Approaching Failure: A Practical Guide

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- Failures are a necessary condition to scientific progress. They are part of experimentation.
- Every project is **stochastic**. The likelihood of success depends on the amount of risk taken. Everything is a matter of probability.
- Many big scientific discoveries originated from major fails.

From failures to successes

"8 brilliant scientific screw-ups": `https://www.mentalfloss.com/article/21135/8-brilliant-scientific-screw-ups`

1. Anesthesia (1844)
2. Iodine (1811)
3. Penicillin (1928)
4. The Telephone (1876)
5. Photography (1835)
6. Mauve Dye (1856)
7. Nylon (1934)
8. Vulcanized Rubber (1844)

They all emerged from a mistake leading to a discovery.

Being open to failures

- Importance of refutability - **falsification principle** of Karl Popper

- Unfalsifiable theories cannot be wrong by definition: is that a win?
- Rigorous research gives precise conditions for the refutation of its claims.
- This is what opens scientific dialogue and provides foundations for future enquiries.
- Vulnerability is accountability. But this is difficult to achieve.

Failures in academia

- Let's face it: we have a problem in academia with "failures".

- I personally think this is detrimental to scientific progress.
- It's hard to fix but I think we can actually *succeed* in this.
- **My proposal: Let's succeed in failing. Together.**

Failures in general

- Let's think about the topic of personal failures more generally.
- After all, even academics are behavioural agents (spoiler alert #1)
- In principle, a personal failure should be a teachable moment.
- But, it's often not.
- Failure to learn from one's failures = the biggest failure of all?

Failing to learn from failures (1)

Not Learning From Failure—the Greatest Failure of All

Lauren Eskreis-Winkler, Ayelet Fishbach

First Published November 8, 2019 | Research Article | Find in PubMed | Check for updates
https://doi.org/10.1177/0956797619881133

Article information

Altmetric 337

Abstract

Our society celebrates failure as a teachable moment. Yet in five studies (total N = 1,674), failure did the opposite: It undermined learning. Across studies, participants answered binary-choice questions, following which they were told they answered correctly (success feedback) or incorrectly (failure feedback). Both types of feedback conveyed the correct answer, because there were only two answer choices. However, on a follow-up test, participants learned less from failure feedback than from success feedback. This effect was replicated across professional, linguistic, and social domains—even when learning from failure was less cognitively taxing than learning from success and even when learning was incentivized. Participants who received failure feedback also remembered fewer of their answer choices. Why does failure undermine learning? Failure is ego threatening, which causes people to tune out. Participants learned less from personal failure than from personal success, yet they learned just as much from other people's failure as from others' success. Thus, when ego concerns are muted, people tune in and learn from failure.

Failing to learn from failures (2)

Many barriers to learning from experience:

- **Blind spot** (we see failures in others, but not so much in ourselves)
- **Hindsight bias** (the famous "I knew it!")
- **Attribution bias** (we just blame the circumstances)

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$\Rightarrow$ Failure = ego threat

$\Rightarrow$ Blocking failures = defense mechanism

Sharing failures (1)

Assessing one's failures is important. Sharing them with others is *essential*.

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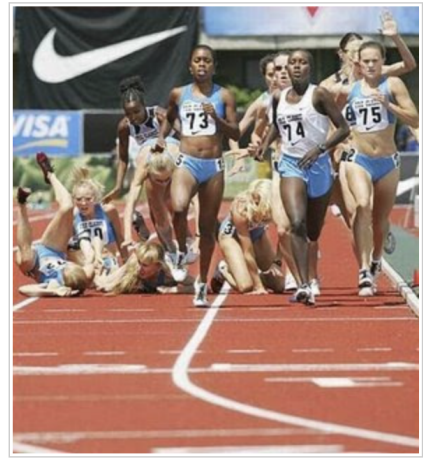
(Okay, maybe not like that:



