Experimentation

Why we learn by testing, and how to make testing safe

A forecast stays a story until it meets the world. This paper describes Experimentation as the engine of the AFERR loop, the four ways people engage with uncertainty, and how to design spaces where being wrong is cheap enough to be useful.



Mohsin Memon

AFERR Research · www.aferr.org

03 EXPERIMENTATION

PROPOSED, WITH OBSERVED ELEMENTS

Version 1.0 · November 2026 · DOI pending · CC BY 4.0

CITE THIS WORK

Memon, M. (2026). Experimentation: Why we learn by testing, and how to make testing safe (AFERR Phase Paper No. 03, Version 1.0). AFERR Research. DOI to be assigned.

ABOUT THE EVIDENCE

AFERR is a conceptual framework. This paper links each idea to published research where that research exists, and labels every claim by how sure we are: Proposed, Observed, Tested or Reviewed. It does not claim that AFERR has been proven as a sequence in the brain, or that any phase lives in a single brain region. Observations from Evivve simulation sessions are reported as practice evidence, not as validated measurement.

LICENCE

© 2026 Mohsin Memon. Published by AFERR Research under a Creative Commons Attribution 4.0 International licence (CC BY 4.0). You may share and adapt this work for any purpose, with credit.

ORIGIN

Written in India. Published by AFERR Research, 2026.

THE SERIES

00 The Loop (primer) · 01 Activation · 02 Forecasting · 03 Experimentation · 04 Realization · 05 Reflection



AT A GLANCE

Move 3 of 5 · Experimentation

01	The brain learns most from surprise: the gap between what you expected and what happened.
02	Acting creates the sharpest gap, because the outcome is yours.
03	People meet uncertainty in four dispositions: passive, reactive, explorative and participative. These are states, not types.
04	Every experiment answers back through three channels: results, other people and your own feelings.
05	If the real world is too risky to try things in, build a practice space where it isn't.

WORDS TO KNOW

Experimentation
Acting to find out, not to prove.

Prediction error
The gap between expected and actual that drives learning.

Disposition
How you engage with uncertainty in a given setting.

Practice space
A setting where every move of the loop can run without catastrophic cost.

TRY THIS TODAY

Change one small habit once today. Before you do, write down what you expect. Afterwards, compare.

The idea in one breath

You can't learn to ride a bike by reading about it. You have to get on, wobble, fall a little, and try again. Every time what you expected and what happened don't match, your brain learns something. Trying is how guesses turn into knowledge. The trick is to make trying safe enough that people are willing to do it. That is **Experimentation**.

How to read this paper

This paper runs the loop it describes: Notice, Guess, Try, See, Keep. Each part opens with a short version simple enough for a child, then a longer version for anyone who wants depth.

1. Notice

SIMPLY PUT

Watch a toddler with a new toy. She shakes it. She bangs it on the floor. She puts it in her mouth. She drops it to see what happens. Nobody taught her a method. She is running experiments, one after another, and learning from every one.

Somewhere between that toddler and most adults, something changes. We stop trying things in front of others. We wait to be sure. We ask for the manual.

GOING DEEPER

Experimentation is where a person moves from thought into action: where forecasts meet consequences and the mind's picture of the world is put to the test. Activation sparks the feeling. Forecasting builds the expectation. Only Experimentation turns those into evidence.

It is not random trial and error, and it is not performing for approval. It is intentional exploration: testing, failing, adjusting, and trying again. To experiment is to give ourselves permission to rehearse who we might become. The outcomes of those rehearsals, success, failure or surprise, become the raw material for the last two moves, Realization and Reflection.

2. Guess

SIMPLY PUT

Before you read on, guess. Which helps people learn a new skill faster: watching an expert do it perfectly ten times, or trying it themselves ten times and getting it wrong at first?

GOING DEEPER

Most people guess correctly that trying wins. Then they design most of their training as watching. The gap between what we know about learning and how we build it is one of the reasons this paper exists. In a large review of university science courses, students in active-learning classes outperformed those taught by lecture, and were less likely to fail (Freeman et al., 2014).

