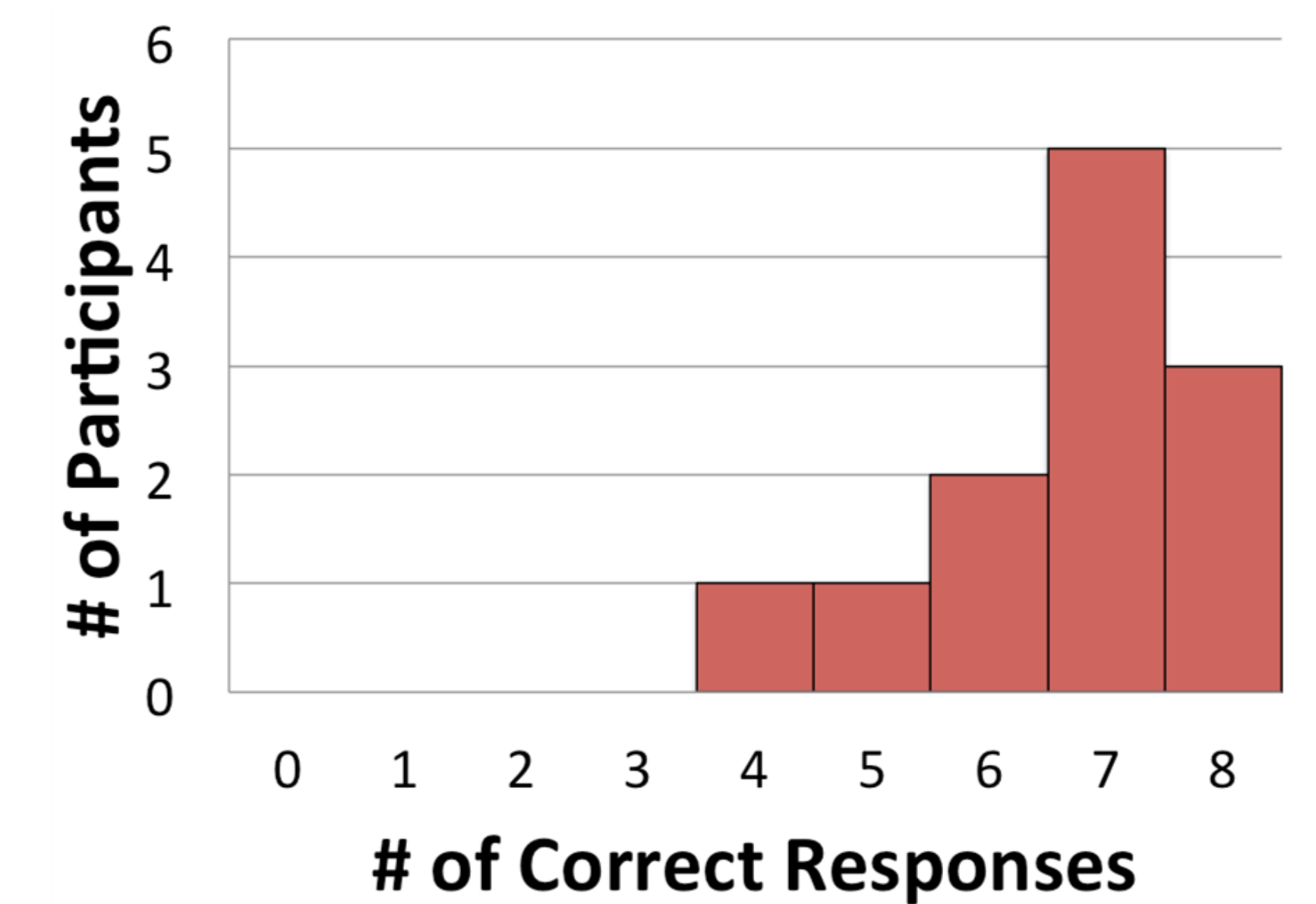
Trial phase:

- 8 randomized trials of instructing participants to either "make ball roll" or "make ball sparkle", both shapes were present.

