

Questions about greatness:

- When we call someone *great*, what really do we mean? Why are there no entrepreneurs on the list—why are Rockefeller, Carnegie, and others of the like not remembered nearly as much? Why are famous musicians, athletes, journalists, architects not seen in the same light—why are certain professions over-represented?
- On a superficial level, what are some of the traits they all share? Any differences between thinkers and statesmen? What are some traits or similarities you *might expect* them to have, but they don't share—what are some important sources of diversity or things you don't need to worry about honing? What are some of the most unusual traits they shared or unexpected commonalities?
- To what extent did circumstance play a role? Would they have been successful if they have been born 5 years before or after? Born in a different socioeconomic class? Born to parents in similar circumstances but with a different outlook on the world? Why did they succeed but others from similar backgrounds and circumstances didn't?
- To what extent did they optimize for posterity? What were *their attitudes* towards going down in history? How were they perceived when alive, and what did they think about that perception?
- How thoughtful were they about picking their career paths and choosing the problems they set out solving or work they set out to do? Why did they choose that path? How did their thinking on this front differ from my own?
- Why are they remembered more than their contemporaries; were they genuinely more prolific and innovative, or merely products of circumstance and fortune?
- How will they be remembered in 5 years? 50 years? 500 years? Are there patterns in who is remembered most, and least?
- Is there a relationship between productivity/quality of work, and posterity? Are the people on the list who are remembered most also the ones that contributed the most to human progress? Are there certain contributions that are valued more by posterity than others?
- Are there similarities in historical society/the state of the world when people achieved greatness? Was the failing Roman Republic at all similar to renaissance Italy or WW2 Berlin?
- Did all these people surround themselves with other similarly great people? What are the tangible benefits they derived from it; could they conceivably have achieved as much if they were cut off from society—was their position in intellectual/cultural centers *really* that important.

- To what extent do I agree with the great man theory—that history is merely a summary of great men’s achievements; or is the ebb and flow of history more to do with the choices and will of the masses?
- When there were overlaps in their lives, like Churchill and Einstein, what relationship did their worlds have? How did their outlooks of the same time period compare? How were they respectively perceived at the time, and now today, and why, if at all, is that different?

Alexander the Conqueror

Julius Caesar

Preface

PERNICIOUS = damaging, destructive

PAGAN = heathen, infidel,

PARADIGM = the ideal model, prototype, example

OVERMUCH = too much

- Caesar was a living embodiment of Kvothe. He was a master orator and fierce commander, lover of women and pirate-killer, visionary dictator and high priest by birth. As with most others I deify, he had experiences that would go down in history, the kind that people sing songs about through time. Aside from impacting the world and being prolific in reshaping Roman society (which is emblematic of modern society), he made sure to do things that made him easy to talk about. He was a physical beast who swam across raging rivers and of course, a womanizer with a shredded physique, whose outward aesthetic was a consequence of internal discipline.
- On a meta-level, he was so great because he converted Rome from a Republic to an Empire (somewhat regressing it), was super productive in changing laws (and doing things like introducing the modern calendar) that are still with us as well as the fact that he was a legendary, memorable personality.
- The difference between a republic and democracy, which are two alternative ways of governing, are that a democracy represents the will of the majority directly, at the expense of the majority, whereas the republic structure is bound by a constitution that ensures that the

will of the minority is not completely trampled and the majority do not take tyrannical power over the minority. In other words, a republic is slightly more limited than a pure democracy.

- Important dates include:
 - Founding of Rome (allegedly by Romulus and Remus, c. 750 BC)
 - Roman republic (c. 500 BC)
 - Roman Empire c. 27 BC
 - Fall of the empire c. 480 AD

Prologue

BLUSTERY = stormy, windy

OVERTURES = opening movement at the beginning of an opera or play

- Power is the ability to impact millions of lives significantly with one decision that you have unchecked autonomy to make.

The Early Years

RAVAGES = damaging effects, scars

LATRINE = communal toilet of the type present at barracks or campsites

LIBATION = drink poured as an offering

STAINCHLY = do something in a fiercely loyal, committed way

REPUDIATE = refuse to be associated with, disown, reject

DITHER = hesitate, oscillate

VENDETTA = feud, quarrel

INDEMNITY = insurance, protection

INIMICAL = harmful, detrimental

BESEECH = implore, beg someone to do something

BAWDY = suggestive, inappropriate, indecent

IMPUNITY = exemption from punishment, immunity

- Musical is play with some music, and opera is entirely in music. In this continuum, a musical is in between a play and an opera.
- Plutarch was a classical biographer, Cicero was an ancient author and philosopher.
- One purpose of biographies beyond educating and entertaining the public is to serve as a definingly accurate chronology for reference far in the future—we remember much about Leo and Caesar from their contemporary biographers (Vasari and Suetonius, respectively).
- Ideas are so revolutionary and scary in autocracies because a revolution in one place can resonate and diffuse easily. Because there was ‘communist’ revolution in Greece at the time, there was a strained relationship between the patricians, the nobility, and the plebians, the common men, at the time.
- The reason we study classics is because that is when documented knowledge and thought resembling that which we have today began. Fables like the Roman senate quelling plebeian revolution by telling the story of how the limbs left the body and realized they needed the belly —we play on and mock these stories today, but they are the foundations for our ways of thinking.
- It’s interesting to note that the Jews were outcast and hated as a group throughout history, even in Roman times. *I should look into why this is at some point, and what we can learn from it.*
- It’s interesting that religion at the time was based entirely on transaction, not emotion. People would sacrifice to the gods in hope of getting something in return, there was no element of belief or emotion. *The birth and evolution of religion would be something interesting to learn about.*
- Rhetoric was immensely important, and deeply taught in classical times. Since there was no public education, those who *were* educated were taught at private tuition or through individual

tutelage. They taught kids how to master oration, from delivery and voice to structure of argument, all without notes.

- As he came of age, he was assigned a religious post. At the same time, there were battles for power, and as Sulla, a general who secured power after the war with Italy, left for Asia to fight battles on behalf of the republic, Marius and Cinna came to power, keeping it until Sulla returned from his battles, regained power, and slayed the usurpers. He married Cinna's daughter, Cornelia, until she died, when he mourned and then married Pompeia, the granddaughter of tyrant Sulla (a patrician). His mother was Aurelia.
- Caesar was good at choosing his friends—importantly, who he *didn't* believe in or want to be around, and making sure not to be associated with, or not to care about the opinion of.
- The way the Roman republic (and empire) worked is that Rome would, through military strength, conquer a territory, and then provide it with peace and stability, good infrastructure and protection, in exchange for levying taxes and allowing its senators and civil officers to bleed it dry for personal gain.
- Cicero watched Caesar as a lawyer represent someone, and described it as 'a beautiful painting, but in words', with no reason to fabricate anything since he was a rando who had no relation to Cicero. *Practise, and master, the art of controlling masses and groups—whether that's storytelling at a party or pitching to a crowd of 10,000.*

The Path to Power

PASTORALIST = sheep, cattle farmer

RABBLE = mob, crowd

IMPLACABLE = unappeasable, unpacifiable

DECIMATED/ FASCISM/ REPUBLIC = decem (10), fasces (weapon worn by praetor guards) , res publica (state of the people)

INSURRECTION = rebellion, revolt

FOMENT = instigate, incite (an undesirable or violent result)

BALK = resistant, hesitant to do something

SCANT = little, barely any, hardly

CHAGRIN = annoyance, irritation

PLODDING = trudging, dragging

EXORCISE = drive out, cast out

ENDEARING = adorable, delightful

- There are enormous cultural remnants from Rome, even today. Everything from the etymology of words like decimate and fascism, to the calendar, to the thumbs up (when spectators wanted gladiators to be killed), and more. Interesting to see the random walk of cultural evolution and remnants that we gloss over as unimportant now.
- The Senate chose Crassus to put down Spartacus' revolt of the gladiators, and when any in his own army fled, he would round them up, put them in groups of ten, then execute 1 in 10 at random. This is where *decimate* comes from. It really is fantastical some of the things that happened—like members of Spartacus' army being taken captive and crucified one by one every few hundred meters for hundreds of kilometers.
- The "Path of Honors" to succeed in a stately job went from Military Tribute to Quaestor to Aedile (or Tribute of Plebs) to Praetor to Consul of the Senate (and then dictator in rare occasions).
- Great gumption and audacity is distinguished from stupidity in the person's ability to back themselves up with charisma and save themselves from a dangerous situation from allies or beauty of wit and personality. Boldness without these quartiles is mere stupidity.
- One of the great landmarks of Rome (even during its Republic days, before the Empire) was their roads. This is because they were high quality, and vast in scale, and symbolic in the

sense that they would barge through mountains and valleys without yielding, sending the clear message: Romans do not yield.

- Two important people were Pompey and Crasses. The former was a famous military general that conquered eastern lands, and the latter a rich and powerful citizen. They were initially racing each other to political positions, but Caesar eventually brings them together to make the most powerful threesome in history—the first Triumvirate. Another important figure is Cato, a rival of Caesar equal to him in wit and ambition, slightly his younger.
- Caesar was fortunate to see lots of political upheaval and turmoil and learn the lessons from others when he was growing up so he learned how to be a successful politician without making any mistakes.
- Charisma pays for its investment many, many times over. You need to invest time in learning to master storytelling, to small groups (in intimate, social environments) and large, raucous groups (in formal, business environments), and to capture people with the beauty you paint in words. Practise, practise, practise, record yourself, take classes, study the great orators, read the classical texts, practise, get feedback, practice. This skill demands mastery, in rhetoric, delivery, and strength of argument.

Conspiracy

TEMERITY = audacity, boldness

SACROSANCT = sacred, respected

RAPACIOUS = greedy, predatory

UNPERTURBED = untroubled, undisturbed (by some news, for example)

INVECTIVE = insulting, abusive language

CHASTISE = scold, reprimand

INCONSTANT = variable, irregular

DEBACLE = fiasco, failure, scandal

RUFFIAN = thug

UNNERVE = demoralize, dishearten, frighten someone

BELLOW = roar, thunder

PROMULGATE = make known, publicize and disseminate

SACRILEGE = desecration, blasphemy

IRREVERENT = disrespectful

AVANT-GARDE = innovative, cutting-edge

CUCKOLD = a man whose wife is unfaithful

WOEBEGONE = sad, miserable in appearance

HAMLET = a small settlement, even smaller than a village

GARNISH = decorate, ornament

PRIGGISH = self-righteous, smug

CONCORD = harmony between people and groups

ANATHEMA = something or someone that someone hates vehemently

- Caesar was all about calculated risks, never losing his cool. He'd do outrageous things, but never out of an emotional reaction, even in high pressure situations like being called out in the Senate and captured by pirates. When a foolish boy tried to seduce his wife, he coldly divorced her to save face, but did not admonish the boy as his relatives could be powerful allies in the future. He was also all about building relationships before they were needed. He also gave up the legendary triumph military award in favor of running for consul instead of just waiting another year to run for consul, heretical at the time, but for him a calculated risk.
- Cicero was more than just an author and philosopher, but a consul of the Roman senate at one point, known for his golden tongue, coming from absolutely nothing but playing a grand political chess to position himself at the top. He was ultimately slain by the second triumvirate,

spearheaded by Octavian. It can be tempting to see the stories of great people as stories of circumstance, as biographers will make it seem like everything was important, but Cicero's story shows how someone can come from nothing, have no advantages comparable to some others, and still reach the top given that the world is ready for visionaries, like it is now.