3. Try

SIMPLY PUT

Pick one small habit and change it once today. Sit somewhere different in a meeting. Ask a question you would normally keep to yourself. Write with your other hand for one sentence. Then notice two things: how it felt *before* you did it, and what actually happened.

GOING DEEPER

The feeling before is often bigger than the event. That gap, between how risky something felt and how risky it was, is information. It tells you how much of your caution comes from the situation and how much from habit. It is also the gap that well-designed practice spaces are built to close.

A harder version: think of the last time you tried something new at work and it didn't work. What did you do next? Try again differently, try again the same way, or stop trying? Your answer says something about where you stood in the four dispositions described below.

4. See

SIMPLY PUT

Your brain learns most when it is surprised. You expected one thing, something else happened, and *that* is when it rewires. But you only get surprised if you try. So the best places to learn are places where trying is safe, where you can be wrong without getting hurt. Some people wait to be sure before they try. Some only try when pushed. Some try everything. Some try with purpose and with others. Everyone can move between these.

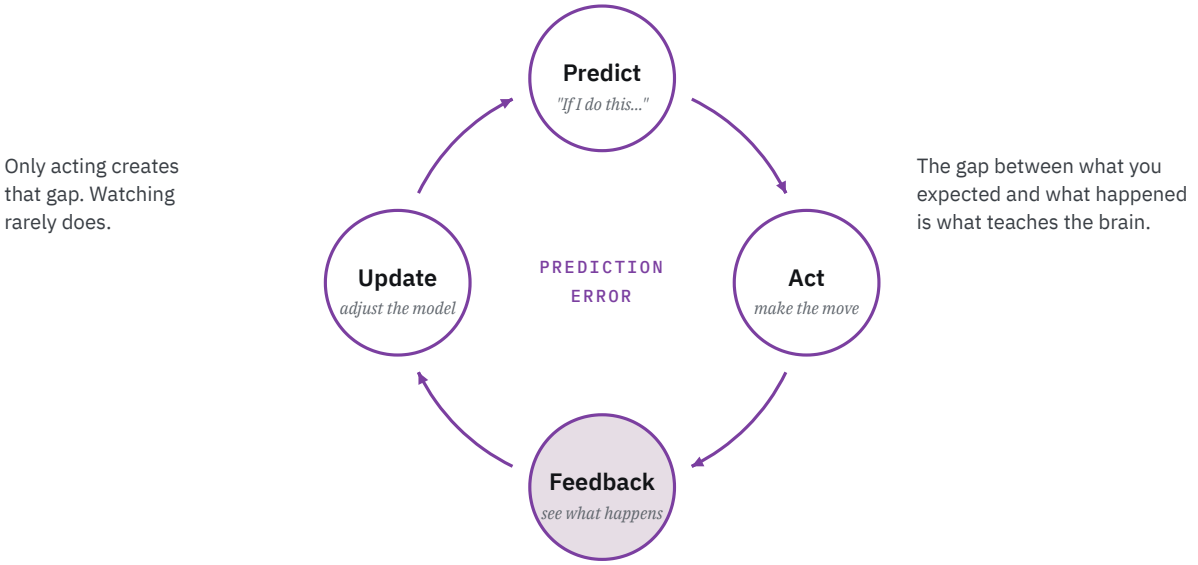
4.1 Why the brain needs Experimentation

The brain constantly predicts what will happen and updates when it is wrong (Friston, 2010; Clark, 2013). The update is driven by *prediction error*: the gap between expected and actual. In a landmark series of studies, dopamine neurons were found to fire not simply for rewards, but for rewards that were better or worse than expected, a signal well suited to teaching the brain from surprise (Schultz, Dayan & Montague, 1997). *Evidence: well established for reward learning; AFERR's extension to complex social behaviour is Proposed.*

Experimentation is the behavioural form of this loop: predict, act, receive feedback, update. Forecasting lets us imagine outcomes, but only acting generates the mismatches that drive lasting change. Donald Hebb proposed that connections between neurons strengthen when they are active together (Hebb, 1949), later summarised by others as "neurons that fire together wire together". Experimentation supplies the firing.