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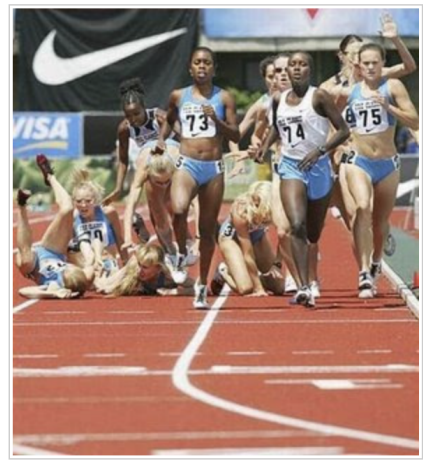
(Okay, maybe not like that: 

)

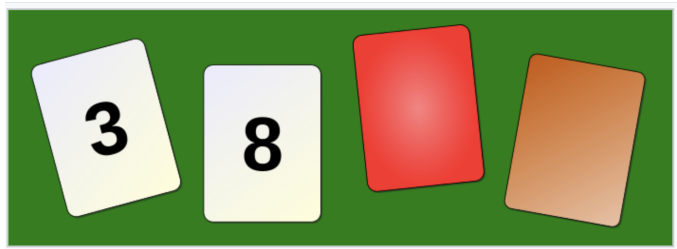
- Sharing failures is a **public good**. And thus, it is underprovided.
- One may pay a reputational damage (at least in the short run).
- But it builds knowledge for the scientific community (we know how to learn from others' failures!).
- And the individual private benefit is non zero. Sharing = objectifying. By sharing, we can better come to terms with reality.

Sharing failures (2)

- The perceived **reputational damage** of sharing failures is not the only contributing factor behind the lack of sharing.
- Other likely reason: the failure (another one!) to **see the value in communicating failures to others**.
- Learning that something did not work IS knowledge.
- Failures tell us what should be avoided in order to succeed - this knowledge is harder to extract than with straight successes.
- As behavioural agents (and thus "cognitive misers"), we struggle to learn in these indirect ways.

Sharing failures (3)

- **Confirmation bias**: we tend to search for evidence that confirms our hypothesis.
- We have much harder time searching for **contradictory** information.
- **Wason Selection task** for determining the truthfulness of a rule.



Which card(s) must you turn over in order to test the truth of the proposition "*If a card shows an even number on one face, then its opposite face is red*"?

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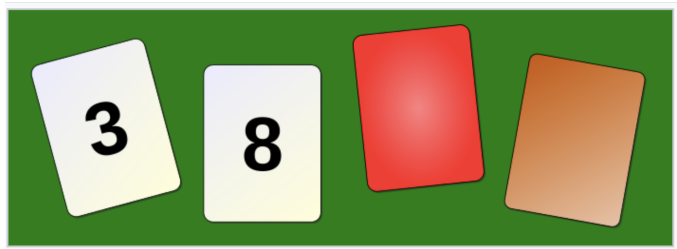


Which card(s) must you turn over in order to test the truth of the proposition "*If a card shows an even number on one face, then its opposite face is red*"?

- Answer:
  - Turn # 8 (easy and intuitive - confirmatory)
  - Turn brown card (difficult - contradictory)
- In Wason's original study, $< 10\%$ of subjects found the right answer.

Sharing failures (4)

Eskreis-Winkler and Fishbach (2020) tested the conjecture that people **do not see the value in sharing failures**: `https://www.sciencedirect.com/science/article/pii/S0749597818302747`

- Subjects presented with 3 mystery boxes containing a prize (\$-0.01, \$0.20, \$0.80).
- People learn about the location of both \$-0.01 and \$0.20.
- They have decide what to tell the next participant. They can only share the location of one of the two prizes.
- 41% share information about \$0.20.
- This is despite the fact that sharing \$-0.01 guarantees higher expected earnings.
- People also prefer to receive information on \$0.20 prior to playing.

The danger of not sharing failures

- Not documenting failures means that others will take the same dead end we took while resources could have been invested elsewhere.
- These informational asymmetries likely contribute to the "impostor syndrome".
- This is because, as behavioural agents, we have hard time to draw inferences from what we do not see (i.e., the failures)
- For instance, see Benjamin Enke (2020) "What you see is all there is": `https://academic.oup.com/qje/article/135/3/1363/5821301`
- Consequence: we may be led to overestimate the amount of success that others experience.