- One reason it's useful to be boys with the people on the ground—a man of the people, if you will—is that they can give you a good sampling of popular sentiment, which can be important to know at times when you're in your elitist bubble. Crassus paid informants in this way, and so does Varys in GoT.
- Great people are excellent at recognizing how the rise of a foe or circumstantially bad situations can be used for their gain. Cicero and Cato, for example, catapulted off the back of Catiline, a nobleman's, intent to overthrow the Roman state through force by rallying plebians.
- Were the Romans really the first civilized empire, or are we just blinded by our limited understanding of history? Research suggests they truly are unique—historians are constantly looking to challenge status quo, hunting for new evidence. It's always possible we're missing something and there were great empires in a completely separate part of the world, but that is quite unlikely. They aren't the first empire at scale, but the first to distribute one uniform culture at scale, as well as to profoundly shape the path of Western civilisation, which is currently the dominant civilization (we may study Rome less as China takes over the world).
- Caesar was legendary. When accused of siding with the traitor Catiline, he receive a note discreetly in the senate, and when called out by Cato, the note revealed he'd been fucking Cato's stepsister. That's absolutely hilarious—the sort of thing that will go down in history for being phenomenal bant, giving us a hint into the kind of person he was. This woman, Servilia, was the mother of Brutus, who would kill Caesar, and also the wife of Silanus, a senator at the time. Goes, again, to show, how everyone knows everyone in times of great change and progress.
- We often forget the complexity and drama of antiquity. All of modern politics can look very tame compared to some of the very real, and nuanced, events of history, that people fail to internalize were very real.
- Broadly, the senate was comprised of the optimizes (noble conservatives like Sulla and Cato) and popularists (noble populists like Marius and Caesar).
- Romans would have parties with wine flowing and dancing, just like modern humans, and gossip and laugh and seduce in the same way—human behavior is broadly a constant because we don't evolve on an instinctive level over the course of millenia.

Consul

RIOTUS = unruly, boisterous,

FOOLHARDY = rash, reckless, careless

HALLOWED = holy, sacred

UNPROFITIOUS = unfavourable

FIEFDOM = a person's sphere of control or influence

- Caesar was an epileptic, regularly undergoing deep pain and bouts of seizures. This did not change the fact that he would mould the world under the palms of his hands. He made a choice to be great, and a major genetic condition would then be nothing more than a slight bump in the road. He would eat these bouts up, sleep outside and fight on the front lines, so that his illness was the least of his concerns. A man of incomparable discipline.
- The political maneuverings necessary to go down in history are quite literally comparable to chess in the 'if I do this they can do that' dynamic. In this sense, learning to think predictively might be a useful tool if you focus on learning to think about probabilities and consequences and consciously apply that to social decisions.

- Politics is one big game for people to improve their status, fame, and wealth at the expense of the masses. Rulers, even in democratic societies, do not see the people as anything more than another constrain (for election) in a complex, constrained system that they navigate as players, optimizing for wealth, power, and status. Democracy really is not a good system of governance, and human nature sucks.
- Caesar was a brilliant political theorist. He drafted extensive and detailed legislation that overturned the dysfunctional status quo, and even his opponents struggled to find fault—he did things that genuinely made the expanding republic sustainable, laying the seams for the world's greatest Empire.
- Egypt history is fascinating. To think that the Romans would walk around Egypt, witnessing ruins and pyramids that hinted at civilizations more ancient to the Romans than the Romans are to us, is staggering. Most people don't appreciate the gap in antiquity, and mistakenly bundle these things together.
- Caesar married Calpurnica as a political move to forge an alliance, after he had divorced Pompeia in light of the scandal by the guy who invaded the female-party.
- Great military leaders are so alpha. They have the intellectual rigor, charismatic personality and social awareness to change millions of lives—these people include Hannibal, Philip and his son Alexander the Great of Macedon, Caesar, Pyrrhus, Napoleon, amongst others.
- After his consulship, Caesar was at risk of losing immunity and having all his work undone by the optimizes that hated him so. So, he instigated a conflict with tribes in Gaul as an excuse to be granted governance of the area, with lots of resources & strong soldiers, to both maintain political power after consulship, and establish himself with more riches and military fame. Wars are literally started by individuals who want to advance their status and see it as shaking up the chess board. It's hard for them to realise—or indeed, beyond that, care—about the devastating effect this has on the common people.

Gaul

SUBORDINATE = lower in rank

PILLAGE = ransack, plunder

GARRISON = military unit, platoon, group of troops

CITADEL = fortress, fort, fortification

- History is long, nuanced, and repeats itself. Invasions, battles on fields, starving soldiers sleeping outside, building bridges to reach the enemy, drowning while running, all of this happened hundreds of times in many conflicts before Caesar was even born.
- The Celts/Gauls were people of modern day France, comprised of lots of little tribes that shared culture and skirmished as well as collaborated with each other. They lacked the structure of Roman civilization, but were fearsome warriors. Caesar wanted any reason to engage in conflict in Gaul (he was situated to govern just south of it, in north Italy) so that he could station his troops deep inside and slowly convert it into a Roman state.
- The Roman military was not the best equipped, or commanded in the world (though it was good at both), instead the dynamic *between* the soldiers, the arms and legs of the machine, was seamless so they had high conversion efficiency from number of humans to strength of army.
- Caesar was a military genius, using geography cleverly, making sharp decisions about when to attack, manipulating the enemy with 'defectors', and even fighting on the front lines to invigorate his troops. There was real rigor there.
- He was also incredibly charismatic, knowing exactly the social play at the right time. When his army was nervous chasing Gauls, about whom they had heard legends, he rallied his veterans together and frankly reminded them about their duty to their country and the greatness of the republic.

- He was unfazed. When a Gaulish leader told him the Senate asked them to slaughter him, which may very well have been true, he didn't flinch, and won the negotiation. I would definitely have panicked there, losing the backing of my country. Need to learn extreme unreactivity when necessary.

Belgae

ENSCONCE = settle, establish, install

LARGESS = generosity

UNFETTERED = unrestrained, uninhibited

CLAMOR = racket, tumult, loud noise, chaos

PROTRACTED = prolonged, extended

VANQUISH = conquer, annihilate, trounce

- Caesar was a demanding, disciplined leader of troops, but saw them as comrades rather than subordinates, and did all he asked them to do. This, as well as many being paid by him and not the state, bound them by loyalty to *him*, as opposed to Rome, as useful tool in many battles they'd otherwise have lost.
- The Belgae were tribes occupying modern day Germany—they had intimidated Roman territories in the past, and no-one had done anything about it.
- Caesar was more merciful than his contemporaries, sparing lives where he could, even when others would not have. But he was not merciful twice—if the imprisoned tried to rebel or betray, which did happen, he would slay and enslave them, and everyone they knew, without thinking.
- We, in the modern day, clump history—especially ancient history before around 1600, into one big bucket of “olden times” without realizing the layers that exist, and how people in 1600 did the same thing with 1500 having been contemporary for them. There are histories as different as Rome is to today, to Rome itself, and most of us make no effort to ever learn about those beautiful human events.

Britain

MARAUDING = predatory, rapacious

EXPEDIENT = convenient

- A major reason for conquest is wealth and status. Through military genius and fortuitous timing, he took both the Gauls and Belgae into the empire, bringing glory to the empire. In the same vein, a lot of what he did was simply a PR stunt—building a bridge across the Rhine, sailing to Britain to try conquer them (and bring back scandalous, fantastical tales) to further posterity. He was aware of his legacy, and would not let it be dictated for him.
- He knew time was gold in achieving this goal. They did not have the petty, vacuous distractions we have today, and worked hard to cement their names in the history books. He would dictate his philosophy of rhetoric when on horseback and when recovering from training, coming to be known in history as not just a great general, but statesman, orator, philosopher.
- We take it axiomatically that saving lives is definitionally good. For example, when thousands of innocents are killed in a battle, we define that as a tragedy. But on what ethical framework? To what end? There was very little human progress going to take place there. But perhaps it's to minimize suffering—even though the world will not know the difference between there having been suffering or not, just a few minutes after it's all over. But we do need an axiom, and this seems to be one that humans can intuitively agree on because of their instinct to value their own life. Perhaps even if we're optimizing for progress, most progress comes spearheaded by individuals, and we can't know who in advance so we have to treat all lives as if they could be that world-changing individual that was just killed.

- Because wars are complex systems, reasoning from first principles doesn't work well. Therefore, studying military history was important to reason by analogy with situations—like Caesar did when his ships were destroyed on his second landing in Britain, where he remembered how the great generals he studied were characterized in history by their ability to recover from disaster.
- He was also an engineer and inventor, helping design the ships sailing to Britain the second time around based on what he had seen was flawed about the anatomy of his ships during the first time. It was easier to be renaissance men back then, but that doesn't give me an excuse not to do it now.
- Caesar did not hold grudges. He was stoic in the sense that he'd only kill when there was a tactical advantage to be gained by doing so—when the son of a family friend wrote a scandalous poem making fun of him, he had the good taste and mercy to laugh it off. Ethnographer.
- Caesar was a softie. He mourned greatly on the death of Julia, his daughter, during childbirth, as he had done for his mother and siblings. He made elaborate events out of commemorating her, against the tactical grain of custom in Rome.

Vercingetorix

TRUCULENT = defiant, aggressive, quick to fight

PUNITIVE = penal, disciplinary action

INTERCESSION = mediation of a contract or conflict

EMISSARIES = diplomatic envoy, ambassador

LOCUST = large grasshopper that flies in swarms

IGNOMINIUS = humiliating, embarrassing

YOKE = wooden crosspiece holding an animal to a plough

- The power of history lies in defining a peoples' identity. The reasons the Gauls rebelled again and again was because they identified as a free people who owned the land in which they lived, and they wouldn't allow the Romans to change that history.
- Honor and valor ran deep in Roman society. When ambushed, Romans would slay each other consensually to prevent their enemies from the pleasure of victory. While Machiavelli argues the fear is better than love when you have to choose one, the ideal situation is to have both—loyalty, when done right, can make people die for you.
- Thinking about posterity is useful because it serves as perspective, and inspires great action. If your legacy is on the line, and you're thinking about how humanity will remember your actions, you will take the right actions every time, and make difficult but important decisions.
- Vercingetorix was a great Gaul rebel who united the Gaul in the biggest rebellion Caesar had to quell, taking pages out of Roman history in both his militaristic style and his ambition. In battles against Caesar, there were great tactical moves on both sides, forcing both generals to step up their game in a rivalry that will go down in history—a great person can push other great people beyond their limits.
- Imagine the Roman levels of chaos in today's world, with today's population, globalized economy, and technological power. They would pillage, without law, structure, plan, or consequence, slaughter innocents and put their bodies on display. Modern democracy and humanism is a core tenet of society that really stops us from descending into the neanderthals we once were. We are a fragile society that is constantly one decision away from catastrophic anarchy—the institution's we've constructed (like government, law, finance) are powerful but delicate social contracts, and we'd do well to remember that.
- It's important to know that while Caesar is great, we should not deify him. He had the best military forces in the world, capable of mighty engineering and tactical feats that no other

force in the world could muster, no matter under whose leadership. He was a great leader with phenomenal troops in an excellent military culture.

- Mercy is useful not out of kindness but as a powerful tool of symbolism. The reason Gaul didn't rebel after he put down Vercingetorix is because he was ruthless to send a message, but also merciful with those that had done well to him in the past, making good use of both positive and negative conditioning.

Rubicon

COUNTENANCE = facial expression

TEPID = lukewarm

CONCOMITANT = associated

- The reason for conquest was wealth. After conquering an area, you could levy huge taxes, plunder resources and become rich, as well as gaining lots of status, power, and prestige.
- After his conquest of Gaul, the senators, particularly the optimates, at this point led by Pompey, were eager to stop him becoming too powerful. To prevent his bid from consul or any higher political office they would inundate him with lawsuits as soon as he stepped foot out of his province in Northern Italy, back into the Roman territory. But he was intent on using the wealth and army he got from his years in Gaul to take up absolute power.
- Like everything else, think about which connections in your network provide the most value, and double down on those. 5% of your network will provide 95% of the value, like Cory, Harshita and Alex Fine in my network.
- Caesar was perfectly willing to die at any time. He didn't live through battles by the skin of his teeth because he was scared of death and would avoid it at all costs, but instead because the clarity he got from lack of fear or death, since it was so normal at the times, gave him the headspace to make the logical decision.
- Crossing the Rubicon with soldiers was prohibited for any Roman general, for fear of a coup d'état, like the one that took place. He hesitated before crossing the stream, deliberating deeply about the decision, but at last plunged forward, into Civil War, beginning the end of the Roman republic, ruled by senators, and into an Empire, ruled by an Emperor.