FIGURE 1

Learning from surprise



Experimentation is the behavioural form of the brain's prediction loop. Dopamine signals track rewards that are better or worse than expected (Schultz, Dayan & Montague, 1997).

Many brain systems are involved: areas of the prefrontal cortex in planning under uncertainty, emotional systems that weigh outcomes, the basal ganglia in learning from repeated feedback, the hippocampus in remembering where and when a strategy worked. The point is not to map each phase to a region.

There is an evolutionary story here too. Organisms that tried new strategies and explored new environments were the ones that adapted. Experimentation is not optional for a learning animal. It is the inheritance.

Processed insight, like processed food, may fill us. It cannot nourish change. Behaviour change needs the friction of uncertainty, the gap between intent and outcome, and the feeling of a real consequence.

This is consistent with long-standing theory. Kolb's experiential learning cycle places concrete experience at the centre of knowledge building (Kolb, 1984). Bandura showed that confidence in our own ability, self-efficacy, grows most strongly from our own successful attempts (Bandura, 1977). Deliberate practice research shows expertise is built through effortful, feedback-rich trying, not exposure (Ericsson, Krampe & Tesch-Römer, 1993). Studies of *productive failure* suggest that struggling with a problem before being shown the solution can deepen understanding (Kapur, 2008).

4.2 The four dispositions

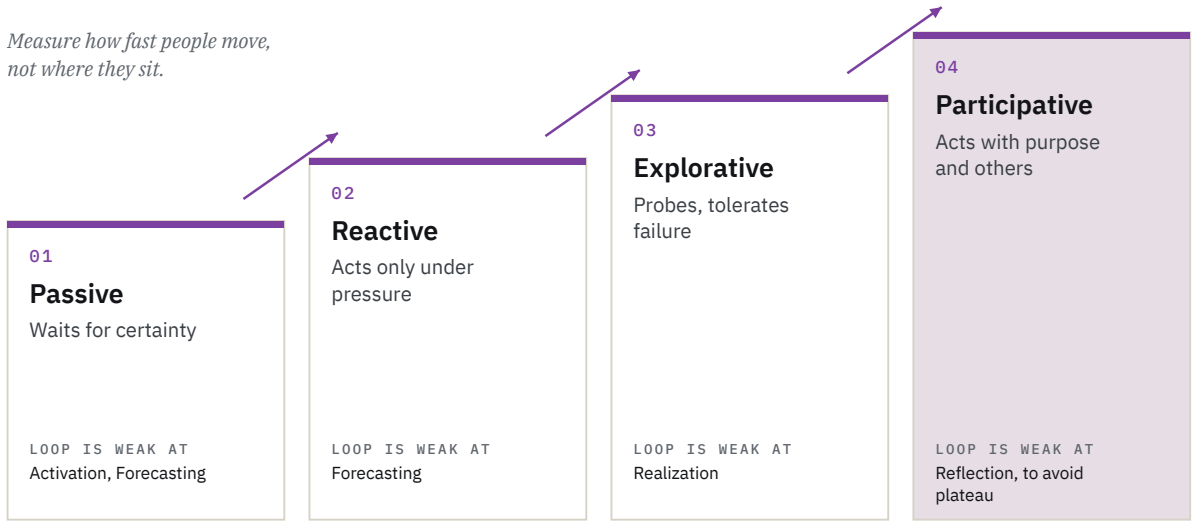
Across years of facilitated Evivve simulations, four recurring ways of engaging with uncertainty appear. They are not personality types. They are **dispositions**: states people move into depending on context, experience and how safe they feel. *(Observed.)*

DISPOSITION	WHAT IT LOOKS LIKE	UNDERLYING STANCE	WHERE THE LOOP IS WEAK
Passive	Withdrawing until certainty or direction appears.	Fear of error, low agency, high need for safety.	Activation and Forecasting.
Reactive	Acting only when forced by pressure or a trigger.	Loss aversion, defensiveness, compliance.	Forecasting; Realization is minimal.
Explorative	Probing limits, tolerating failure to find what works.	Curiosity, resilience, openness.	Realization; many trials, little synthesis.
Participative	Acting with purpose and with others, adjusting as feedback arrives.	Foresight, adaptability, confident agency, collaboration.	Balanced; the risk is plateau without Reflection.