My journey with failures

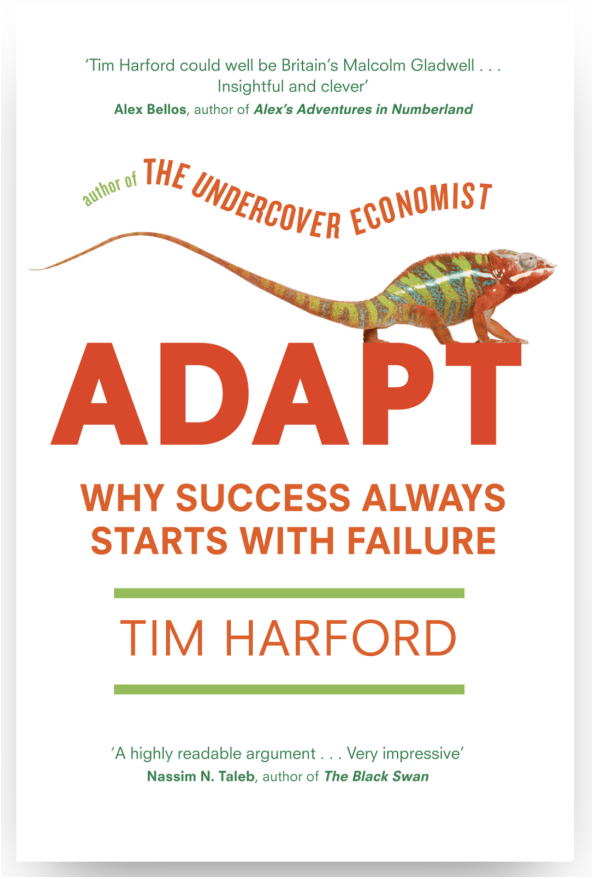
- As an experimental economist, a lot of things need to go right for a project to come to successful completion.
- With experience, I cannot say that I have learned to fail less (why would I?) but I have become better able to learn from them.
- Here are important stages where I have failed (and will keep failing):
  - Failure to convince project partners
  - Failure to secure funding
  - Failure to recruit subjects
  - Failure to find the right experimental paradigm
  - Failure in data recording (self or partners)
  - Failure to produce drafts
  - Failure to publish (rejections from journals) - learn more about peer review in economics: `https://evalresearch.weebly.com/`

My top lessons from over 10 years of failures

1. Move slowly
2. Fail Fast

   1 & 2 seem hard to reconcile?
   Not necessarily: break down the problem and fail on the small parts.
3. Scale down and maybe scale back up
4. Remember the planning fallacy - apply caution
5. Document research processes and dissect failures
6. Put processes in place to learn why you failed
7. Prepare yourself to fail (this is the default) and to adapt

Own your failures and adapt



- Importance of failing through experimentation and experimenting with failures.
- Adaptation and resilience are key.

Failures can make you stronger... if you learn from them

Article | Open Access | Published: 01 October 2019

Early-career setback and future career impact

Yang Wang, Benjamin F. Jones & Dashun Wang

Nature Communications **10**, Article number: 4331 (2019) | Cite this article

92k Accesses | **16** Citations | **279** Altmetric | Metrics

Abstract

Setbacks are an integral part of a scientific career, yet little is known about their long-term effects. Here we examine junior scientists applying for National Institutes of Health R01 grants. By focusing on proposals fell just below and just above the funding threshold, we compare near-miss with narrow-win applicants, and find that an early-career setback has powerful, opposing effects. On the one hand, it significantly increases attrition, predicting more than a 10% chance of disappearing permanently from the NIH system. Yet, despite an early setback, individuals with near misses systematically outperform those with narrow wins in the longer run. Moreover, this performance advantage seems to go beyond a screening mechanism, suggesting early-career setback appears to cause a performance improvement among those who persevere. Overall, these findings are consistent with the concept that "what doesn't kill me makes me stronger," which may have broad implications for identifying, training and nurturing junior scientists.

- `https://www.nature.com/articles/s41467-019-12189-3.pdf`
- `https://www.scientificamerican.com/article/failure-found-to-be-an-essential-prerequisite-for-success/`

The bigger reality

I told you (part of) my reality. What is the bigger reality?

https://www.geeksaresexy.net/

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$\Rightarrow$ I need to give you a standard, a reference point. Failure is very relative!

