Learning Continuous Action-Effect Contingencies through Observation

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Introduction

- Although traditional cognitive coding theories assume that a person must carry out an action in order to form cognitive action plans, more recent studies show that it is possible for to learn action plans solely through observation.
- According to Hommel et al. (2001), the effects of movements become associated with the motor commands generated by those movements and later exposure to those effects primes us to make those same kinds of movements.
- Our experiment investigated
  - Whether response-effect pairings could be found during a continuous control task
  - Whether observers can acquire action-effect pairings simply by observing another person
- We developed a paradigm to explore whether participants can make pairings between action-effects of the paradigm.

Method

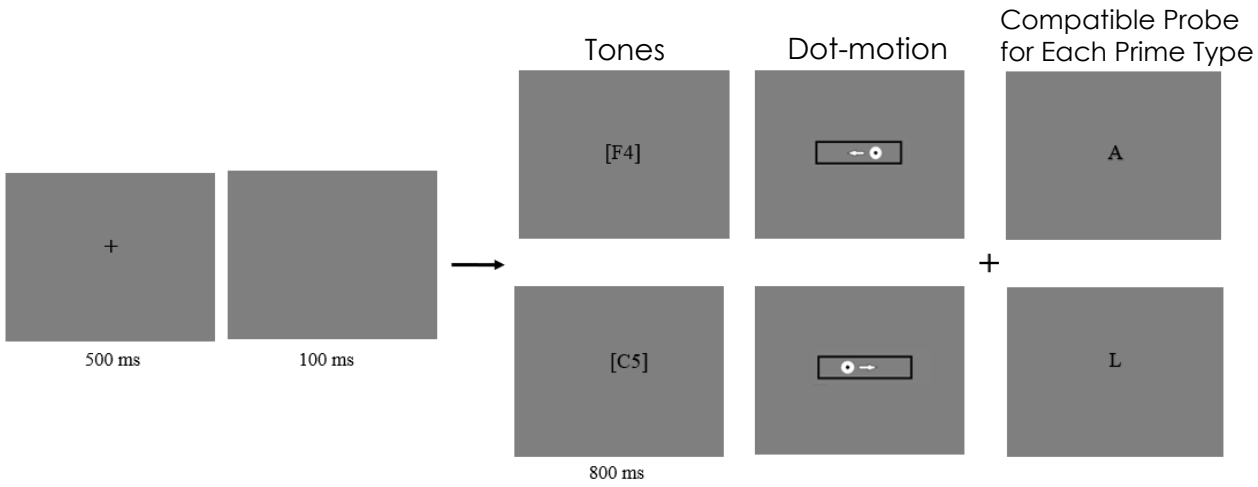
Participants

- Controllers (*n* = 30), Full Observers (*n* = 13), Partial Observers (*n* =14)
  - Outliers based on average reaction time were taken out of data.

Procedure

(1) Pre-Compatibility Test: All participants completed a reaction-time task on their own computers.

- They were instructed to press "A" or "L" as soon as they see the probe on the screen.
- Heard tones or saw a dot-motion before the probe.

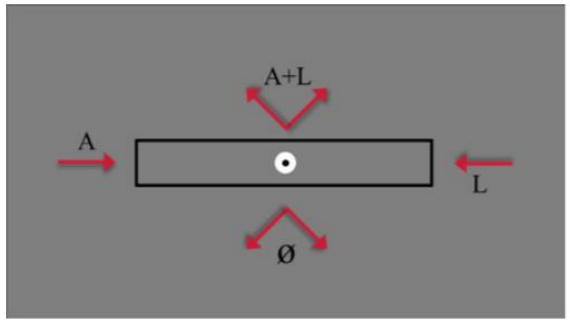


Method

Procedure

(2) Dot-Probe Task: Then, controllers and full or partial observers sat next to each other.