Civil War

CADRE = a small group, team, specializing in a certain thing.

PORTENT = sign, omen

GALLING = annoying, irritating

CONSTERNATION = dismay, anxiety

ABSCONDED = run away, flee

CLEMENCY = mercy

MAGNANIMOUS = generous, charitable

- When optimizing for interesting and dense experiences and emotions, there are few that had it better than the Romans. On the eve of the battle, they had to make peace with their lives, knowing they would not wake up the next morning. When they lost, they remembered how they had tortured enemies to death the days after, and thus knew the fate awaiting them. Imagine feeling that—and one of the most experientially dense times of my life was a pregnancy scare, what a stark contrast.
- Caesar had an interesting attitude towards mercy. He wasn't merciful out of the love of his heart, but to gain loyalty. Sometimes, this mercy would turn people to his side, making them worship him as a just ruler and god, making them willing to die for him—as many of his veterans did. Other times, the mercy would fan the flames of deeply-rooted hatred, and birth enemies that would come back to haunt him. You either need to be merciful to all, which makes you look weak, selectively merciful (as Caesar was)—in which case you have to choose exactly the right times to be merciful (as even Caesar failed to do), or be uniformly

cruel, which will only breed hatred and get you deposed. It seems to be a lose-lose situation, with Caesar's middle ground an optimal approach.

- When fighting Pompey on water, he used insights from how the Britons architected their navy to gain an unforeseen tactical advantage and used that insight to get an edge in battle. It's important to recognize your edges, and to leverage them forcefully—like the Internet, a huge edge I have over the previous generations that I'm not fully leveraging as well as I can. In almost all situations, especially the most dire, impossible ones, there is always one, or more, paths of actions you can take, that will lead to the desired outcome. It is just your job to find it. Caesar was defined by his behavior in the face of impossible odds, which he overcame time and time again.
- Caesar had balls in a way lacking both in myself and modern society. When his soldiers rebelled that he was too merciful, and threatened to desert him—at which point he'd have lost the Civil War by default, instead of compromise, he scolded them for lacking the discipline characteristic of ideal Roman soldiers, and expressed disappointment in the 'children he had raised'. This made them long for his approval, and they immediately apologized. I would have certainly looked for compromise in that situation, which was the wrong answer. It's important to be able to read complex and high-pressure social situations calmly, objectively and correctly to find the correct answer—practise this skill.
- Caesar was not superstitious, but understood the power of belief. He would consciously mimic ancient fabled events and rulers to conjure an image of him being almost a religious figure sent by God on a mission. In other words, he made it easy to spin stories about him, knowing this would add to his fame and mystique.

Pompey

RAMPART = a defensive wall of a castle, of the type you can walk along

MALFEASANCE = wrongdoing, particularly by a civil officer

- *"If fortune doesn't go your way, sometimes you have to bend it to your will."* —Caesar
- Another example of greatness begetting greatness is in when Pompey and Caesar, two military giants, clashed on the battlefield. There was invention of new types of warfare in response to the opponent's tactics (like trench warfare) that hinted that warfare that would only arise millennia after they were gone. Surround yourself with people you know to be better than you at what you're looking for, challenge them and ask them to call you out—like spending time with Harshita will imbibe rigor and practically into how I take action, something I direly need.
- Caesar escaped death and defeat by the skin of his teeth several times, like in a battle with Pompey where they lost a battle and would have been slaughtered if Pompey hadn't been excessively cautious waiting to approach them, or when he was caught in a small boat trying to go to Greece to call an army, and he confronted the captain of the opposing boat who caught him—the captain could have killed him right there, but was too afraid to do so.
- It's important to realize that the history we read is not completely accurate. It is reconstructed from reading the books of victors (Caesar himself wrote the most popular account of *Civil War*) and the writers of their time, each of whom has their own biases (like Cicero).

Cleopatra

RECALCITRANT = uncooperative, disobediant

SUPPLIANT = someone making a humble plea to authority, a beseecher and beggar

CATARACT = waterfall, white water rapids

A short aside on Alexander the Great:

- known for conquering large swathes of land, as a Greek (Hellenic) ruler (Macedon was then a core part of the Greek empire) uniting East and West not done by even Caesar, at an even younger age

- tutored by Aristotle as a teenager
- Caesar came to Egypt to chase Pompey after beating him in battle, and stayed for Cleopatra and to use it as an excuse to subsume Egypt into the Roman Empire, fighting many battles against Alexandrians, and indeed against Cleopatras siblings, to win the state as part of the Empire, which he eventually did.
- Caesar was always in control, even having an affair with Cleopatra for tactical reasons. He only let fame get to his head towards the end of his reign, leading directly to the Ides of March.

Africa

REPROACH = scold, berate

EXHORTATIONS = urging, persuasion to do something

INSOLENCE = impudence, audacity, cheek

- After Caesar won power and was in Africa, there was no clear government in Rome, and the city descended into chaos. This is again, empirical evidence showcasing how government does play an important role in society, and lack thereof causes much suffering—Rome descended into “a madhouse of gang warfare and street battles” in Caesar’s absence.
- Important figures on the optimate resistance, even after Pompey’s death, were Cato and Scipio. Cato was known for his immunity to bribery and perfect moral standing, and resolute holding of beliefs all the way to the grave. These two presented resistance to Caesar from Africa after the defeat of Pompey.
- When Caesar defeated both Cato and Scipio, they committed suicide, remaining staunch to their beliefs until the very end. Even though the senatorial cause and the republican structure had championed aristocracy over merit, and had often led to suffering of the common people, which Caesar would improve, Cato (and to a lesser extent, Scipio) would be lauded as martyrs who fought for their love of their country, to prevent a tyrant taking over as had been done in the past. This was particularly because Caesar foolishly tried to paint them in a bad light when he came back to Rome after defeating them.

Triumph and Dictatorship

ANOINTED = to be chosen or nominated for a position

EMETIC = a medicine inducing nausea and vomiting

- Caesar hosted outrageous celebrations on his return to Rome, and the senate, just wanting peace after these years of insane bloodshed, made him dictator for life. The celebrations were enjoyed initially, but when he started acting like he was a god, and mocking some of the optimates who died for what they believed in, people became uneasy, and started plotting his demise.
- The Roman government was organized with a senate and assemblies. The assemblies drafted legislation and were elected democratically, thus giving the plebs the right to veto anything coming from the senate, but the senate controlled day-to-day life (which wars they’d fight, how grain would be distributed) and was elected by the consuls (who were elected by the assemblies of the people) who in turn elected the senate (like modern politicians elect their cabinet).
- The Byzantine empire was the spin-off of the eastern Roman Empire (Turkey and the middle east) after the collapse of the empire around 400 AD.
- Some of the changes he implemented as dictator included:
 - Economic policy when debt was rampant in the city after the wars:
 - Capping the amount of money any individual can hold in cash.
 - Mandating that property is accepted as payment at pre-war values.
 - Free rent and cheap grain for a year for common people.

- Incentivised the poorest rabble to go to other Roman colonies to take up jobs, stabilizing Rome and cleaning it up.
- Had a proper survey/census done on the city of Rome's population.
- Construction of great new buildings—status, forums, public works and libraries—to increase Rome's greatness compared to other cities he had visited, like Alexandria in particular.
- Give lots of immigrants Roman citizenship.
- Instituted a new calendar, patching a broken old one that was barely working, and introducing the one that we still use today—a solar calendar as opposed to a lunar one.
- Reconstructing other cities in the empire to become great again—like Carthage.

The Ides of March

FLEDGLING = young bird, chick

- The three classes of people that wanted him dead were: his enemies (old allies of Pompey), his friends (who were angry he was being too merciful to the conquered and not rewarding him enough), the idealists (those who feared for a tyrant ruling over the Roman state and overthrowing the republic).
- Many people thought he was being wastefully extravagant and soon-to-be tyrant, by spending lots on public display, and executing any people who dissented against him. This laid the seams for his betrayal and demise.
- Caesar even flirted with the idea of being named king, testing the waters to find that the public wouldn't tolerate it, then making a scene out of rejecting the crown when Mark Antony, a loyal follower from the beginning (and praetor) presented it to him.
- The main conspirators were Decimus Brutus and Trebonius, both of whom were veterans under him angry they hadn't been given more, and Marcus Brutus, who believe the Roman republic was collapsing.
- On the 15th of March, despite warnings from followers, he went to the senatorial meeting, and was stabbed over 20 times with 60 men complicit in the assassination, with his dying moments involving watching Marcus Brutus, the beloved son of Servilia, his long-time lover, walk up to him to stab him, crying in Greek, "*You too, my child?*". Despite Brutus believing he was serving the best interest of his state, he is now remembered as one of history's most despised traitors.
- The assassination had the opposite effect of those intended. The public didn't want more violence and were happy with Caesar, and became terrified of more violence when they heard about the event, which indeed did happen. There were more civil wars, with Octavian (and his second Triumvirate, including Mark Antony and Lepidus) emerging as Caesar Augustus, the next dictator after Julius Caesar, thus establishing the new Empire over the old republic.
- Afterwards, the second Triumvirate did not show clemency towards the assassins, capitalizing on the mob's mourning over Caesar to kill them all, including Cicero. When they were split, with Antony siding with Cleopatra against Octavian, with the latter emerging victorious. Julius Caesar was then deified, officially, by the Roman state.
- Many argue that Rome became an empire long before Caesar, with Marius and Sulla being dictators of a city-state that had conquered other countries before Caesar's more aggressive expansions, and Octavian was only the first emperor in name.
- It's also important to question whether the imperialist Rome was indeed very much worse for anyone than republican Rome—or if in reality it was very much different at all. While Republican Rome was supposed to put the power in peoples' hands, the senate determined most policy and made most important decisions, and even the assemblies were controlled by an oligopoly of family that bribed their way to power. The republic was also bound by a

constitution. In imperial Rome, these constraints were largely forgotten but the government was not less successful in governing. The whole millennium from around 500 BC, the rough start of the republic, and 500 AD, the fall of the Empire, was the golden era of Rome. Imperial Rome was much more effective at commanding the empire because it was more decisive and less hesitant to use military force to command its armies in colonies to maintain control.

Fall of the Empire (own notes)

- It got too large to be effectively policed, and so was split into the western (Europe) and eastern (middle-eastern) halves, which drifted apart over time. The western empire fell to Barbarian invasion in the 5th century, being reduced to Italy alone, but the eastern half lived on as the Byzantine empire for another millennium. Many people attribute its fall to corrupt and weak politicians who did not have the welfare and legacy of the state in mind like the early Roman politicians around Ceasar's time.

Leonardo Da Vinci (Walter Isaacson)

I Can Also Paint

- He had a good blend of imagination and skill. His imagination bordered on hallucination, since he abandoned lots of his works and never could build lots of what he imagined, but he had *just enough* skill to back this up.
- He tunneled his curiosity onto masters of his time. He would pick the brains of brilliant people around him: ask X about the proportions of Milan, ask Y about the walls of the cathedral, and more. He would also be curious about random shit: why does the tongue of the woodpecker look weird, why are the geese's feet that particular way? In other words, I need to de-institutionalize myself, and focus on *now*.
- The Renaissance, or "rebirth", is essentially a time of rapid scientific, cultural, political and artistic progress starting in Florence than diffusing throughout Europe from 1300-1600.
- He was a Kvothe, muscular, charismatic, good looking, but ultimately an inwards facing misfit —illegitimate, gay, vegetarian. It's interesting to note that he'd be the type of person who would be prescribed medications in today's world for ADHD or depression.
- He was not alone in being great. His peers in the Renaissance were Michelangelo, Raphael, Donatello, and other memorable figures; moreover, his time was one of Columbus and Gutenberg—of rapid, unprecedented innovation, much like today.