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N.b.#3: We *have the right* to disagree with the standard.

N.b.#4: We should all agree to disagree!

The No-Trade theorem must fail. Trade ideas!

My own take on this

Don't forget to fail... and embrace it!

If you're not failing, it's either because:

1. You got a lucky draw from your stochastic distribution.
   Implication: Be humble in the face of success. Next time it's your turn.

2. You did not try anything new or your goal was too easy.
   Not fair play!

If you are not failing, you're not doing it right.

By revealed preference, you must be here for the challenge somehow. So you must accept the failures that come with it.

Dealing with failures

I hope I convinced you to play the game and accept failures.

If you take on this challenge and you fail, what should you do then?

Let me give you a step-by-step guide to failing.

Step 1 to dealing with failures

Step 1 is simple: You cry it out! Alone or in company.

My company since I joined Oxford? A few people, but one in particular:

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Johannes Abeler

(N.b.: The font size will never match the greatness).

JA has been my mentor at the department, but also my therapist, tax preparer, pension advisor, and running buddy sometimes.

Just to be clear...

=

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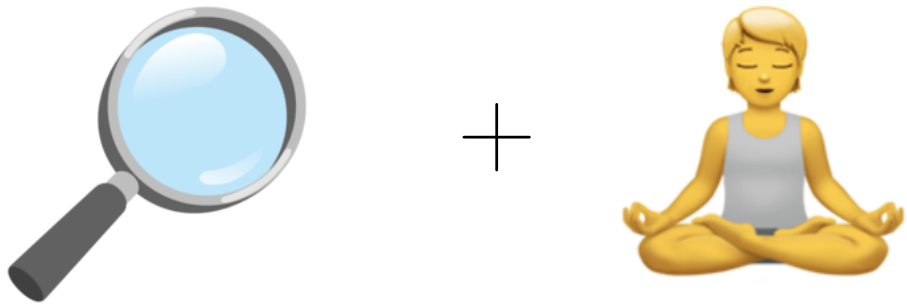
=

Step 2 to dealing with failures

Step 2: You look at the evidence. Calmly.



Remember that the processing of ego-relevant information is biased.

- So look at it with a friend, course instructor, thesis supervisor, etc.
- If someone makes a constructive criticism, process the signal.
- Look at the evidence holistically.
- Realize that it's actually ok. (Remember: You should be proud of having tried!)

Step 3 to dealing with failures

Step 3: Move forward. One step at a time. Don't look too much back.

`https://www.becomeanindividual.com/fail-well/`

- You are there, in the mud. Embrace it! Actually, it can be fun. (Do you know tough mudders? There is a market for mud.)
- Don't fall prey to the sunk cost fallacy. What's sunk is sunk.
- Don't rehearse 1,000 times what else could have happened. Next time, just try to do it before ;)

  (BUT: spoiler alert #2: Contingent reasoning is really hard.)

Step 4 to dealing with failures

Step 4: Ask yourself (i) whether you *can* salvage the project and (ii) whether you *should*.

Given the (opportunity) costs and uncertain benefits, do you want to continue?

There is no escape! You need to figure out the objective function $W(\mathbf{X})$.

Spoiler alert #3: EXTREMELY hard.

("Let $\succeq$ be a complete and transitive preference relation on X" = bs.)

Before thinking about aggregation of costs and benefits, list them:

- Do you have a hard deadline?
- Do you have fun working on this project?
- Does the project push your learning?
- Does the project give you purpose?

And then aggregate fun, prestige, purpose, output, etc.! Good luck!

Step 5 to dealing with failures

Now you have the objective function (incl. the constraints: don't forget your Lagrange multipliers!).

So what do you do next?

Step 5 to dealing with failures

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So what do you do next?