These form a developmental trajectory, **Passive → Reactive → Explorative → Participative**, though not a strict ladder. In simulations, many participants begin passively, waiting for cues. Once they see that failure is not fatal, many start exploring. As feedback builds up, some begin to engage participatively. A useful thing to measure is not where someone sits, but how quickly they move.

FIGURE 2

Four dispositions toward uncertainty



States, not types. The same person can be passive in one room and explorative in another. The path is common in simulations but is not a strict ladder. (Observed.)

The same person can be passive in one room and explorative in another. That is the most useful thing about dispositions: they point not to who someone is, but to which part of their loop needs support right now.

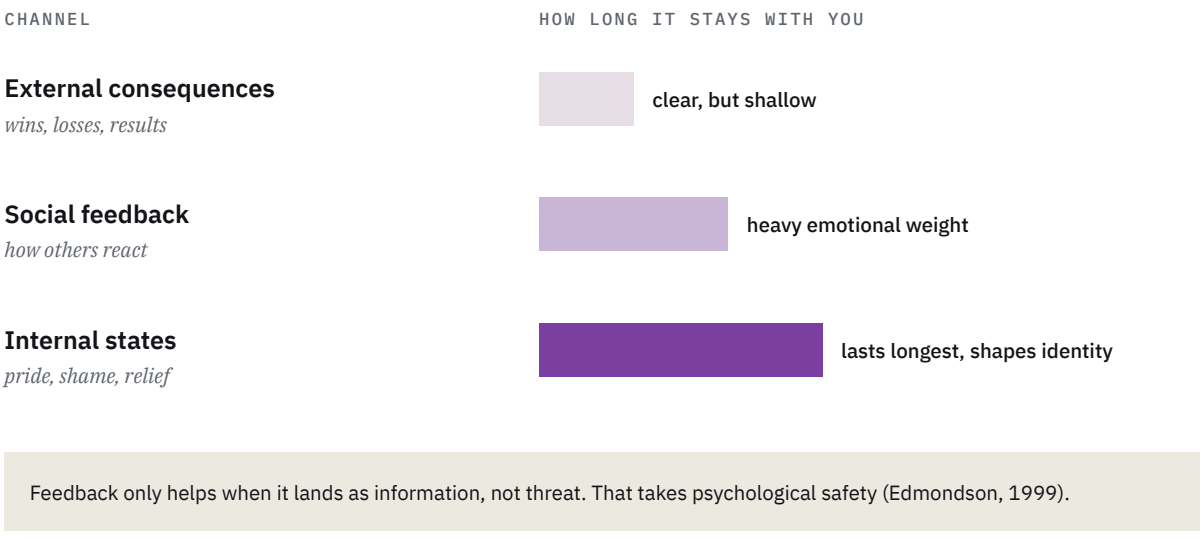
4.3 Three channels of feedback

Every experiment produces feedback, wanted or not, through three channels.

- **External consequences:** visible results such as wins, losses, gains and setbacks. Clear, but shallow on their own.
- **Social feedback:** how others react: support, critique, withdrawal, collaboration. Humans are social learners, so these signals carry heavy emotional weight.
- **Internal states:** pride, shame, relief, renewed confidence. These last longest and shape identity and future agency. Emotionally charged experiences tend to be remembered more strongly (McGaugh, 2004).

FIGURE 3

Three channels of feedback



Feedback only helps when it lands as information, not threat. That takes psychological safety (Edmondson, 1999).

Every experiment answers back, wanted or not. Design for all three channels, not just the scoreboard.

Feedback only helps when it is received as information rather than a threat. That depends on psychological safety: the shared belief that it is safe to take interpersonal risks. Teams with more of it engage in more learning behaviour (Edmondson, 1999). Without safety, feedback triggers defence and learning shuts down. With it, feedback becomes fuel.