Preference phase:

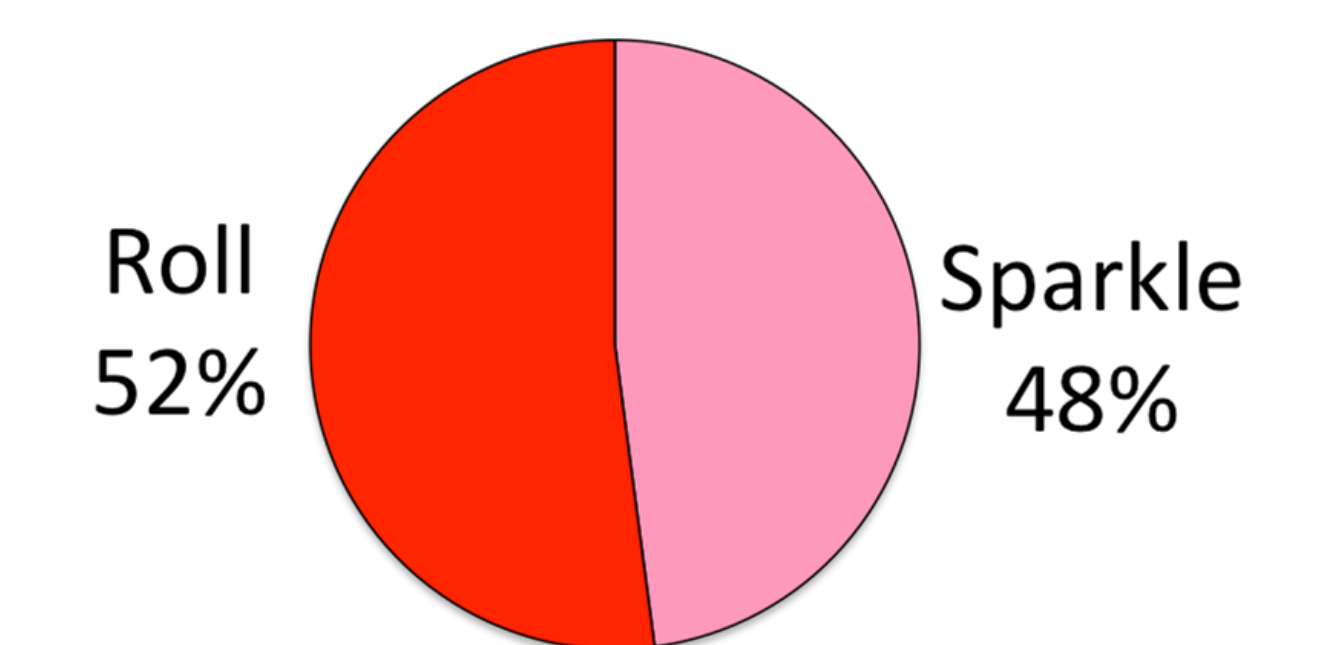
- 8 trials of instructing participants to "do what they would like" when both shapes were present.