Step 5: You solve for the optimal solution! (or not)

$$\max \mathrm{W}(\mathbf{X})$$

The “optimal” stopping time problem

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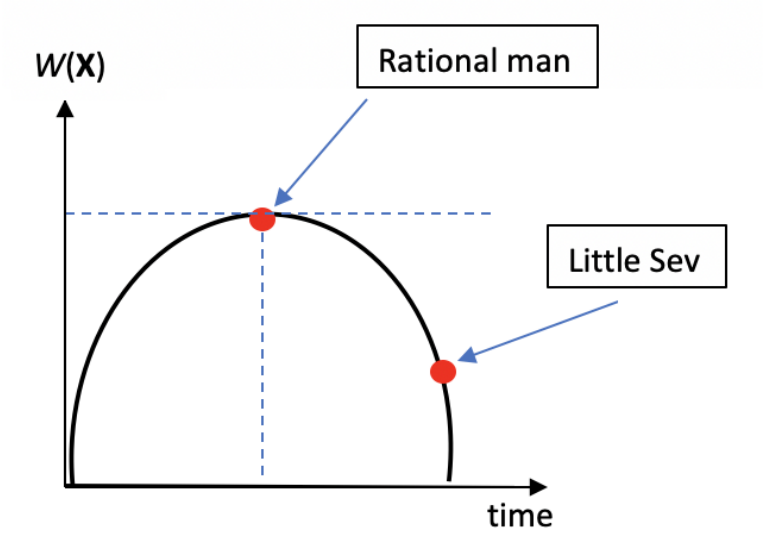
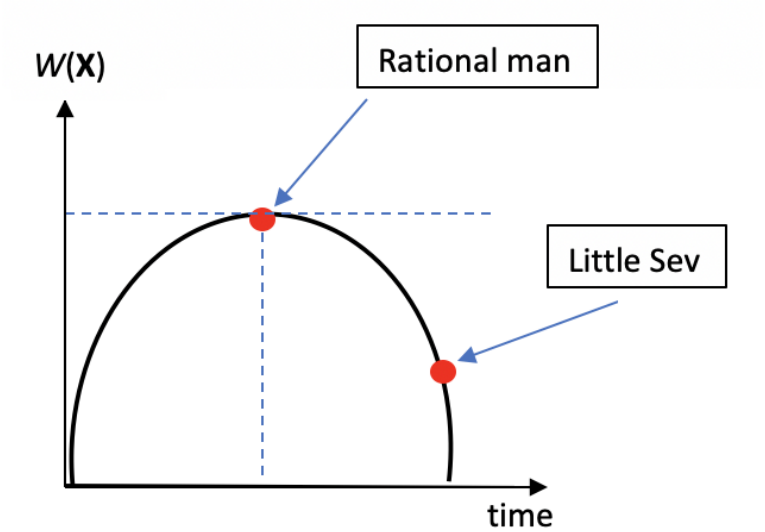


The "optimal" stopping time problem



I often try for too long because:

- I am loss averse ($\lambda >> 2$)
- I am incredibly stubborn (one of my rare qualities ;)
- My biggest disease: perfectionism (a perfect perfectionist, maybe?!)

BUT: note that I put a MAX operator in front of the objective function.

Sometimes try to be a satisficer. (Do what I say, not what I do.)
It often goes a long way!

Implementing the steps

Ok, I gave you a 5-step guide to failing. (Should I patent this?)

You don't get it the first time? Well, it's an iterative process. It will converge eventually.

So try, fail, update, repeat. Be humble.

Remember, success is just another failure.

Or (for the "glass 1/2 full" person), is failure just another kind of success?

Why are you here?

At the end of the day, ask yourself why you are here.

You won't get the answers straight from the sky.

Use the economics you've learned!

Apply the principle of revealed preference. You can learn from your actions.

My "Why"

So what's my answer to this? Why am I in this crazy job, working so many hours for so little positive feedback?