4.4 Designing practice spaces

If the real world is too risky to experiment in, build a space where it isn't. AFERR calls these **practice spaces**: environments where every move of the loop can run to full depth without catastrophic consequence. A good practice space is not judged by how real it feels, but by whether each move gets what it needs.

- **Activation** needs meaningful stakes, not trivial exercises.
- **Forecasting** needs several possible futures, not one right answer.

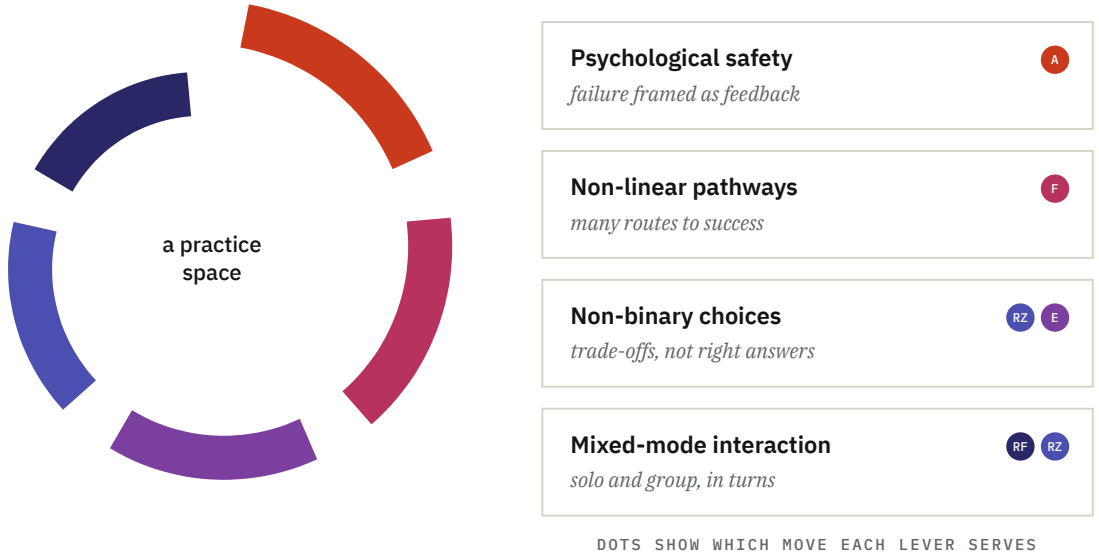
- **Experimentation** needs repeated trials with visible but non-destructive consequences.
- **Realization** needs structured sense-making that people can't skip.
- **Reflection** needs explicit time and prompts, so insight carries forward.

Four design levers make this possible. *(Proposed, from practice.)*

LEVER	WHAT IT DOES	PHASE IT SERVES
Psychological safety	Frames failure as feedback, so fear gives way to curiosity.	Activation
Non-linear pathways	Several routes to success stretch imagination.	Forecasting
Non-binary choices	Trade-offs instead of right and wrong answers create real surprises and nuanced conclusions.	Experimentation, Realization
Mixed-mode interaction	Shifts between solo and group work let sense-making happen at both levels.	Realization, Reflection

FIGURE 4

Four levers for a practice space



A practice space is judged not by how real it feels, but by whether every move of the loop gets what it needs. (Proposed, from practice.)

At every scale the principle is the same. For individuals: safe-to-fail side projects and personal prototypes. For teams: pilot sprints, simulations and debriefs where mistakes are mined, not punished. For organisations: pilots, sandboxes, innovation labs and recognition for intelligent failure.

5. Keep

SIMPLY PUT

Being better at experimenting doesn't mean failing less. It means bouncing back faster, trying smarter next time, and telling yourself a more useful story about what went wrong. "We got unlucky" teaches nothing. "Our plan for when to switch was too vague" teaches a lot.

5.1 What "better" looks like

Growth in Experimentation rarely shows up as higher first-attempt success. It shows up in the quality of the loop. *(Observed.)*

- **Error half-life shrinks.** People recover from mistakes sooner and pivot instead of fixating.
- **Co-modulation improves.** Energy, agency and foresight rise together, rather than one racing ahead (high energy with no plan, or careful plans with no action).
- **Up-cycling appears.** Feedback is turned into criteria for the next attempt. The story changes from "we got unlucky" to "our pivot rule was vague, and now it isn't."