MERCANTILISM = economic practice of optimising for exports and minimizing imports

NOTARY = someone who draws up legal documents for a living

Childhood

- He was fortunate to be born a bastard. This meant he wasn't expected to follow a conventional career path (notary), yet the time was such that being a bastard wasn't looked down upon as it might be today. It gave him enough adversity to make him feel like an outsider, and freedom to not be expected to follow any conventional path, yet it didn't shackle him or ensure his failure.
- The printing press would ensure he had access to materials to teach himself with, and the money flowing into Florence due to trade success meant that patrons were willing to take a risk on him.

DELUGE = inundate, overwhelm

FABULISM = fantastical reality

IMPEL = force, compel, drive someone to do something

Apprentice

AUTOCRACY = a system of government with one ruler that has absolute, total power

- Leonardo wasn't innovating from scratch. Idols of his had already done good work in the fields he was interested in, and he was to build atop that. He made note of their styles, and really did try to emulate and copy them, in the same way I idolize Kvothe and Einstein.
- Florence was utopia for artists. Wealth flowing in meant that plays were performed on the streets nightly, there were extravagant festivals and celebrations of literature, humanism, and philosophy. The wealthiest Medici, a banking family—and, indeed, middle class families too—

would routinely patronize artists, increasing demand and forcibly making the city competitively creative. Characteristics that made for a great community were: a population that appreciated intellect, great universities and thriving businesses, and absolute freedom of the individual. This suggests that great, untempered and meandering thoughtfulness is somewhat orthogonal to business interests. Culture also made Italy great—people saw themselves as direct descendants of the Romans, and took it upon themselves to rebirth Roman thinking. Florence became the banking capital because bills/loans were invented there, and it had a strong river allowing for easy shipments and trade. You can see how somewhat random factors compound over time to create concentrated areas that have advantages over the rest of the world—no clear, easy-to-explain narrative.

- Unsurprisingly, young Leo's style was heavily inspired by Verocchio's, and indeed every other prominent artist of Florence at the time. He was like a sponge exposed to water at the right time, learning softening edges to add ambiguity to expression, mastering light dynamics by using insights from optics, and more. The illusion of depth is his art's hallmark trait. He also learned to see art and engineering as one, through welding by angling the sun's rays and using hydraulics to hoist a 2-ton ball atop a cathedral; all these are insights he consciously and subtly made use of later on in his career.
- His work in theatrics helped him learn to intuitively see art and engineering as two sides of the same coin. The benefit of these activities can only be seen in hindsight, and so it's impossible to plan out things you believe will help you achieve some future goal (which also changes)—and it's unclear whether these actually helped him at all, or that's just how we're over-interpreting things in hindsight.
- Art historians and critics think about art with questions and observations like these in mind: light dynamics, proportions of features, what emotions a certain style evokes in the observer's mind, how the nature of the strokes reveals the artist and influences of his teachers, etc.
- A lot of interpretation of art seems like complete bullshit. It makes sense when you read it because you can see how it can be interpreted that way, but it could also be interpreted a thousand other justifiable ways, leading to a breakdown of the narrative that makes the work of art so great in the first place. I should talk to a professor of art history and learn whether there is actually any nuance of the field.
- Leo's early works hinted at themes he came to employ in his magnum opus—the *Mona Lisa*—like masking emotion but revealing it on closer inspection and an understanding of the backstory, playing with depth and lighting in subtle ways. Much of this comes down to the oily nature of his paints and heavy use of fingers to smudge edges to add mystery to his subjects' looks.
- Under Verrochio, he experimented and pushed himself to the limit, as well as deeply imbibed all the experiences from the beautiful melting pot that was his city. He used his youth to work deeply and hone his craft, laying a foundation for future success with the added lens of maturity and experience.

SPINDLY = long, tall, and the

CYPRESS = type of woody evergreen tree with cones

SINEW = tough, fibrous tissue like tendon or ligament

GAUZE = thin, translucent fabric

LISTLESS = lacking energy, enthusiasm

PRESAGES = foreboding, foreshadowing ominously

MAGISTRATE = civilian officer who judges minor offenses

PALLOR = unhealthy, pale appearance

EFFUSIVE = warmly and brightly expressing gratitude, approval

On His Own

SODOMY = anal sex

BOTTEGA = studio/workshop of an artist in which others can work

ABROGATION = repeal, rescinding

CONSIGNED = send, deliver, dispatch

SUBLIMATED = channeled, controlled, refine an impulse into a higher, more acceptable state

SPECTRAL = ghostly

HAGGARD = exhausted, drained looking

- A big part of Leonardo's work was influenced by his sexuality—how he subconsciously drew men and women, being one of the first to imbue women with some depth and personality since he saw them so platonically yet drawing men with a subtle sense of erotic charge, both of which set his work apart.
- A large part of producing great art is not in translating a beautiful, emotive image from your mind to paper, but in constructing that image, in all its nuance and glory, in your mind in the first place. This is analogous to how great writers aren't great because they can translate images in front of them into text, but visualize stunningly moving images *within* their heads better than the rest of us.
- The renaissance is characterized by the fact that all of the famous paintings reacted or revitalized stories, tales or legends from Roman and Catholic antiquity.
- Leo left paintings unfinished for decades because he saw perfection in his mind, and often knew his limitations well enough to know he couldn't realize that after a certain point—with the lighting complexity of *Adoration of the Magi* or the anatomical complexity of the neck in *Sant Jerome* that he waited 2 decades to understand before painting. Art was pursuit of a higher beauty in the world, not trying to "go down in history".

Milan

RETINUE = entourage, escort

EXULTATION = triumphant jubilation, rejoicing

WALLOWING = roll around to keep cool

- On moving to Milan, he promised Ludovico Sforza, new Duke of Milan, fantastical military inventions and urban architectures drawn in great detail, none of which society had the tools to build at the time. It was utopic, detailed thinking inspired by artistic beauty and symmetry, but grounded in scientific understanding and implementation details ahead of its time.

Leonardo's Notebooks

MANIFOLD = many, varied

IMPRESARIO = organizer, producer of a show or play

ENTHRALL = fascinate

MEDLEY = assortment, miscellany

EXTANT = surviving, still in existence

- Much like Kvothe and other greats, there was lots of deep work that goes on behind the scenes to make greatness happen. To really understand the human emotion he would draw, he would keep a notebook with him everywhere, and often go to crowded places and just sit and observe peoples' varied expressions to get a sense for the subtle anatomical happenings when people get mad. He would spend hours just making notes on how peoples' faces contort when they're angry, and how bodies react when in anguish, then employ these subtle second and third order realizations in his work.
- He's survived by thousands of pages of his mind at work, more so than Steve Jobs' emails from when he's alive. He was constantly in deep work. He'd find beautiful relations between arteries and trees and rivers and blend rigorous geometry into otherwise pedestrian shapes—he really saw the world through a double tinted lens of both form and function, art and engineering.

Court Entertainer

ALLEGORY = a story with a moral/political undertone

EDIFYING = providing moral or intellectual/philosophical instruction (eg, edifying literature)

TITULAR = important or powerful only in title, not reality

SOLICITOUSNESS = anxious desire

BEGUILE = charm, entrance, attract

DEBAUCHERY = excessive indulgence, vice

LIBRETTO = transcript of an opera or similar work

CAVALCADE = procession, parade

SERENADE = open declaration of love through song, usually by a man at the floor of a woman

PITHY = short and forcefully expressive comment

OSTENSIBLY = apparently, seemingly

FECKLESS = useless, worthless

AQUILINE = like an eagle (of a nose, typically)

FACETIOUS = tongue-in-cheek, flippant, not serious

WREATHED = draped, covered in

DECLAMATIONS = words delivered emphatically and passionately

DUCAL = to do with dukedom

JUNIPER = evergreen shrub, small tree

LEVIATHAN = large sea creature

ASSAILED = attack, assault, criticism

- Even though people think his work on plays and pageants was useless, but really the wondrous displays laid the foundations for the scientific curiosity and understanding of wondrous mechanics that led to the Enlightenment period in the 18th century.
- He went even further than you might think when pursuing depth of work—he'd walk up to people he thought were comical looking, invite them for dinner, make them laugh and pay close attention to how they looked. Right after they left, he'd draw them, eventually codifying and making a system to draw comically looking people ('Grotesques'). This is the level of nuance that goes on behind the scenes to forge greatness.
- At times it can seem like he was blessed with genius, as while in Milan he served as the Sforza court entertainer, apparently being a prodigious director of plays and pageants, musician, instrument maker, improviser, writer of tales, and more. There doesn't seem to be enough time to get good at all these things.

Personal Life

EFFUSIVENESS = overwhelming, gushing gratitude or pleasure

LANGUID = relaxed, unhurried/frail, weak

ANDROGYNOUS = mixed gender in appearance

CRAGGY = rugged, strong, worn

EPICENE = asexual, sexless

SULTRY = humid stuffy/ (of a woman) attractive in a suggestive, passionate way

- His small amount of fame in Milan came from being at the right place with the right skillset at the right time—Milan had lots of plays and pageants, unlike other cities, and his legend for architecting these spread due to courtly gossip dynamics.

Vitruvian Man

- His interest in Vitruvius, a roman architect, came from wanting to design an extension to a cathedral in Milan. He was invited to consult for the construction of another cathedral, this time in Pavia. Here, he and other brilliant renaissance men, Di Giorgio and Bramante, got to brainstorm, have dinners, reflect on humanity's progress, art, problems, and became collectively interested in Vitruvius' works which were kept in the city.

- The key theme of this work was the connection between the micro—the human body—and the macro—the cosmic structure, which they believed was analogous, and would help them design a more symmetrical, symbolic cathedral layout. Vitruvius specific the proportions of the male body inscribed geometrically. All three men drew their own versions with Leonardo's not only being, by far, the most precise mathematically and aesthetic artistically, but rigorously extended in anatomical detail and proportion informed by his *own* study of human anatomy and proportion, instead of copying Vitruvius. The key insight is that this is a *mathematical breakthrough* coupled with ideas of philosophy, religion, and aesthetics—we now have proof that you can't square a circle (construct a circle and square with exactly the same area using a compass and straight-edge only), but he approximated it to 99.8% accuracy, as well as unified the living world (square) with the divine (circle), with mankind at its centre.
- He took an ancient Roman idea, reinvented and extended it, producing one of his greatest works: uniting cosmic beauty and symmetry with human anatomy and structure in one fell swoop, making one of the most symbolic and memorable pieces of work of all time.

The Horse Monument

EASEL = wooden stand to hold a canvas

- Leo was unbelievably productive. In other words, he spent his time not planning or reflecting, but *doing the thing*. Even if he didn't finish many, the sum total of all the works he started/ worked on is so much more than any other artist.
- Example of seamlessly blending art and science/engineering is in the horse monument Ludovico Sforca commissioned—he had to dissect horses to learn anatomy, study behavior to understand how dynamic and emotive to make the monument, make a scale model in clay, and after he decided to cast it in one piece, he had to invent compounds to hold the weight with lustre, design a shell to hold the cast in place, design the heat distribution holes and mechanism, and more. All of this only for it to be left incomplete when France invaded Milan at the end of the 15th century.

Scientist

- Not having formal education, he had to teach himself everything from observation— definitionally first principles thinking. He understood the scientific method centuries before its formalisation, and would've been given credit if only he'd published his works.
- He was legendary and anomalous in the depth of his observation. He would practice improving his eyes' observatory ability to making a line on a whiteboard and trying to cut blades of grass to that length from varying distances. He would walk around at night, and deeply fixate on the wings of a butterfly; he was a huge proponent of breaking objects down in constituent pieces and understanding those. Observing the world is boring like looking at a page is boring—only if you're not reading the individual words.

