The role of relative motion information during observational learning in Sports

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Introduction

- Model demonstrations are extensively used by instructors and coaches as a teaching strategy to facilitate acquisition of new coordination pattern.
- A topic of interest in observational learning is to identify the nature of information extracted by the observers from a model demonstration for later replication.
- Scully and Newell (1985) addressed this issue and proposed the *Visual Perception Perspective (VPP)*. Scully and Newell suggested that while observing a demonstration, relative motion information of the action is directly picked up and perceived by the visual system and later used to produce the action of the model.
- According to the VPP, a demonstration should be particularly effective when relative motion information of the movement is highlighted. That can be achieved by removing the structural information from a demonstration through representing the human body in the form of a point-light or stick-figure display rather showing the observers a classic video containing structural information.

Aim and Hypothesis

- The primary aim of this study was to investigate the Scully and Newell´s hypothesis.
- According to the VPP, it was hypothesized that point-light and stick-figure model demonstrations would lead to a better performance in comparison to classic video model demonstration. It was also hypothesized that demonstration groups would perform better than control group in acquisition phase and retention tests.

Methods

- **Participants:** Forty one females and males volunteers (mean age = 24.2 years), were randomly assigned to one of four experimental groups: video, stick-figure, point-light and control.

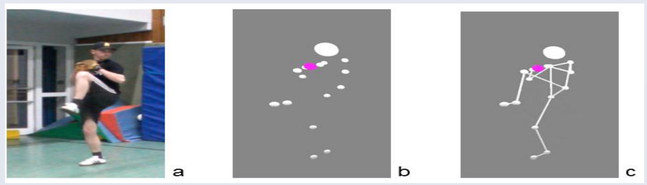


Figure 1. Static images of various model demonstrations. A) Normal video, b) Point-light, c) Stick-figure

- **Motor task:** A highly complex and dynamic throwing action, the Baseball-pitch, was selected as motor task. The pitch consists of a clear phase structure including wind-up, stride, arm cocking, arm acceleration, arm deceleration, and follow-through (Figure 2) which makes it possible to perform a differentiated analysis at the level of both overall movement and individual movement phases.

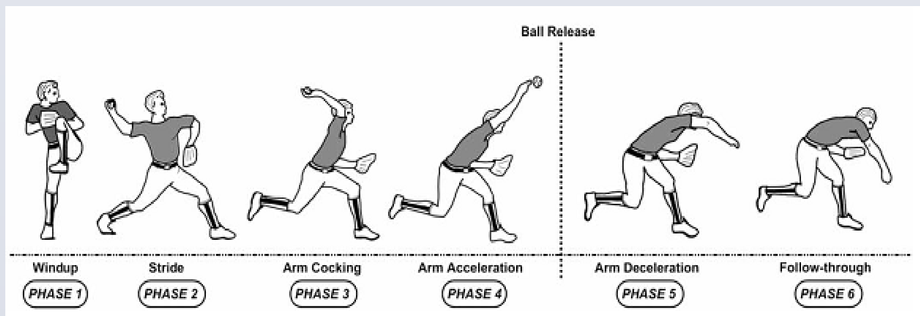
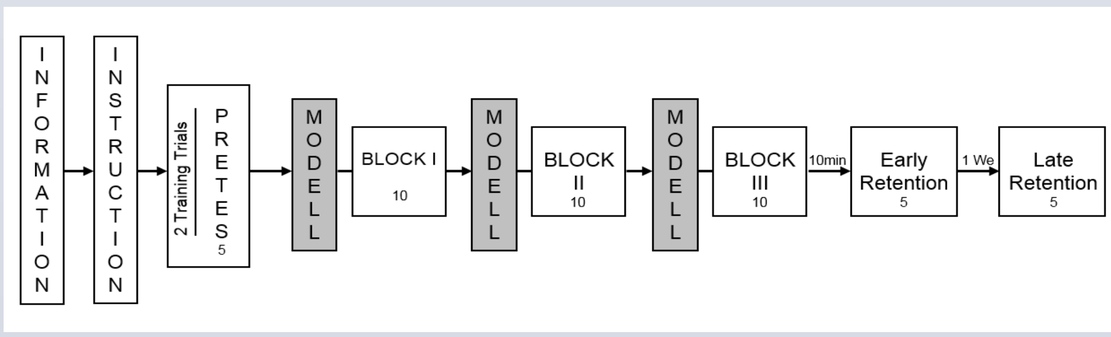


Figure 2. Phase structure of Baseball-pitch (Adopted from Rojas, et al. 2009).

- **Procedure:** Figure 3 (below) represents the experimental procedure used in the study.



- **Dependent variables**
- **Kinematic analysis:** Kinematic data was provided by comparing the coordination profile of each participant with that of the model.
- Intra-limb coordination was included throwing arm (shoulder angle relative to elbow angle) and striding leg (knee angle relative to ankle angle).
- Inter-limb coordination was measured by the relative changes of elbow in relation to knee.
- The deviation of the intra- and inter-limb coordination patterns of the participant from that of the model was measured in terms of normalized root mean squared difference (NoRM-D).
- **Movement time:** absolute difference between the times took the participant to execute the movement and that of the model.

