

Are you Lucky or Good?

Untangling the role of luck in patient outcomes.

- Intro
- ▼ Disclosure
 - None
 - Troponin biochemistry
- ▼ Bombarded with patient outcome measures
 - Surgical Site Infections
 - Cdiff Infections
 - CAUTI
 - Cardiac arrest survival
- What is the role of luck and skill in out patient outcomes?
- ▼ Steeped in Aphorisms
 - “Good luck”
 - “You make your own luck”
 - “The harder I work, the luckier I get.”
 - “I would rather be lucky than good”
- ▼ Every outcome is a combination of luck and skill
 - Blair Walsh shaking a 27-yard field goal kick against Seattle Seahawks at TCF Bank Stadium
 - Buying Apple stock in 1997
 - Winning a running race against Usain Bolt
- ▼ Lottery
 - Powerball Lottery on March 30, 2005
 - 28, 39, 22, 32, 33, 42
 - \$84M prize
 - 3-4 to win 2nd prize by picking 5 numbers — NO — 110
 - All the tickets with same 6th number 40

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▼ Luck

- Out of one's control, unpredictable
- Affects outcomes
- Can have positive or negative contributions
- Another outcome was possible

▼ Luck is not the same as randomness

- Randomness operating at level of system, luck at level of individual
- Coin toss is random, but calling head-tails exhibits “luckiness” for me.
- A good test is can you loose of purpose

▼ Skill

- In your control
- Using one's knowledge and abilities effectively in execution or performance
- Acquire through deliberate practice of physical and cognitive tasks
- Preparation and hard work are essential elements

▼ Let's take a test

- Work through an example of understanding luck and skill
- One hundred questions
- Need 80 to pass
- Memorize 80 items
- No Luck — test is 100 questions
- Luck — test is 20 questions
- When luck has little influence, skill always triumphs

▼ Luck-Skill Continuum

▼ Placing activities on the Continuum

- Cause and Effect

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- Rate of Reversion to the mean
- Is prediction useful
- Left side: Roulette, Coin toss
- Right side: Playing violin, running races, cooking
- Most interesting stuff happens between the extremes
- ▼ Caveats
 - ▼ Take sample size into account
 - ▼ Most dangerous equation
 - de Moivre Equation
 - Variation of the mean is inversely proportional to the sample size
 - Important when trying to determine if outcome is due to luck or skill
 - ▼ Rates of kidney cancer
 - Lowest — Small, rural, central
 - Highest — Small, rural, central
 - If you have an activity that results are nearly all skill, you don't need a large sample size to draw reasonable conclusion.
 - As you move left, you need an larger sample size to understand the contributions of skill.
 - ▼ Don't read more into an outcome than is justified
 - We're naturally inclined to believe that a small sample is representative of a larger sample (ie we expect to see what we've already seen).
 - ▼ Limits of the statistical methods
 - ▼ Taleb 2x2 matrix
 - Rows distinguish between activities that can have extreme variation and those that have a narrow range of possibilities

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- Columns are the payoffs — simple vs complex
- Statistics methods work well in quadrants 1 - 3.
- Quadrant 4 is far more difficult

▼ Two-Jar Model

- Jar 1: Luck
- Jar 2: Skill
- Outcome based on drawing from each and adding result
- Right: All luck balls 0
- Left: All skill balls 0

▼ Paradox of Skill

- As skill increases, performance becomes more consistent and therefore luck becomes more important

▼ Skill - Observed Outcome - Luck

- Converging skill

▼ Why skill and luck confuse us

- Why we are bad at distinguishing skill from luck

▼ Time

- Time is the elimination of probabilities to fixed events
- Driving to work
- The future is filled with possibilities
- Looking back events are fixed and skill and luck appear inextricably fixed
- But we forget our present is only one of many that could have been
- We draw lessons from the past that are wrong

▼ Stories

▼ Humans love stories

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- A beginning, inciting episodes, series of events, complications, love unrequited, villains defeated, surprise, suspense, climax, resolution.
- We weave a satisfying narrative for ourselves
- Desperate requirement to link cause and effect
 - ▶ Creeping Determinism
- Undersample of failure
- ▼ In drive to find cause, we test too much
 - Find causes when we're simply seeing the results of chance
 - Not understanding path dependence of superstars
 - Post Hoc Fallacy
 - We are poor predictorsOur minds are not well suited to make sense of relative roles skill and luck play
- ▼ Many Shapes of Luck
 - Independent vs Dependent outcomes
- ▼ Power Laws
 - Cumulative advantage
 - Social influence
- ▼ Path-dependent
 - preferential attachment
- ▼ Inequality and Unpredictability
 - Economics of superstars
- ▼ Winnter-Take-All Society
 - Technology
- ▼ What makes a useful statistic
 - Persistent (Reliability)
- ▼ Predictive of your goal

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- Validity — conclude the better the statistic the better the outcome

- Clear cause and effect

▼ What do you want the statistic for?

- You get what you measure and only what you measure.

- Don't select statistic for its ubiquity instead of utility

- Correlation with an outcome you desire

▼ Building Skill

▼ Right activities

- Deliberate practice improves skill.

▼ Reliable feedback

- With right activities, little variation from luck so you get instant and reliable feedback, which is key.

▼ Coaching

▼ Atul Gawande — surgeon skill plateaus. Hired a coach.

- Drapes not right, light drifted, elbows too high.

- Checklists — manage attention

▼ Left activities

- What you do is not closely connected with outcomes.

- Focus on process.

- Outcomes will fluctuate, but will gradually improve over long term (large sample sizes)

- In the short term, even if your process is good, outcome can be bad.

- Good process, bad outcome

- Don't be fooled by bad process, good outcome.

▼ Minimizing effect of Luck

▼ Colonel Blotto Game

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- Competitive interactions

▼ In Skill Competitions

- Reducing advantage of skilled opponent if you are an underdog by add battlefields, don't go toe-to-toe
- Strong seek to simplify to emphasize their advantage in skill and resources
- Weak should try to add randomness to dilute the strong player's advantage

▼ Teasing out causality through little bets

- Reducing influence of luck by more effectively tying cause to effect
- Randomness and luck are the result of insufficient information — inability to pinpoint cause and effect
- Run experiments
- Can get a clearer sense of cause and effect through a combination of applied scientific methods and technology

▼ Reversion to the Mean

- Where you fall on the graph, points to your propensity to revert to the mean.
- Repeatedly drawing from jar
- Careful of gambler's fallacy