On Birds and Flight

PRESCIENT = prophetic

INTIMATION = an indication or hint

- He'd apply his deep observatory skills to understand, intuitively and by analogy and relationship, how birds fly, then reason that humans can fly by mimicking the same physics. By constantly observing and fantasising, he spent a significant chunk of time in the future (flying took 500 years to become real), which made his life that much more interesting.

The Mechanical Arts

PURVIEW = scope of concerns, horizons, range of relevance or experience

- Reasoning by analogy is not bad. It is very hard to generate ideas and solve problems from first-principles thinking, but thinking about "Uber for X" can be an easy way of generating ideas. When done right, you start to make links between the mechanisms underlying different phenomena, physical but also cultural and business-oriented, which helps you generalize and

unify things in a way that that first-principles-purists cannot always. Da Vinci lacked the mathematical tools to always reason from the ground up, and it served him well.

- Exploring crazy ideas was good because it showed him which were impossible as well as which were theoretically possible. Understanding why certain things are fundamentally impossible while still being a futurist and visionary is the goal.

Math

BEQUEATHED = leave something for someone else

VERNACULAR = everyday, colloquial speech

INEFFABLE = inexpressible, indescribable

MANIFEST = obvious, plain

TREATISE = essay, paper, work

LUNES = crescent shaped figure borne from overlapping circles

- One of the reasons he was so good at drawing nature's patterns is because they are literally based on physical (often geometric) laws, and he was obsessed with geometry—finding equal areas of shapes in different configuration. He spent years trying to square a circle, which he couldn't know isn't possible.

The Nature of Man

MIRTH = amusement, merriment

- When studying anatomy from cadavers and proportions from his artistic models and trying to understand where man fits into the universe, he was obsessed. The very same obsession I felt when writing essays for top schools, thinking about it in the bus, having inspiration strike me on long walks—much like how some days he would come in and paint from sunrise to sunset without any breaks, other days he wouldn't paint at all but instead come inside once to add once specific brush stroke to a part of the painting and then leave.

Virgin of the Rocks

ICONOGRAPHY = the content of an image

GROTTO = a small cave

STILTED = stiff, strained, forced

GARRET = attic, loft

COLLEGIAL = to do with shared responsibility or feeling, like between colleagues

PROCLIVITY = inclination, tendency, disposition towards something

DRAFTSMAN = someone who makes detailed technical plans/drawings

INCISE = carve, cut, chisel, mark

LUSTER = sheen, gloss, shine

HATCHING = shading with closely drawn parallel lines

GRADATIONS = range, scale, spectrums

Good phrase: 'she drinks you in' to describe, say, Mona Lisa

- He used to sit and watch deaf people communicate to get a better understanding of how humans instinctively use gestures and expressions to communicate emotion, because the deaf capture that in its rawest sense. Match this level of anti-mimetic thinking, preparation and curiosity.
- A 'study' in art is a draft of one part of the piece you will paint to experiment with, and get a better sense of, what style you'll go for and the unique challenges of painting that particular part of the fuller story. For example, da Vinci paints portraits of effeminate young women to experiment with the androgynous angels he wants to draw.
- He uses science tangibly in his work: most artists made things brighter by adding more white pigment, he realised, through studying optics, that light didn't merely affect whiteness/ brightness of a hue, but also intensity and contrasts, and so made sure to make his colors richer—sometimes by adding *black*—and more vivid, as well as brighter, which creates a

much starker and more realistic version of light hitting an object. Another example is in his study of geology to make his rocks look real. He studied the nature, construction, and detail of different types/ages of rocks to make even his background—despite being *imaginary*—scarily realistic, down to the finest detail.

- X-ray/infrared analysis is often used to get a sense of the underdrawing and layers of oil to see how the painter's thinking changed over time as they added to the painting and what their original intentions were.

The Milan Portraits

STIPULATION = condition, prerequisite

BESOTTED = smitten by, infatuated with

BEREAVED = deprived of a relative through their death

FULSOMELY = excessive, ample, profuse (especially of a complement or flattery)

COCKED = tilted

WRITHING = twisting, squirming of the body

COIFFURE = elaborate hairstyle

HAPLESS = unfortunate, unlucky

OROTUND = full, powerful, deep/ pompous, pretentious writing

EXUBERANCE = excited, cheerful

- The level of detail which Leonardo includes is breathtaking. He dilates the pupils of his subject in his *Portrait of a Musician* to slightly different degrees based on his (mistaken) physiological theory that the eyes dilate separately in response to light, and he was trying to make the portrait seem more dynamic by being taken in an instant where light was sweeping across his face from side to side.
- Through a delicate combination of lighting, texture, poses, dynamism, detail, and a host of other subtle things we can't quite articulate (like dilation variances), the painting is one of the first ever portraits to actually convey emotion and depth to the subject, rather than being an accurate albeit lifeless reconstruction.
- Much of what we think about Leonardo is reasoned conjecture, since he didn't sign his works or make any record of them, we're left to observe many of them from their features and form—plus various other things (brushstroke style, dynamism, lighting dynamics, anatomical accuracy, carbon dating) to conclude whether or not they're really by him. Sometimes, as was the case for *La Belle Ferronniere*, there is controversy even amongst experts, involving advanced analysis by forensics (fingerprint matching) and artistic (look at radius of curls of hair and cuts on the edge of the paper to see whether it's plausible it was ripped from an obscure notebook from the time—there are companies that use ML to verify art). What's more, it's astounding that pieces of art, like this one, go from being worth a few thousand dollars to hundreds of millions when someone conjectures it's a Leonardo, despite no change in the actual work itself, which should be judged on its merits.

The Science of Art

POLEMIC = critical, hostile

EXALTED = high-ranking, prominent / elated, intensely happy

FESTOON = a chain of flowers or decorations hung at a celebratory event

TRUNCATED = shorten, cut

STYMIED = prevented, hindered progress of

ACUITY = sharpness, keenness of thought

BEHOOVES = it is incumbent, important, necessary for someone to do something—befits them

- One of the most powerful things about understanding the underlying science behind the art you're doing is that you can choose to be flexible with it. Like in *The Last Supper*, da Vinci

chooses to stretch and bend some laws of strict optical/shadow physics to make for a marginally and subtly more dreamy picture.

- The dichotomy between science and art is also manifested in that between reality and fantasy. The reason he believed painting was the purest art is because it starts with reality but then can include fantastical elements.

The Last Supper

CASTIGATION = severe punishment

SCOURGE = curse, bane, plague, menage, cause of suffering

MAUSOLEUM = tomb, crypt

REFECTORY = dining room in a church or school

CONFOUND = amaze, astonish / invalidate a theory / defeat or foil plans

BEREFT = past tense of bereave—to deprive someone of something

PUGNACIOUS = aggressive, belligerent

WILT = sag, flop

ROLLICK = act or behave jovially or enthusiastically

CORNICE = an ornamental molding around the wall of a room just below the ceiling

MONGREL =

GAMUT =

History of Jesus and Christianity: Most historians agree that Jesus was a real historical figure, born in Israel, and really was crucified. It's important to know that he was a Jewish preacher, and the birth of Christianity was in some sense a way of remembering this pure man who was unfairly punished. He was born, obviously, in the year 0, and crucified 30 years later. There is no consensus for why the Roman emperor had him killed, but theories borne from historical analysis include that he was deemed an 'enemy of the Roman state' because he said God predicted the end of the empire to the fact that he said God was against rapid Roman commercialization. The canonical Christian answer is that he is God's son that came on Earth to suffer for humanity's sins. His followers were all Jewish by birth, and it is from them that Jewish Christianity, then Christianity, as a religion, was borne—from them preaching his flavor of Judiasm (now coined Christianity), and these followers included Paul, John, and more, all saints now. What Judas is known for, is ratting Jesus out to the Roman authorities in exchange for a bag of silver, leading to his castigation and then crucifixion. In a vacuum, as Feynman said, it really is wack that an 'academic' studying the details (many probably fictional) of this one historical story can be as respected and well compensated as one who is understanding the objective nature of reality and others curing cancer.

Analysis of the painting:

- Important to note that he chose a water-based paint on dry plaster (cement wall), which meant he could work on it over a much longer period of time and add numerous layers, but also that it deteriorated much quicker.
- It's not fair to say that Leonardo had ADD—that's a cop out to suggest a significant biological difference. He went from art to anatomy to optics like I go deeper into a recursive stack when learning about something new—he wasn't diverting his attention from one thing to another, but focusing deeply and obsessively.
- The moment being depicted is when Jesus reveals to his disciples the fact that one of them will betray him, with varying responses (though not all art critics would agree with this).
Important artistic features include:
 - Dynamic and varied hand gestures that are inspired by his theatrical background, and add his character sense of motion to the scene, making it come alive.

- Lots of philosophical, political, religious subtleties and ambiguities, like Jesus reaching for the same plate as Judas, showing he's the traitor, or him reaching for his bread and wine symbolizing his flesh and blood will soon be gone.
- He manages to create a clearly sacred moment in the emotion it evokes without making explicit use of any divine imagery, blurring the lines between reality and religion.
- Brilliant use of perspective, which by then he had mastered from a scientific point of view. It's a huge painting elevated off the ground, and so he has to make adjustments—perspective *sfumato* (blurring), if you will—to ensure people who walk by and enter and view it from asymmetrical angles still get a great, symmetrical view.
 - The tapestries painted on the left are aligned to seem like extensions of those in the actual room, making the supper seem like it's actually happening in front of you.
 - He optimized it for viewers entering from the left side, taking into account how the viewers walks around the room.
 - The cornice (lining) at the top disguises the accelerated perspective of the ceiling, giving additional depth without revealing that the ceiling doesn't extend over the table.
 - Huge attention to detail—the right wall is bathed brighter than the left, suggesting the angle of the sun outside the windows at the back—and how the middle window at the back resembles a natural halo for Christ.

Personal Turmoil

POSTERITY = future generations, descendants
 ENSCONCED = settle somewhere, park yourself
 TENUOUS = weak, thin, slight
 VAULTED = arched, curved
 CAPRICE = whimsy, fanciful, easily changed
 MISSIVE = long, official message
 VEX = to annoy, anger

Florence Again

VANGUARD = a group of people leading the way with some idea or movement
 TRANSGRESSION = offence, crime, sin
 BESIEGED = surround and captured by armed forces
 ENTREATIES = a humble plea or request
 BELEAGUERED = besieged / troubled
 DILATORY = slow, unhurried / delaying, stalling
 SCION = descendant, hier
 FLOTILLA = a fleet of ships
 DECRY = publicly denounce
 BODICE = close fitting, upper part of a dress
 BENEDICTION = blessing, prayer, grace
 EXACTITUDE = accuracy, rigor

- A lot of stuff that happened then really is out of a fairy-tale. Because humanism hadn't evolved as an important cultural value, and because there was lots of money that people wanted to spend (and finance hadn't evolved to have it be used on investing or VC), rich people allowed art to flourish. People were publicly burned, quartered, hung, and individuals were bright, ostentatious and elegant in a way that seems fantastical now, but was pedestrian then.

- You really can see the meaningful evolution of Leonardo's art over time, if you compare his early Madonna's to that of the Yarnwinder, you can see a real development and improvement in depth and dynamism, so his gradual and repeated experimentation really did have excellent results.

- Even then, influence had to do with distribution channels. The success of *Madonna of the Yarnwinder* was to do with extensive distribution across France, leading to lots of copies and students mimicking his style, like Raphael.

Saint Anne

VARIEGATED = varied

- An important stylistic feature of Leonardos is dynamism—by that, I mean the fact that he believed that the outer physical state of peoples bodies should reflect inner mental movements.

