# Weekly Work Report 4/18/2025

**This Week:**

* Received video labeling results for 2 subjects from Marina. (8 / 73)
* Prepared a set of sequences for “Analyzing and Predicting Aha! Moments”**.**

**Steps for Analyzing and Predicting Aha! Moments:**

1. **Define Aha! Moments** – Identify when Aha! moments occur and determine the event sequence or patterns that typically precede them.
   1. All sequences should cover all scenarios to label Aha! as much as possible

0 = focusing and staring moving to the target piece\*\*

1 = raise hand\*\*

2.1 = pick up a piece from space (first time fingers close)

2.2 = pick up a piece from space (Last time fingers close)

3 = put a from-space-piece back in space

4.1 = put a from-space-piece in the matrix correctly (first time fingers open)

4.2 = put a from-space-piece in the matrix correctly (Last time fingers open)

5.1 = put a from-space-piece in the matrix incorrectly (first time fingers open)

5.2 = put a from-space-piece in the matrix incorrectly (last time fingers open)

6.1 = pick up a piece from the matrix (first time fingers close)

6.2 = pick up a piece from the matrix (last time fingers close)

7 = put a from-matrix-piece back in space

8.1 = put a from-matrix-piece back in the matrix correctly (first time fingers open)

8.2 = put a from-matrix-piece back in the matrix correctly (last time fingers open)

9.1 = put a from-matrix-piece in the matrix incorrectly (first time fingers open)

9.2 = put a from-matrix-piece in the matrix incorrectly (last time fingers open)

10.1 = rotation start

10.2 = rotation finish

11 = Session finished

12 = Give up (end the puzzle)

13= pause (Give up) continues to finish puzzle?

**Sequence 1: Trial-and-Error to Success (from matrix)**

**Aha! Moment occurs before:** 6.1 (second occurrence)

**Event Sequence:**

… 6.1 → 6.2 → 9.1 → 9.2 → 7 → 10.1 → 10.2 → 6.1 → 6.2 → 8.1 → 8.2

• 6.1: pick up a piece from the matrix (first time fingers close)

• 6.2: pick up a piece from the matrix (last time fingers close)

• 9.1: put a from-matrix-piece in the matrix incorrectly (first time fingers open)

• 9.2: put a from-matrix-piece in the matrix incorrectly (last time fingers open)

• 7: put a from-matrix-piece back in space

• 10.1: rotation start

• 10.2: rotation finish

• 6.1: pick up a piece from the matrix (first time fingers close)

• 6.2: pick up a piece from the matrix (last time fingers close)

• 8.1: put a from-matrix-piece back in the matrix correctly (first time fingers open)

• 8.2: put a from-matrix-piece back in the matrix correctly (last time fingers open)

**Meaning:** Picks up a piece from the matrix, places it incorrectly, returns it, rotates the puzzle (rethinking), and then correctly places the piece.

**Insight:** Realizes the correct position of a previously misplaced matrix piece after rotation.

**Sequence 2: Repeated Failure Followed by Success**

**Aha! Moment occurs before:** 4.1

**Event Sequence:**

0 → 2.1 → 2.2 → 5.1 → 5.2 → 3 → 2.1 → 2.2 → 5.1 → 5.2 → 3 → 2.1 → 2.2 → 4.1 → 4.2

• 0: focusing and staring moving to the target piece

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 5.1: put a from-space-piece in the matrix incorrectly (first time fingers open)

• 5.2: put a from-space-piece in the matrix incorrectly (last time fingers open)

• 3: put a from-space-piece back in space

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 5.1: put a from-space-piece in the matrix incorrectly (first time fingers open)

• 5.2: put a from-space-piece in the matrix incorrectly (last time fingers open)

• 3: put a from-space-piece back in space

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 4.1: put a from-space-piece in the matrix correctly (first time fingers open)

• 4.2: put a from-space-piece in the matrix correctly (last time fingers open)

**Meaning:** Several failed attempts at placing a piece are followed by a sudden correct placement.

**Insight:** Pattern or shape is recognized after repeated failures.

**Sequence 3: Rotation Leads to Correct Re-Placement**

**Aha! Moment occurs before:** 2.1

**Event Sequence:**

6.1 → 6.2 → 7 → 10.1 → 10.2 → 2.1 → 2.2 → 4.1 → 4.2

• 6.1: pick up a piece from the matrix (first time fingers close)

• 6.2: pick up a piece from the matrix (last time fingers close)

• 7: put a from-matrix-piece back in space

• 10.1: rotation start

• 10.2: rotation finish

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 4.1: put a from-space-piece in the matrix correctly (first time fingers open)

• 4.2: put a from-space-piece in the matrix correctly (last time fingers open)

**Meaning:** Removes a piece, rotates the puzzle, selects a new one, and places it correctly.

**Insight:** Visual perspective shift from rotation leads to a realization about the correct piece.

**Sequence 4: Giving Up, Then Breakthrough**

**Aha! Moment occurs before:** 2.1 (after re-engagement following pause)

**Event Sequence:**

2.1 → 2.2 → 5.1 → 5.2 → 3 → 12 → [pause] → 0 → 2.1 → 2.2 → 4.1 → 4.2

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 5.1: put a from-space-piece in the matrix incorrectly (first time fingers open)

• 5.2: put a from-space-piece in the matrix incorrectly (last time fingers open)

• 3: put a from-space-piece back in space

• 12: give up

• [pause]

• 0: focusing and staring moving to the target piece

• 2.1: pick up a piece from space (first time fingers close)

• 2.2: pick up a piece from space (last time fingers close)

• 4.1: put a from-space-piece in the matrix correctly (first time fingers open)

• 4.2: put a from-space-piece in the matrix correctly (last time fingers open)

**Meaning:** After giving up following failure, the subject resumes and immediately succeeds.

**Insight:** Stepping away enables a refreshed and insightful approach.

**Sequence 5: Matrix-Based Realization and Adjustment**

**Aha! Moment occurs before:** 8.1

**Event Sequence:**

6.1 → 6.2 → 9.1 → 9.2 → 6.1 → 6.2 → 8.1 → 8.2

• 6.1: pick up a piece from the matrix (first time fingers close)

• 6.2: pick up a piece from the matrix (last time fingers close)

• 9.1: put a from-matrix-piece in the matrix incorrectly (first time fingers open)

• 9.2: put a from-matrix-piece in the matrix incorrectly (last time fingers open)

• 6.1: pick up a piece from the matrix (first time fingers close)

• 6.2: pick up a piece from the matrix (last time fingers close)

• 8.1: put a from-matrix-piece back in the matrix correctly (first time fingers open)

• 8.2: put a from-matrix-piece back in the matrix correctly (last time fingers open)

**Steps for Analyzing and Predicting Aha! Moments:**

1. **Define Aha! Moments** – Identify when Aha! moments occur and determine the event sequence or patterns that typically precede them.
   1. All sequences should cover all scenarios to label Aha! as much as possible
   2. Preprocessing: event labeling result (optional event)
   3. Intermediate level sequence
   4. Don’t condition rules
2. **Pupil Dilation Analysis** – Analyze pupil dilation for each atomic event and arrange all events according to the defined sequence.

* **Next week**

1. **Identify Aha! Sequences** – Detect actual sequences that lead to Aha! moments based on physiological and event data.
2. **Label Signal Data** – Use the identified sequences to label the corresponding physiological signal data, find out the best window size.
3. **Modeling and Prediction** – Apply machine learning or deep learning models to predict Aha! moments.
4. **Interpret Results** – Explain the prediction outcomes and the patterns leading up to Aha! moments.