5.2 Intervene at the process, not the person

When someone is passive, reactive or endlessly exploring, the instinct is to correct the behaviour: push them, discipline them, slow them down. AFERR suggests asking a different question. Not *why are they passive?* but *which part of their loop needs strengthening?*

DISPOSITION	WEAK POINT	WHAT HELPS
Passive	Activation and Forecasting	Clarify what is at stake for them, build visible agency, rehearse low-stakes scenarios.
Reactive	Forecasting	Widen time horizons, ask for several options, plan "if this, then that" before the pressure arrives.
Explorative	Realization	Structured debriefs: *What happened? So what? Now what?* Combine individual and group data.
Participative	Reflection	Link lessons to earlier experience, recalibrate risk, build commitments into the next forecast.

A real example from a simulation: a participant sat back through round one. Instead of pushing, the facilitator asked, *"What feels at stake for you here? Where could your choices matter?"* By round two the participant was testing a move that had felt too risky at first. By the end, with a structured debrief, they were planning with the group.

5.3 How Experimentation can be observed

Facilitators can score each loop, not each person, on a simple rubric, and look for direction of travel rather than snapshots. *(Practice tool; not a validated instrument.)*

PROCESS	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Activation	Avoids or overwhelmed	Scattered entry	Intentional entry, names stakes	Steady entry, steadies others
Forecasting	Defers, one vague path	Short-term only	Several paths, uneven criteria	Balanced options, explicit pivot rules
Experimentation	Repeats the safe move	Adjusts only under pressure	Iterates noisily	Targeted probes, coherent pivots
Realization	Withholds, anecdotal	Defensive	Open sharing, partial synthesis	Structured synthesis, cross-checks
Reflection	Dismisses the lesson	Notes it, no change	Specific change, uneven follow-through	Integrated change, wiser risks

The richest picture comes from combining three sources: what people did (behaviour in the simulation), what others saw (peer and facilitator observation), and what people say about themselves (short self-report prompts).

5.4 Questions to keep

- When did you last try something at work where failure was genuinely allowed?
- Which of the four dispositions do you slip into under pressure?
- Where in your team or organisation is being wrong expensive, and what is that costing in learning?

5.5 Limits and open questions

- The four dispositions are observed patterns. Their stability, their boundaries, and whether they predict performance outside simulations all need testing.
- Whether behaviour in a simulation transfers to the workplace is the central question for practice spaces. AFERR's working claim is that it does when Reflection is built in. That claim needs controlled study.
- The rubric is a facilitation aid. It needs inter-rater reliability testing before it can be used as a measure.

5.6 What comes next

An experiment produces an outcome. Making sense of it is a separate act, and an easy one to get wrong. That is the next move: **Realization**, the subject of Phase Paper 04.

Each experiment you run is more than a test of strategy. It is a rehearsal of who you are becoming.

References

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Clark, A. (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences, 36*(3), 181-204.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350-383. https://doi.org/10.2307/2666999

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363-406. https://doi.org/10.1037/0033-295X.100.3.363

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410-8415.

Friston, K. (2010). The free-energy principle: A unified brain theory? *Nature Reviews Neuroscience, 11*(2), 127-138. https://doi.org/10.1038/nrn2787

Hebb, D. O. (1949). *The organization of behavior: A neuropsychological theory.* Wiley.

Kapur, M. (2008). Productive failure. *Cognition and Instruction, 26*(3), 379-424. https://doi.org/10.1080/07370000802212669

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall.

McGaugh, J. L. (2004). The amygdala modulates the consolidation of memories of emotionally arousing experiences. *Annual Review of Neuroscience, 27*, 1-28. https://doi.org/10.1146/annurev.neuro.27.070203.144157

Schultz, W., Dayan, P., & Montague, P. R. (1997). A neural substrate of prediction and reward. *Science, 275*(5306), 1593-1599. https://doi.org/10.1126/science.275.5306.1593