Paintings Lost and Found

NUZZLE = nudge, prod, push

LITHE = agile, graceful, supple figure

DEMURE = (of a woman or her behavior) meek, modest

SALACIOUS = too sexual

SINUOUS = having many curves and turns / lithe and supple

FECUNDITY = ability to produce lots of offspring

DISPOSITIVE = settling an issue or legal quarrel

PENTIMENTO = visible trace of earlier layers of painting

Cesare Borgia

TREACHERY = betrayal, disloyalty

WANTON = deliberate, vicious act of violence

DEBAUCHERY = hedonism

LIBELED = defame, slander

LIBERTINE = playboy / religious free-thinker

PREDILECTION = a preference for something

PIETY = devoutness, quality of being religious

CAPITULATED = surrendered

WILY = shrewd, cunning

LACONIC = concise, terse

CHANCERY = a type of legal court

BEHEST = instruction, bidding

SUBDUED = muted, low-spirited

INTRIGUERS = co-conspirator, collaborated

AMORAL = unprincipled

UNREMITTING = incessant, relentless

APHORISM = truism, maxim, platitude

WRY = ironic, satirical humor / (of a persons face) twisted with disgust and offense

- He literally lived like Kvothe—he spent 8 months traveling with Cesare Borgia, watching tyranny and war from the front lines, including extensive bloodshed, and whispering into Cesare's ear just as Kvothe had Maer Alveron on lock.

A short aside on Niccolo Machiavelli:

- based on pragmatic understanding of *human nature, which he believes to be ungrateful and not always good*

- therefore being generous can 1) go unrecognized 2) make you look weak to those that don't have good intentions—it's only a tool to get the public to like you

- if you're optimizing for keeping the state safe from outside threat and stability, you want to crush resistance—*"it's better to be feared than loved"*—just make sure it doesn't turn into hate

- a convenient, elegant lie is better than a harsh truth and easier for people to believe

- inspired by Cesare Borgia, a ruthless ruler—*"the end justifies the means"*

- church banned it and it opposed Plato's *Republic*, where the ideal ruler is a "philosopher king" who appreciates the value of wisdom, and is an intellectual idealist
- plato wanted to replace democracy, after observing how people don't think about who they're voting for, and so wanted to make sure that the electorate was philosophically, morally, and politically educated, and thus started 'the Academy'. It was thus that he decided he wanted a king that was a philosopher, or a philosopher that was king.

A short aside on Renaissance & Florence:

- plague caused labour restructuring caused political shifts in electorate desires
- focus on humanism and human desires and nature as opposed to the gods and cosmos
- "wealth supports the institutions that legitimize it"
- was there really "a renaissance"? For intellectuals and rich people, sure, but not so much for the common man

- classical style is that of the Romans and Greeks, whose empire and cultural value extended over a thousand years. Neoclassical is therefore a revival, like the renaissance.

- while romans depicted idealized humans and gods, the renaissance depicted more human, flawed characters—see Leonardo's support for variety in human form

A short aside on the Medici:

- rose through merit of trade, not war or lineage
- one guy, Giovanni, rose through ranks as bank employee, then started local bank in Florence
- his sons, Lorenzo and Cosimo, the main people remembered, grew the bank into a European force, dealing in favors as much as money, having influence all around the continent, including with the pope
- the family spent >\$450M on the arts and culture throughout their reign
- after exile in 1494 because of exhaustion of funds they fought their way back, and became popes and unofficial rulers of Florence, which continued for centuries peacefully

Hydraulic Engineer

SILTED = become filled with silt

- The way to do experiments is to literally do them. He'd throw rocks and fruit into the ocean and observe whether things move fast when in the center compared to the edges, and same with depth, and take extensive notes. Take-away: think more, and actually come up with theories to test, then test them.

Michelangelo and the Lost Battles

EXALT = glorify, hold someone in high regard

PARABLE = story, moral tale, fable

COMMEMORATION = remembrance

LURID = vivid in color, fluorescent

FURROW = trench for planting seeds

INIMITABLE = unique, distinctive, cannot be copied

REQUISITION = purchase order, demand, claim, application paper

PETULANT = childishly sulky, moody, irritable

CONTENTIOUS = controversial, disputable

URBANE = suave, sophisticated, debonair

DANDYISHLY = a man excessively concerned with his appearance

ASCETIC = abstinent, self-denying

LIONIZED = celebrated, glorified

QUIDDITY = a quirk, distinctive feature

- When making a painting on the side of the inside of a church, racing Michelangelo on the other side, he studied horse anatomy and dust dynamics to get the war ethos perfectly correct. You would think with modern resources studying these things would be trivial and so many people could paint like Leonardo, but despite the fact that he had to seek out violent scenes to study dust dynamics, he has done better than any modern artists, which shows that the very greats are not simply a little better than the majority, but orders and orders of magnitude.
- He left Florence to go back to Milan because he didn't like competing (with Michelangelo) and became drawn into land disputes with his half-siblings over his parents' possessions, and also that Milan simply deified and supported him more, and had a more diverse talent pool.
- The success of good art ultimately came down to patrons with taste—if the palette of the Medicis was for a different type of art, the history of culture might have turned out differently.

A short aside on Michelangelo:

- Craggy, ugly, asshole who preferred to work alone than collaborate. Goes to show that genius comes in all shapes and forms—you don't need to be charismatic or collaborative.
- A more traditional painting style (he was actually a sculptor) focused on clear outlines and no sfumato, which juxtaposed Leonardo (and Raphael and others).
- had to aggressively seek out the opportunity to be a painter against the will of his family, and a friend connected him to an apprenticeship—disposition for visual beauty & the status/position artists occupied seems to be genetics and temperament as a consequence of childhood experiences, respectively
 - kicked out of his apprenticeship for giving his master the middle finger, but found patrons because of his talent sculpting
 - pieta was his big hit and gave him commission from all the big names in Europe, it took him two years to build this
 - it took him 3 further years of work to finish David, his magnum opus, where he has to work with constraints including the fact that the slab he was given wasn't big enough to craft the traditional pose with Goliath's head at his feet, and so he had to invent a new pose for David, the giant slayer.
 - despite not being a painter, he painted the ceiling of the sistine chapel, masterfully employing perspective and coolest with the same obstinance and obsession as da Vinci—but he didn't even like doing it.
 - it was unheard of for artists to sign their names at that point, but since people didn't believe that he made it as he wasn't famous at the time, he signed his name, pioneering the ownership of a piece of art. He was strong headed, stubborn, and hard to get along with—so much for all visionaries having one charismatic personality in common.

Return to Milan

INTESTATE = adjective for someone without a will

AMANUENSIS = an assistant that takes dictation

ESTRANGED = alienated from a family member

EXHORTATIONS = urging, encouragement to do something quickly

PLAINTIVE = sad and mournful sounding

INCOMMODE = inconvenience

SOJOURN = a temporary stay

FERMENT = (of a group's behavior) furor, frenzy

- He lived in a time where people valued his work. People were willing to pay for the arts, just as now it's common place to take risks with the newest technological innovations—we live in the computation equivalent of Florence in the age of the visual and fine arts.
- Leonardo was not a naive painter. He made friends in powerful places and knew how to pull those strings to get things he wanted done, and had no shame about it whatsoever.
- When visiting a place, he still used his time productively. When he came back to Florence from Milan to simply sort out some legal matters, he dissected a corpse of a centenarian, planned a test of a flying machine, began a treatise on geology, swam underwater to compare fish to birds, and more. He *did the thing*. This would be analogous to me arranging meetings and things to do (visit a landfill, talk to school districts, entertainment tech founders) when in LA.
- Sometimes, like with Leonardo spending time on military engineering, you have to choose between posterity and enjoying your life? Which would I pick given the trade-off? Probably the latter.

Anatomy, Round Two

CENTENARIAN = >100 years old

FIXATIVE = something used to stabilize things

IRRESOLUTE = uncertain, indecisive

GRIMACE = frown, wince

TRANSVERSELY = lying across, spanning something

- At 58, he would spend his days dressing like a pimp and painting, then his evenings dissecting things and talking to patients about signs and symptoms. In other words, he would think full time aside from his job. Similarly, at Harvard, I need to set aside time to think full time; 2 days a week where I just meet people, think about problems and tinker on projects.
- He made discoveries relating to the aortic valve, fossil record, geology, the heart, brain, lips, smile, face, spine, and more, centuries before others did, but never published. If he did, we'd know many things as "the Leonardo valve" or "Leonardo flow", but don't. He could've been the single most prolific and famous thinker in history—Einstein is famous because he wasn't just very productive, but outspoken and took credit for his work (see GR) and is thus remembered for it. Take-away: if you made an important contribution to a work, make sure you publicize it and people know you did the thing that changed the world.
- He discovered the fluid dynamics of aortic valve closure by studying eddies and vortices in little streams—shows how reasoning by analogy can be a powerful tool if done carefully, where you know the limits of your reasoning by analogy.
- The fact that Leonardo had all these discoveries first but we didn't know about them makes you think about all the things that may have once been thought of before or pondered before but no-one either took action on or was discovered as have knowing that are lost to antiquity and we give the wrong person credit for.

The World and its Waters

VIRTUOSITY = skill, mastery

PENNANTS = flag (like the triangle college)

EMANATE = emerge, flow, exude

- He was guided by beauty and symmetry but not blinded by it. He looked for ways in which the world mimicked the human body, Burt knew enough to know when experiment contradicts this, theory must be revised. When the analogy between the heart and water cycle didn't hold up to experiment, he abandoned it. He was great because he understood models well enough to know that sometimes you have to bend them or that they don't always work.

- His life was one of true scholarship and curiosity. The way a child plays and ponders, except more rigorously, and done throughout his whole life. Developing this sort of mentality, except with the charisma and rigor to commercialize this stuff would lead to legendary gains. You need to develop an eye for beauty, a childish curiosity, and a playfulness for projects, all three of which I don't quite have right now.

Rome

EXPROPRIATION = (the state) seize, take away land or property

WARD = district, zone of a city / young protegee, pupil, trainee

FOLIO = page number

RUEFULLY = expressing sorrow in an ironic, humorous way

MINGLED = mixed, blended

GUSTO = enthusiasm, delight

BENEFICE = a permanent church appointment

RELINQUISH = renounce, give up

ERRATIC = sporadic, unpredictable

UNHINGING = going mad

ACOLYTE = an assistant in a religious procession or event

LIVERY = uniform or dress worn by a servant or assistant

Pointing the Way

ELEGIAC = mournful, melancholic

SENSUOUS = aesthetically pleasing, pretty

LEERING = ogling, staring in a predatory way

SFUMATO = blending edges without sharp outlines

CHIAROSCURO = stark contrast between dark and light, careful use of shadows

FRISSON = a sudden, strong feeling of excitement or fear

DISJUNCTURE = a gap, separation, or disconnect

LUSTROUS = shiny, glossy

LEWD = inappropriate, debauched, dirty

CATAMITE = a boy kept as a sexual companion (by a man engaging in pederasty)

DIAPHANOUS = thin, delicate (fabric)

The Mona Lisa

PIECE DE RESISTANCE = masterpiece, magnum opus

POPLAR = thin tree that looks like a corndog

PURVEY = provide, sell, supply

COMPORT = behave, hold oneself in a particular way

BILLOW = a large, undulating (waving, bobbing) mass of something, like smoke or clouds

PLEAT = fold, tuck at the edge of fabric

GOSSAMER = silky, cobweb-y

RINGLET = corkscrew-shaped lock of hair

IMMUTABLE = fixed, set, rigid

- It was his magnum opus that he kept retouching over time. He would add strokes and modify it every few weeks for years on end, tweaking and having it constantly on the back of his mind—just as how I was so obsessed with college essays that I would dream about them, take notes, have ideas pop up in conversation, and notes and more. That's what it feels like to be obsessed, and that's the state you have to put yourself in to successfully solve a problem.

Analysis of what makes it great:

- Painted it for the wife of a normal upper class man, she is nothing special but he liked her wicked, eerie smile and the fact that she wasn't royal meant he could have his way with moulding her image and being unconcerned about experimenting.