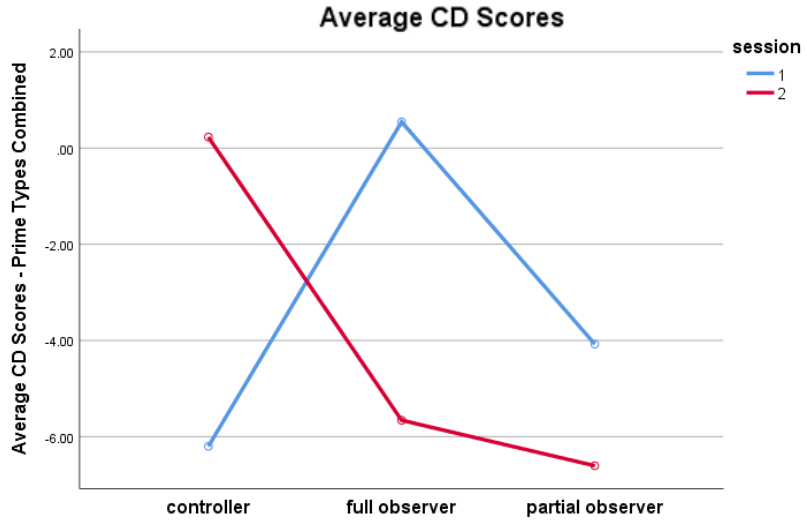
- **Controllers** - Used the "A" and "L" keys on a keyboard to keep a stimulus inside a rectangle for 3 minutes
- **Full observers** – Had full view of the controller's key presses and the screen
- **Partial observers** – Only observed the game through the screen



(3) Post-Compatibility Test: All participants completed the reaction-time task again to measure whether they were primed to the action-effects of the task or not.

Results

- Reaction times from both compatibility sessions were transformed into CD scores (Incompatible – Compatible Trials)
- Mixed factor ANOVA between Session (between) X Condition (within) X Prime Type (within)
  - Marginally significant interaction between **Session X Condition**, $p = .07$.
  - **Controllers**' scores became **more positive** (indicating priming effect) across session, while the opposite occurred for the other groups.

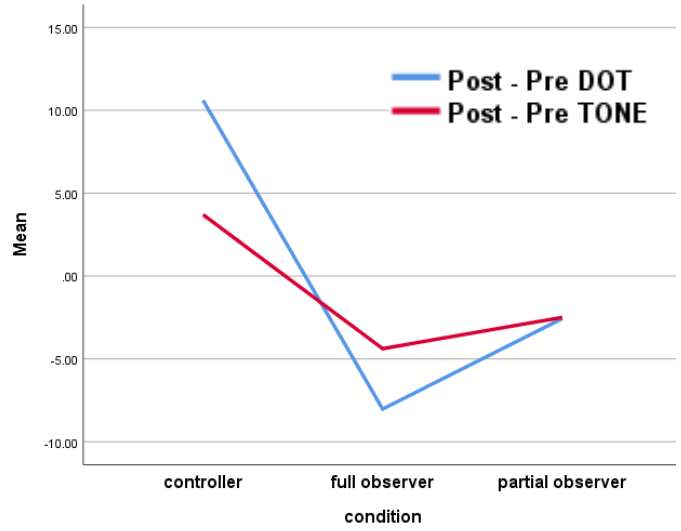


- However, we also found a significant group difference between the combined (tone and dot) base scores which means that there were pre-existing differences between our groups.
- The baseline group differences were further analyzed but no correlations were found.

Results

- Then, the differences between post and pre scores were calculated to see how the scores were changed between sessions in each group (See figure)
- This **3x2** ANOVA showed a marginally significant (p = .09) difference **between full observers and controllers** for the **dot prime**, which implies full observers were not able to learn the relationship between key presses and dot movements, simply through observation. Further analyses will be conducted to determine if this difference is influenced by the quality of control the controllers actually achieved over the dot during the control task.

*Change score was calculated as post-pre to be able to find the true difference between negative and positive scores.



Future Direction: To avoid group differences in the base condition, the paradigm will be changed as described below.

- Dot-Probe task ➡ 1st Compatibility Task ➡ Dot-Probe Task ➡ 2nd Compatibility Task