My "Why"

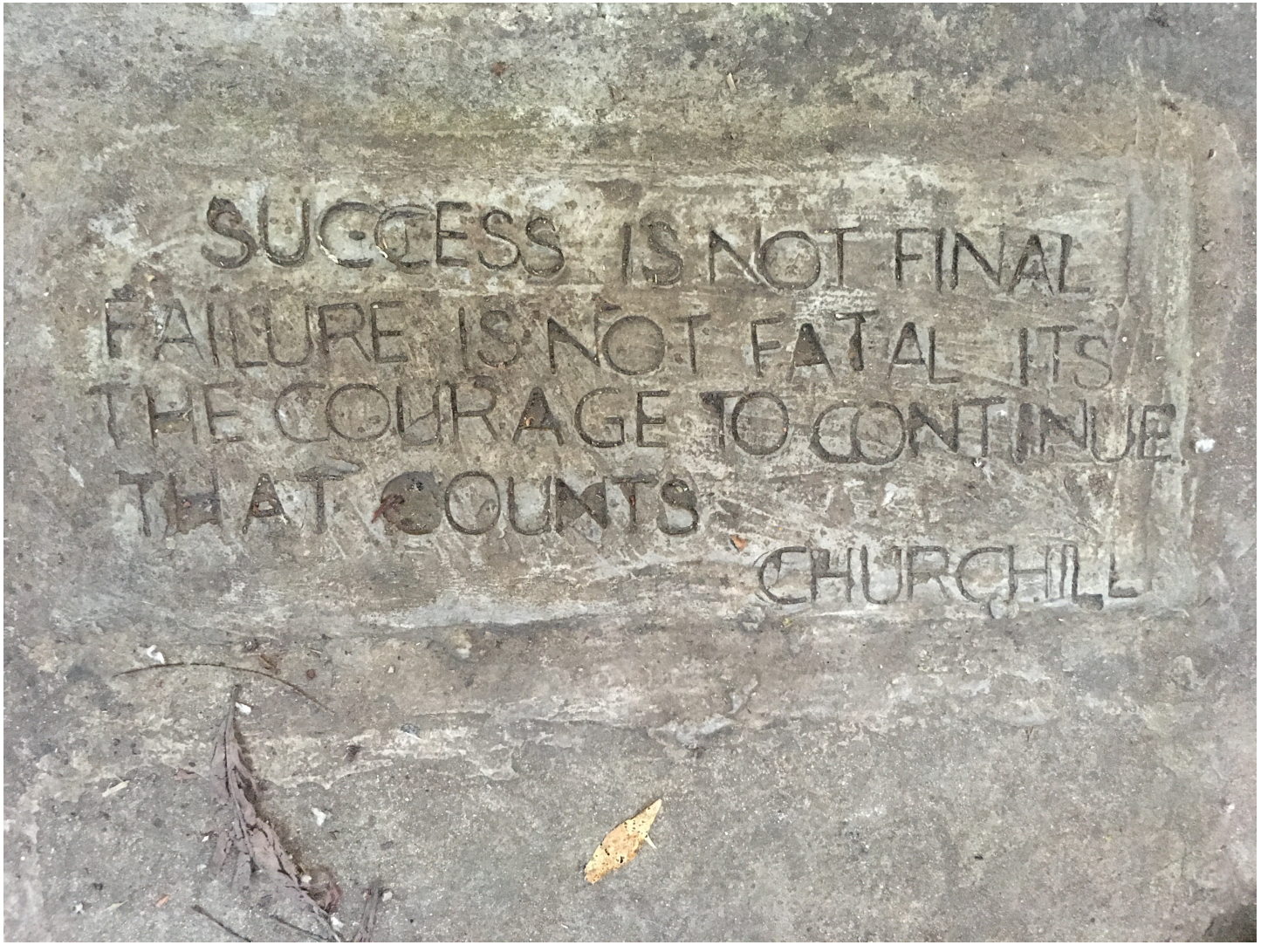
So what's my answer to this? Why am I in this crazy job, working so many hours for so little positive feedback?

- I am here for the *questions* (far more than the answers!).
- I am *ok* being in a state of uncertainty.
- I might even derive utility from this: seeing new problems = thrill!
- I love seeing my state space expand, even if it means I doubt more.
- It's ok to doubt. It's healthy to question. It can be transformative and even liberating.

Doubting and failing

- Maybe it's not just ok to question, it's our *duty* as members of academia.
- We should question our past and current views.
- We should be open to being wrong and making (honest) mistakes.
- And acknowledging this is not failure. It is in fact major success.

#Fail2Succeed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