Results

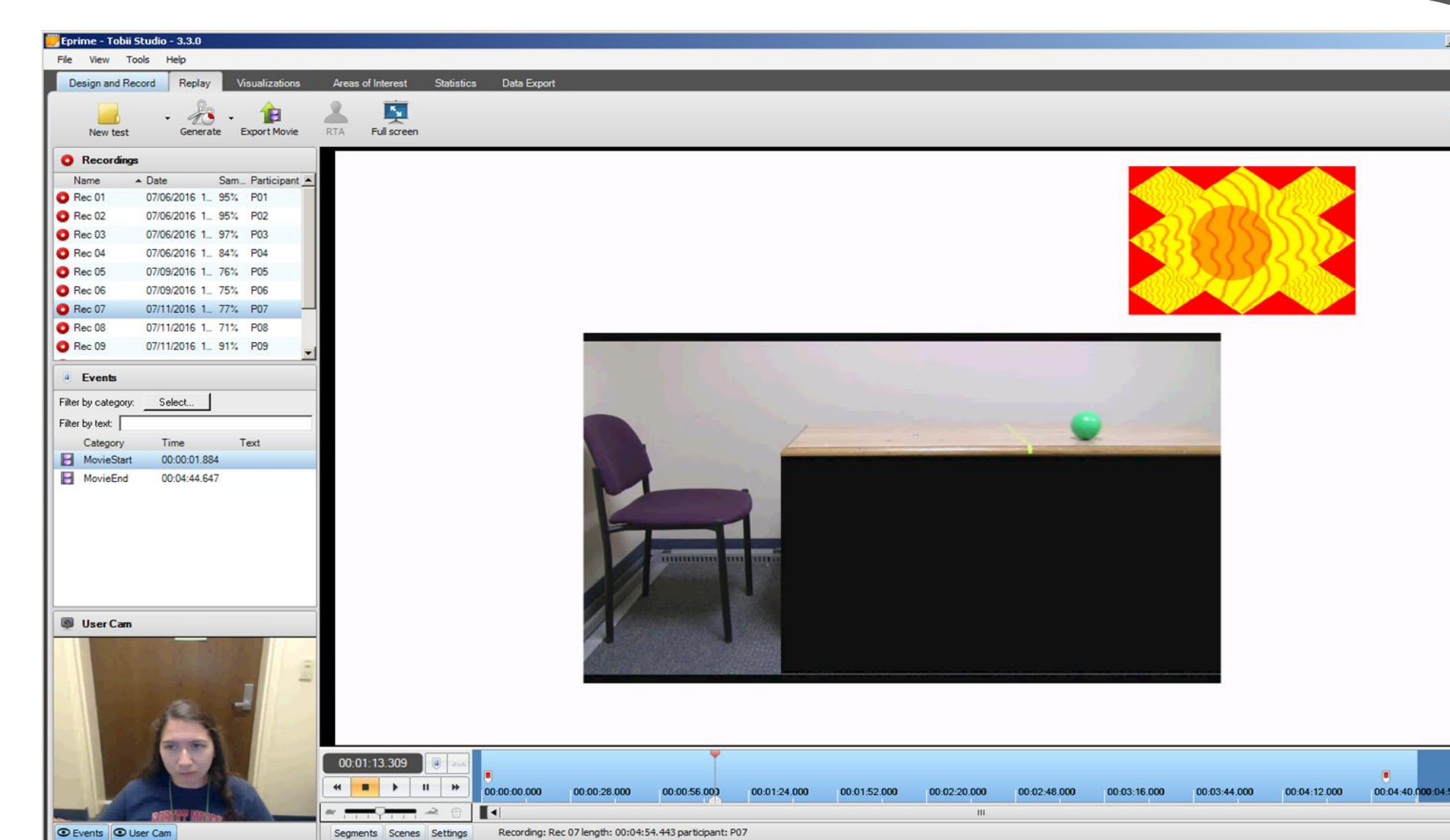
