Element Duel: Can a Balanced Pattern Still Be Predicted?

Plan 35-45 minutes: predict on paper, then check on one projected computer. The local-model lesson needs a computer to run its download. Split advanced calculations across two sessions.

Learning goal

Count frequencies and one-step transitions, make a prediction and counter, and record prediction accuracy separately from game wins.

Before starting

Count events; Guess the Word is a useful starting point. Water beats Fire, Fire beats Nature, Nature beats Water; reveal simultaneously.

Materials

Fire, Water and Nature cards, two worksheet pages and an optional fair die per group. The teacher projects the lab.

Class sequence (5 / 10 / 10 / 10 min, plus 5-10 min discussion)

1. Predict (5 min): counter predicted Fire with Water, Water with Nature and Nature with Fire. Record correct predictions separately from wins.

2. Play (10 min): inspect seven moves F,W,N,F,W,N,F. What does frequency predict? Break ties in the declared order Fire, Water, Nature.

3. Observe (10 min): count what followed Fire in past transitions: Water twice. Counter that prediction, then reveal move eight; never inspect the current opponent move first.

4. Challenge (10 min): switch to a reproducible random opponent and fix the number of rounds before comparing. Balanced counts do not prove independent randomness; short-run wins do not establish universal performance.

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Worked example

Counter predicted Fire with Water. F,W,N,F,W,N,F has counts 3,2,2, so frequency predicts Fire. Given the final Fire, conditional counting uses two earlier F→W transitions and predicts Water.

Check understanding: ask before showing an answer

If move eight is Water, what does each predictor play? Does predicting correctly automatically mean a win? Do equal counts imply unpredictability?

Expected answers and worksheet check

Frequency predicts Fire and plays Water: a draw against Water. Conditional counting predicts Water and plays Nature: a win. A correct prediction still needs the correct counter. Counts are 3/2/2; both observed Fire successors are Water, so the sample proportion is 2/2=100%, not a guarantee. A cycle can be balanced yet predictable. Against independent fair random moves, a past-only forecast has expected accuracy 1/3, with short-run variation; the lab uses seeded pseudorandomness.

Keep the claim within its limits

The classroom version keeps prediction counts separate from wins; some original reading levels award prediction bonuses. This lab implements frequency and first-order conditional counting, not a neural network or a predictor of every deterministic program.

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Teacher setup

Load the worksheet history: its seven moves are observation data, not scored rounds. Test frequency once, reload the same history and test conditional counting on the same next move.

Ties prefer Fire, then Water, then Nature. Unseen context backs off to overall frequency. Default Fire on empty history is a convention, not a learned conclusion.

Evidence and feedback

Read prediction, counter, actual opponent move and outcome as four distinct steps. Update counts from the past only; do not use future moves to choose this round.

Support and extension

Support: practice counters and cycle cards only. Extend: change the opponent’s habit midway and compare all-history with a recent window. Test a held-out opponent rather than choosing a champion from one match.

At home

Build a balanced but ordered card sequence and ask a parent to predict the next move from its first half.

Continue learning

Guess the Word: How AI Reads a Sentence / Monkey Republic: Give Your Monkey a Memory / Your Own Tiny Language Model: Count, Then Generate

Teacher reference (links also on the lesson page)

Lucas Academy: original game: https://lucasacademy.org/app/?fp=u5-mind-game