- Number of firsts. She sits in 3/4 pose as opposed to profile, he paints her structure like a pyramid guiding out gaze to her face
- He used lead white, a carbonate, as his base layer on the wood over which to paint, as opposed to the conventional combination of setting pigments, which reflect and absorbed light differently, giving a vibrant underflow to the image, as well as painted up to 30 layers atop each other on the painting, and made a custom chemical mix of pigments and oils to give a certain finish. It was almost alchemy.
- She started with eyebrows, but those have been worn out over time.
- Her right pupil is slightly more expanded than her left—perhaps she’s happy to see us, or he documented the natural asymmetry present in 20% of people?
- The beauty lies in the details. He took the care to make a soft fold over her cleavage to add dimensionality, and painted the background behind her veil before painting the veil to make it more realistic.
- The background is detailed yet misty, blurring the line between fantasy and reality. It’s almost set in a prehistoric nature setting, and we’re shocked out of that and reminded of his time period on seeing the bridge over the river in the corner.
- He represents the relationship between man and cosmos through the same winding curls being present in her dress and hair as in the water flow behind her and winding of rivers and paths in nature.
- He designed the smile based on anatomy of the lips and understanding of optic focus such that the closer you look/focus on it, the more mysterious it seems, seeming most clear when you’re focusing on another part of the painting, as then the thin curls and shadows dancing on her lips become less conspicuous.
- Despite her hands being roughly as close to us as her face, they’re much clearer, with less sfumato, making her face and gaze seem distant, literally, even when they aren’t, again—blurring the line between fantasy and reality.
- General use of sfumato, particularly with her veil, hair, eyes, gives the painting a vaguely smoky feel, compounding the fact that she’s real, but also fantastical and dynamic, like a fairy dancing in your dreams.
- Because of all of this, and more that we cannot even fathom—and perhaps he couldn’t either—the portrait is *alive*, imbued with a palpable sense of *consciousness*, which was (and is) unprecedented in artwork. Even if you can’t formally describe the artistic details or know the social/historical context, you can catch her gaze as if she’s sitting in front of you.
- It must be said though, that while the painting is a masterpiece, it’s relevance in popular culture is not proportional. Millions flock to see it and take selfies with it without understanding the first thing about it, just because it is ubiquitous as a symbol plastered on mugs and cards and present in movies as a symbol of genius and mystery and antiquity. It’s interesting to see how art and indeed ideas become famous—if the Mona Lisa hadn’t been stolen—then people wouldn’t be able to weave mythical and coherent stories about it, and it’d be less interesting. It’s a real life connection to movie tales. Pater, an art critic, wrote a waxing panegyric about it, making for great soundbites for people who can’t understand it to interpret it, and when it was stolen, that meant someone cared enough to steal it. It *must* have some greatness I can’t comprehend, then, right? What a story! It’s fascinating to see what makes things famous, how reputations can be manipulated and legacies can be handwritten.

France

BEQUEST = inheritance, will, endowment, legacy

CURRY (favor) = ingratiate yourself w/ someone, put yourself in their good books by sucking up

BEVY = a large group of a particular kind, gang, troupe

INCULCATE = instill, infuse (a trait, for example)

LASCIVIOUS = lewd, lustful

RAPPROCHEMENT = reconciliation, understanding between two parties

VERNACULAR = everyday language

PROFUSION = abundance, gluttony of something

BUFFETED = (of wind and wave) to batter and pound / (of trouble or pain) to afflict

FRAY = battle, engagement, intense situation

BOOKEND = to position at the end of something

PENITENT = regretful, apologetic

PAROXYSM = a sudden attack of a particular emotion or behavior

- Surround yourself with, and engage deeply with, great mentors. Francis I made old Leonardo his patron, and siphoned tons of knowledge out of him, to in turn, go down as an erudite and charismatic king. Same with Alexander the Great and Aristotle.

- “Just as a well-spent day brings happy sleep, a well-employed life brings a happy death”

Epilogue

CROSSCURRENTS = a process in conflict with another (“crosscurrents of debate”)

PURVIEW = within the scope or jurisdiction of something

- “Talent hits a target no-one else can hit, genius hits a target no-one else can see.”

- Take-away: indulge fantasy. When imaging futuristic waste management and K-12 education systems, make notes, toy with ideas, dream like a child. This is how revolutions begin.

The Life of Isaac Newton

Questions to answer:

- Would Newton have achieved as much or have been remembered in the same way if he was born 10 years before or after when he was?

- How has pop culture shaped the way that he was remembered?

- How-come the general populace know of him? Do they even? If they don't, is that who I want to be remembered by? Why, or why not?

A Sober, Silent Thinking Lad

ANTIQUARIAN = someone who studies old shit

YEOMAN = someone who owns a small plot of land—freeholder as opposed to leaseholder

PLIABLE = flexible, malleable

BENEFICE = a permanent church appointment

CREDULITY = gullibility

PEURILE = immature, infantile

REMONSTRATE = complain, protest

GRANDILOQUENCE = pompous, extravagant

SURLY = grumpy, glum

- Before Newton, science was largely pseudo-philosophy, mostly unrelated to experiment and done by rich people debating each other about the logical consistencies of their arguments without empirical proof. It was largely based off the works of Aristotle—a shining example of how fields can go millennia (two, in this case) without advancing if individuals don't contribute. It's also crazy to think that da Vinci had more rigorous empirical science than most 'scientists' at Cambridge at the time, it's just that he'd never published it, or he would have been more famous than Newton for formalizing the scientific method earlier than he did.

- He was born to a wealthy family, but raised by his grandparents because his father was dead and his mother remarried, choosing not to take him with her. This turned out to be a blessing

because, although he hated spending time with them and disliked them deeply, they were literally and made sure relearned the value of education and to read in a time where most people couldn't read, and didn't care about educational pursuits. They also had enough family connections to get him to Trinity, and even elected as fellow. His boyhood was very lonely, and so the only distractions for someone of his temperament was intellectual exploration, birthing a lifelong curiosity about the natural world out of his early reclusively.

- School at his time tight Latin, Greek, grammar, ethics and philosophy. There was no math and science; even at university most scholars were theologians who did not do any substantive work and instead just messed about with government funding. Universities as academic research powerhouses are relatively recent inventions.
- He was a renaissance man. He was obsessed with sundials and windmills, building his own when young, hinting at engineering prowess that would manifest in making the modern telescope. He also did tons of charcoal drawings about biological structures. He might seem the quintessential mathematician and physicist, but also had deep interests in chemistry (alchemy) and engineering.

A Solitary Scholar

DENIGRATE =

SCRUPULOUS =

AUSTERE =

IMPUGN =

LAXITY =

REDOLENT =

MOTILITY =

INCHOATE =

PLENUM =

IMPIGN =

BONING =

NEUROSES =

ECCLESIASTICAL =

PREFERMENT =

- Interesting to note that Newton was not at the epicenter of science at the time, which was not at any one place. The importance scientists of his time were Descartes, Leibniz, Hooke, Kepler, and more were not at Cambridge with him. This did not matter because he was an isolationist, and when he did communicate it was through letters. I would say that it goes to show that you don't need to be charismatic or collaborative to succeed, but you have to look at the context. In labours of the mind, introverts like Newton and Michelangelo can thrive because it's all about your work and ideas which you alone control. This would not fly in war, politics, or business. So think less about general personality traits that span across all the greats, and understand each man's context to see what traits were important in that context and why.
- Once he knew he had the requisite background and strength to be able to improve on work in a field (optics, for example), he was unafraid to throw conventional Aristotelian wisdom out of the window, much like Einstein went on to do to him.
- Learn to think in terms of edge case hypotheticals, or thought-experiments. This is how you deeply internalize an academic concept, but is also how you come up with interesting possibilities for what the future of the world can look like, and why.
- Much like da Vinci, when he was curious about something, he wouldn't plan something elaborate and perfect, he'd just test the thing, whether that involved literally blinding himself by looking at the sun or some other form of testing a hypothesis.

Anni Mirabiles

PROPOUND = put forward, advance, offer,

CIRCUMSCRIBE = restrict, limit

ANTIPATHY = hostility, animosity

HOMILY = sermon, religious lecture, speech

DOYEN = the most respected person in a particular field

- The years from 1664 to 1666 is when he made all his discoveries on infinite series, binomial expansions, developed calculus—he lived, breathed, ate mathematics. He claimed his mathematical ability peaked around this period, at 22, and declined slowly since then. People at Harvard don't realize it, but they're in the prime years of their life—put aside 2 days every week to doing the work you will be remembered for.
- More than anything, Newton moved science from pseudo-philosophy based on millennia old conjecture to actual rigorous, empirical thinking. Moreover, he was one of the first people to both develop mathematical methods and apply them creatively to describe the universe. He essentially invented physics by releasing that the moon's orbit followed these wacky formulae he'd described when discovering circular motion.
- There is no magic to how he did phenomenal work on everything from numerical methods to calculus to optics to gravitation and celestial mechanics. He obsesses over a problem, takes lots of dead ends, thinks long and hard in isolation, then eventually, after much difficulty, solves it. You just need to be curious and obsessed, is all.

Lucasian Professor

PHALANX = a body of troops moving in close, tight knit formation.

ERSTWHILE = former, old, ex-

AUSPICIOUS = favorable, promising, conducive to success

SUBVERSIVE = disruptive, troublemaking

INCOMMENSURABLE = incomparable

PERTINACIOUS = determined, tenacious

GADFLY = an annoying, provocative critic

DIFFIDENCE = shyness, modesty

DILATORINESS = slowness to act

- Newton was definitely concerned with issues of authorship, and was deeply scared of criticism. He'd often ask his name to be taken off his publications on first print to see how they were received, then put them on if they were received well. For an introvert, he was deeply bothered whenever someone doubted or questioned his work and this stuck in his mind, ruminating, annoying him from the inside out. He did, however, make sure to make any disputes of authorship (like when Hooke claimed much of *Principia* was contained in his *Micrographia*) very clearly on his side—perhaps why he's remembered so clearly today.
- Like all the other great thinkers, he was a renaissance man, and did whatever had to be done to collect experimental data. He would build his own telescopes, grinding materials himself and assembling them himself, too, much like da Vinci. This part of his scientific prowess isn't sexy or advertised as much since he's more known as a pure mathematician, but is crucial to his discoveries, particularly in optics.

Publication and Crisis

ASPERITY = harshness, sharpness of tone

DEMUR = object

RANKLED = irritated, upset

RUFFLE = tussled, roughened, run ones fingers through

INTERLOPER = intruder, trespasser

AGOG = eager, excited

MEMORANDUM = record, contract, agreement
INSUPERABLE = insurmountable
EXPLICATE = explain, make explicit
EVINCE = reveal the presence of, show, make obvious
CONFUTE = disproves
CURT = rudely brief
EXPOSTULATE = disagree, argue
HAUTEUR = disdainful pride, conceit, feeling of haughty superiority
CHASTEN = subdue, deflate, humble
TYRO = novice, beginner
DISABUSE = persuade someone an idea or belief of theirs is mistake, correct
EXPOUND = present, put forward
INEXORABLE = relentless, unstoppable
AGGRIEVE = resentful, indignant

- An ode to the power of circumstance—Hooke was nowhere near as smart or rigorous as Newton, yet is remembered as a historical figure because his personality made him chair of the Royal Society at a time of rapid scientific change, as well as because he was smart enough to contribute things of his own just enough to be considered worthy of disagreeing with Newton. It's not clear at all whether he would achieve anything noteworthy in the modern era, whereas Newton certainly would.
- Despite the fact that he didn't collaborate much with others, he did get some of his most pivotal inspirations (including for the creation of physics, from Halley) from contemporaries, which included Wren, Hooke, Halley, Boyle, de Moivre, amongst others, all of whom were at Oxbridge.
- A key insight is that Newton was mainly a mathematician. He was not "the first scientist" but the "last of the magicians", who created physics largely by showing how rigorous mathematics can perfectly explain and predict the real world via circular motion, celestial dynamics, gravitation, and more. Other contemporaries had used math, sure, but none had been as prolific in doing foundational work in so many different fields, and being as productive mathematically, too. So a big point is that these intelligent people went into mathematics, whereas many other intelligent people at the time went into theology, philosophy, and other things—so another circumstantial point is their exposure to math (then a niche field) is in itself a boon and advantage. In an era of mixed basic empirical science and pseudoscientific rigor, he united mathematical sophistication in natural science with empirical rigor in many foundational fields, leaving his name on a large number of things.
- Newton did not live a lucky life, he had to survive the bubonic plague, leaving Cambridge to do so, some of his best manuscripts were burned down accidentally and he had to reconstruct those discoveries from memory, people tried to plagiarize and belittle him and his work. Greatness doesn't come about because of a lack of adversity, but because the individual is so damn good adversity pales in comparison to their output.
- After his publication scandals, he chose the silent life, spending the next decade in almost monastic focus, with little no interaction with other people or the outside world. In essence, this worked because he knew the cutting edge knowledge of the field and so just positioned himself to think anti-mimetically—he had no need for collaboration because he already knew the cutting-edge ideas, and no-one was even close to him in productivity. Neither of these is true for me, so monastic focus will be less important for extended periods of time for myself.