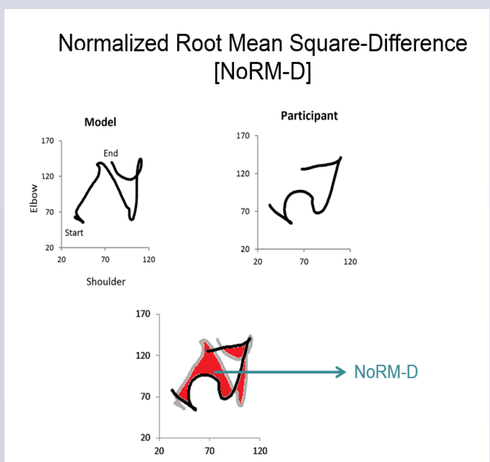


Figure 4. Normalized root mean squared difference (NoRM-D).

Results

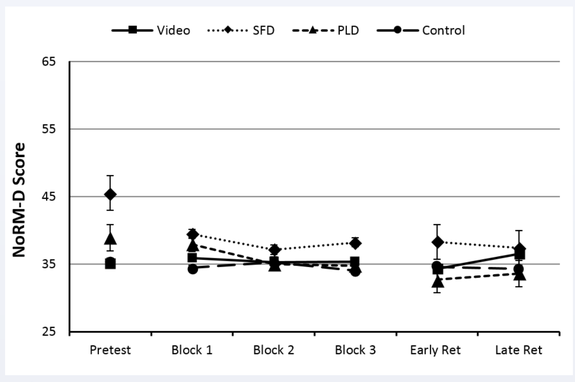


Figure 5. Mean of NoRM-D scores of throwing arm coordination.

- No significant differences were observed between groups in pretest, acquisition blocks, and retention tests.
- Participants improved significantly their performances from pretest to acquisition blocks.
- There was a significant improvement from pretest to acquisition blocks in stride phase.

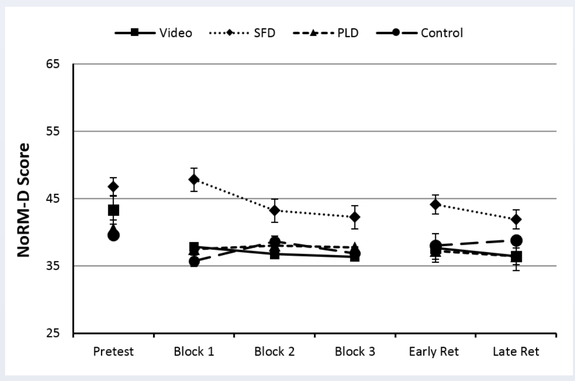


Figure 6. Mean of NoRM-D scores of striding leg coordination.

- No significant differences were observed between groups in pretest, acquisition blocks, and retention tests.
- Participants improved significantly their performances from pretest to acquisition blocks.
- There was a significant improvement from pretest to acquisition blocks in stride and arm acceleration phases.

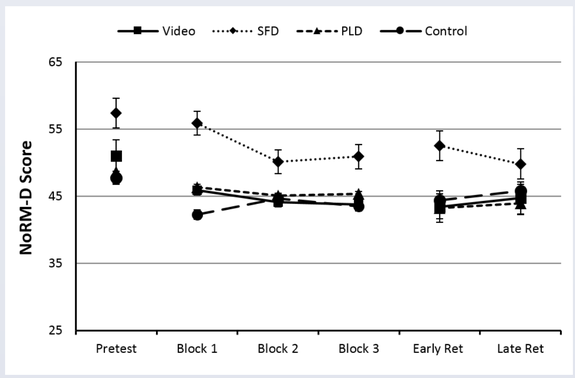


Figure 7. Mean of NoRM-D scores of coordination between throwing arm and striding leg.

- No significant differences were observed between groups in pretest, acquisition blocks, and retention tests.
- Participants improved significantly their performances from pretest to acquisition blocks.
- There was a significant improvement from pretest to acquisition blocks in stride phase.

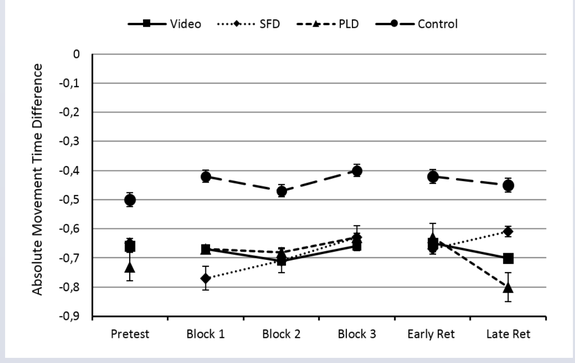


Figure 8. Mean of absolute movement time difference scores.

- No significant differences were observed between groups in pretest, acquisition blocks, and early retention test.
- In late retention test, control group showed significantly better scores than point-light group.
- There was a significant improvement during the acquisition blocks and from pretest to acquisition blocks in stride phase.

Discussion

- Generally, the results provided no support for Scully and Newell´s hypothesis.
- Second hypothesis was also not supported; as participants in control group did not underperform those in demonstration groups in acquisition phase or retention tests.
- It might be possible that amount of observational practice of our complex throwing skill was not sufficient to provoke any significant difference between demonstration groups and control group.
- According to the pretest´s result, participants showed relatively accurate coordination patterns to the model, at least in terms of throwing arm coordination. It might be possible that presenting participants with static images of pith before pretest prevented any effects of model demonstrations, because the to-be-learnt action is already learned by participants before they observe the model.
- Stride phase is improved in all dependent variables from pretest to acquisition blocks. It might be possible that stride phase is the most practice-demanding phase of pitch.

References

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