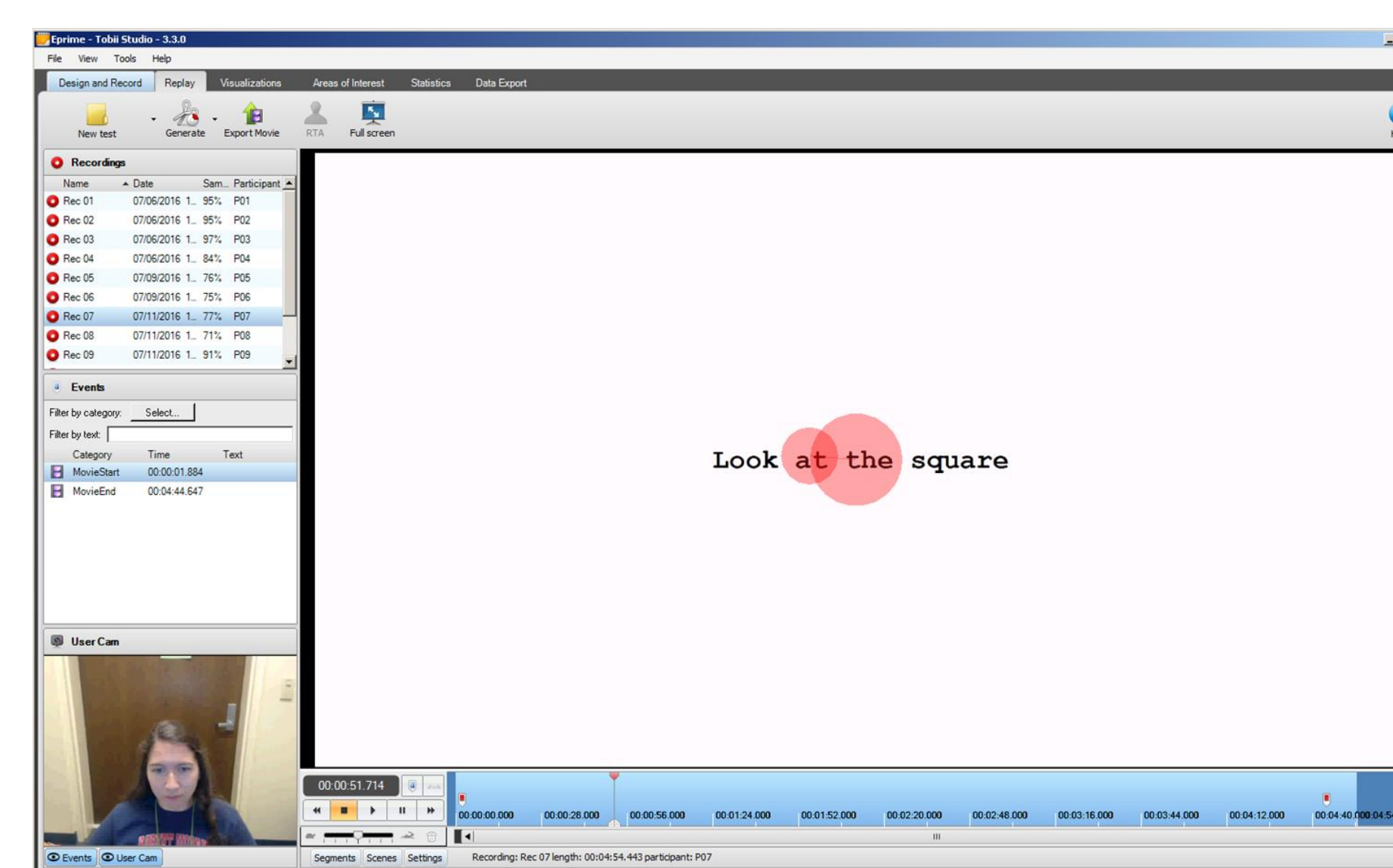


We found statistically significant results that show that adult college participants were able to carry out eye gaze contingent tasks with above chance success ($P = .833$, $p = .0014$).

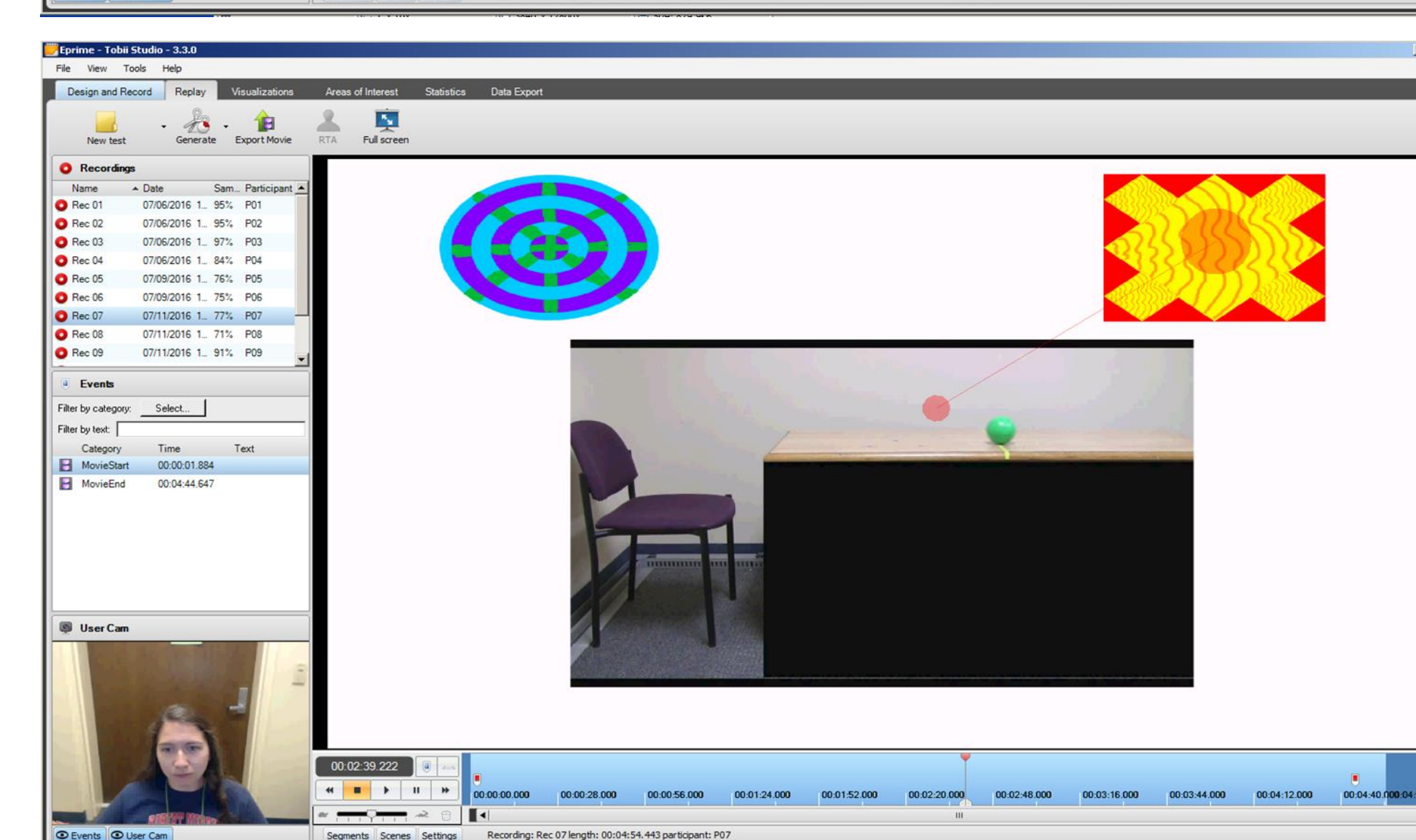
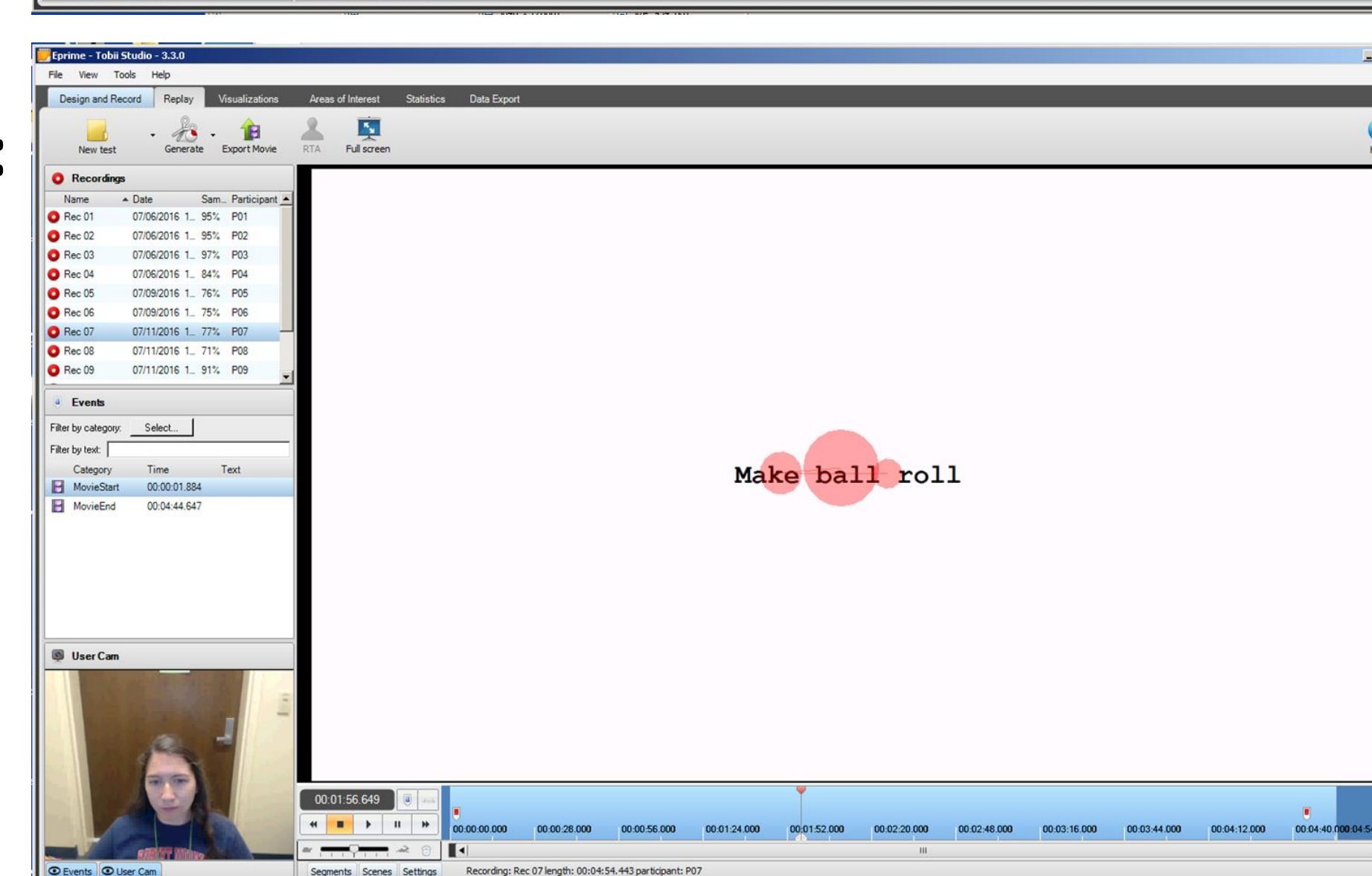
Preference Task



Training trial:



Task trial:



Future

With the success of this paradigm, future experiments involving infants can be developed to determine their development of prosocial cognition.

References

- Johnson, M. H., Posner, M. I., & Rothbart, M. K. (1991). Components of visual orienting in early infancy: Contingency learning, anticipatory looking, and disengaging. *Journal of Cognitive Neuroscience*, 3, 335 - 344.
- Sommerville JA, Woodward AL, Needham A. Action experience alters 3-month-old infants' perception of others' actions. *Cognition*. 2005;96:B1-B11.