Rebellion

PROSAIC = dull, unimaginative
IMPUGN = challenge, call into question

PROFUNDITY = profoundness
EXCEPTED = not included, omitted
LUXURIANT = flourishing, rich, fecund
PUISSANT = powerful
OCCULT = supernatural
ORDINATION = welcoming someone into the religious order
PATRISTIC = relating to early Christian clergy
IDOLATRY = worship, idolisation
ECCLESIASTICAL = priestly, churchly
POLITY = an organized society, separate state
PROVIDENCE = fate, destiny
VOUCHSAFE = grant, give something
EDIFICATION = education, instruction
COVETOUSNESS = showing great desire to possess something belonging to someone else
SCORN = contempt, derision
LEPER = exile, outcast
PARIAH = leper

- When his work on optics was criticized and he took relief from the formal academic world, he conducted extensive work in alchemy—what we call “chemistry” today, but without his characteristic skepticism and rigor, more riding a hype train that led nowhere. His physics separated “spirit” and such unquantifiable phenomena from the scientific method in a time of Aristotelean speculation, but for some reason he accepted this way of thinking in alchemy, the definition of a pseudoscience because it rejected purely mechanical philosophy. Some claim this is because he was so smitten by nature and truth, he believed there had to be more complexity than ‘mere’ mechanical philosophy.
- In a similar vein, he then studied theology intensely for several years, examining religious sources himself and coming up with an explanation for the religious story, eventually settling on his own explanation for the religious events everyone blindly believes in, as if cracking a puzzle. The principal end of the college at the time was to breed clerics and religious figures, almost no-one spent their time doing actual academic study, and even fewer on actual mathematical/scientific study. Part of his success was the absolutely tiny pool of people actually even *thinking* about the laws of the world.

Years of Silence

EXPEDIENT = convenient, advantageous for oneself
HAMSTRUNG = crippled, disabled
MINISTRATION = the provision of help by an assistant
FILIAL = dutiful, devoted, of a son/daughter
PERSPICUOUS = clear, lucid
APOSTASY = renunciation of belief, disloyalty
TRANSMIGRATE = (of a soul) pass into a different body after death
TRANSMUTING = changed, altered, reworked
EXULTANT = jubilant, thrilled
RETICENCE = reserve, restraint
ASCRIBE = attribute, assign
OBTRUDE = intrude, impose
PROFFER = offer, extend, suggest
CONFORMABLE = disposed to conforming
POLEMICAL = critical, venomous

- It cannot be overstated how obsessed this man was with his study. He would forget what day it was because of how excited he was with his experiments. A key take-away is that I need to find a way not to motivate myself, but to align incentives and desires such that prototyping, thinking, user testing, building is genuinely exciting, enjoyable and philosophically worthwhile without an end in sight, as was the case with his scientific experimentation.
- It also cannot be overstated how crude understanding of the physical method and universe was. While he had worked out infinite harmonic series and calculus, he still believed that a comet was a 'foreign body' not subject to the same laws as planets in the solar system. What an interesting combination of magic and science at the time; a big part of his achievement is formally separating pseudoscience, magic, spirit, from quantitative, empirical, mechanical philosophy.

Principia

FORWENT = do without, renounce

IMPETUOUS = impulsive, rash

CAPITULATE = surrender

EMENDATION = correction, rectification

PRESIDE = chair, oversee, officiate

PLENUM = an assembly of all the members of some group

SPATE = series, succession of some action

ONTOLOGICAL = relating to physical reality, the nature of being

PARAPHERNALIA = stuff

SMATTERER = dabbler

GALL = impudence, irritation

- The revolution took place when Halley, an empiricist, asked Newton, a theorist, what the shape of orbits would be based on the principles of circular motion—an ellipsis, as was the case for the comet Halley had observed. This thrust Newton into further study about the comet, causing him to come up with universal gravitation. He was shown the right question by the right person at the right time.
- The *Principia* is a result of two years of monastically deep work. One of the reasons he's remembered as being so great is because *Principia* is a complete work that is a definitive treatise on a topic. Whereas da Vinci failed to complete many works, Newton finished this one, which was crucial for posterity—the entire arc to tell kids about.
- As with many intellectuals, he wasn't okay with 'reasonable intuition' with some gaps swept under the rug. He sought absolute mastery, which meant spending long, hard hours thinking about small details that didn't make intuitive sense yet. In the process of codifying celestial mechanics, he had to formalize circular motion, his three laws—the *invented the very concept of mass to do so*—and more.
- It's interesting to note that as the great thinkers get older, they become more set and rigid in their ways of thinking—perhaps due to fame or status, and that marks the end of their greatness. Be wary of this in yourself.
- In studying the orbit of Jupiter, he noticed the moons' orbital deviations as a result of the sun's attraction—and thus, universal gravitation (helped along by his third law) unfolded before him. He didn't even believe it himself—the *Principia*—said it was mathematical trickery that said nothing about physical reality.
- He himself was scared about how universal gravitation was to be received, having been breastfed by the conventional mechanical philosophy of his time—he couldn't explain *why* universal gravitation existed, only saw that the same attraction holding planets to the sun held comets, and vice versa, and so the only reasonable conclusion *was* universal gravitation, but

he tried to downplay it in his book. You mustn't be afraid to completely overthrow conventional wisdom and architecture in the face of new knowledge and insider insight.

- He was excellent at rolling with new ideas after he both learned them and invented them—he derived the shell theorem soon after formulating universal gravitation—he wasn't afraid to take on routes that weren't clean or made sense, and push them to their absolute limits, wringing them of all their predictive power. He was a very flexible mind, happy to explore the consequences of outrageous theories.

(Glorious) Revolution

- It cannot be understated how helpful Halley was, as a catalyst, sounding board, publisher, dispute intermediary, and more. Newton would not have known how to publicize, publish and establish his ideas without him.
- Even while reading about his life it seems to be pretty impenetrable. His deepest friendships were with Locke and Boyle, about theology and alchemy, respectively. Even without them, he would've done the same work in the mathematical and physical sciences. Even scarier, it seems like he's truly the first "great man" that clearly would've been similarly great if he'd been born 5 years before or after. Sure, the plague outbreak might've affected him differently which might have changed the course of his learning, but since his achievements come down so much to his time spent mulling over hard problems alone, it's hard to replicate.
- You have to appreciate how different understanding knowledge is to creating it. When he was studying things, all you did at universities was study the Bible as a narrative to become a clergyman. And so for him to depart on studies of mathematics, physics, philosophy, alchemy, and more, was understandable, because the scientific method and worldview was far from commonplace, there was no reason that qualitative philosophisation was any worse at describing the great, complex beauties of the world than arbitrary, human-invented numbers. When he stumbled across empirical, math-based science, he thought he had only solved some particular cases of the natural world, that there must be a great more wonder and complexity to everything than mere pedestrian mathematics.
- He moved to London because he felt like he was getting stale, losing his creative power, and needed to rely more on the company of other smart men, of whom there were more in London than Cambridge (which at that point really just trained clergy).

The Mint

- The government had called for great intellectuals to help them with fiscal war policy because they lacked economic experts at the time and were nearing bankruptcy, as a nation, so Wren and others were also called upon.
- It's stunning to see how powerful his generation was, intellectually, even if he didn't much engage with them—Newton, Hooke, Huygens, Wren, Bernoulli, Locke, de Moivre, Leibniz, and more.
- He did, however, get favors from friends that proved super useful (Halley, his uncle, Montague for the mint) that he got out of the clout of being at Cambridge and being at an elite institution, which was the main benefit of having worked at Cambridge.
- For him, working obsessively on something was a habit. Even at the mint, he went through and read its entire history, constitution, and more, and set about reforming it with the same obsession and fervor with which he pursued science. He became head of the mint in all but name. The whole affair, however, turned out useless because even though it worked in economic theory, recoinage just meant more crony capitalism and crime at play under the table. Nonetheless, he did his job perfectly. A real manifestation of the quote:

"We are what we repeatedly do. Excellence is, then, not an act, but a habit."

- He developed a sense of completeness in him—he did problems because he believed himself a genius and anytime a problem vexed him it would be like an itch he couldn't scratch. You need to stop being okay with unsolved problems, and forcibly think about them until you solve them.
- Far from being a socially autistic savant, he was also socially savvy. He allegedly played match-maker with his niece and a famous politician to get himself written into his will, as well as the standard political chess to become master of the Mint, leveraging his intellectual clout, giving him lots of money and a lavish lifestyle commensurate with his intellect throughout the latter third of his life. What's more, he was an MP representing the university of Cambridge—a Kvothe, almost.

President of the Royal Society

- Despite what he did during his life, he was not God. He stooped to petty disputes, name-calling, insecurity, dealing behind-the-back, being a control freak when in a position of scientific credulity, and more. These were not necessarily traits that followed from his genius, sometimes he was just an asshole (a little bit like Einstein)—we're all human, I guess. There was a non-trivial portion of the society that constantly voted against his membership on the senior council because (they didn't understand the genius of his work as it was largely non-technical people) he insisted on flexing his intellectual superiority.

The Priority Dispute

- He was not above exaggerating, bordering on lying, about when he came up with things himself—and indeed, and the “truth” we have today is only what we reconstruct logically and rigorously from all the evidence (letters, publications, diaries) available—and this may very well be inaccurate or incomplete. It is entirely possible that Leibniz really did invent calculus, but will not be remembered for doing so—or remembered merely for his “squabbles”—and so you have to take great care not only to get credit for what you do, but make sure the evidence that makes that abundantly clear is available to all, most of all historians of the future. Newton also marshaled his clout with the Royal Society to get them to conduct an “impartial” survey and come to the same conclusion, giving him henceforth “official” backing.
- In addition to being “the last of the magicians”, Newton was good in that he would only write about that which could be measured in his works of physics—he never conjectured an underlying cause of gravity (which Einstein would then work out), and was clear about that. He only described the mathematics that enabled accurate prediction.
- For Newton, and especially those before him, mathematics and physics were fundamentally inseparable from philosophy, because they were on a quest to understand the nature of reality, and so asked questions of logic and epistemology as much of physical reality (how can we know that which is reflected in our experiments is also true throughout the universe—a natural question in a vacuum—the answer to which is we don't, but we must assume so).

Years of Decline

- He also didn't stick to his ideals against great criticism. Indeed, he shied away from criticism, and it fermented in his mind for time long after it was cast. He even made concessions and retreated from his most controversial claims in appearance so he wouldn't seem like an outsider or be disputed for his rebuke of natural philosophy.
- Similarly, he left his reputation clean and his theological heterodoxy (which he spent his last decade refining) unpublished for the sake of his public image.

Napoleon: A Life

Einstein, His Life and Universe (Walter Isaacson)

The Light Beam Rider

- Einstein was not a standalone genius. He was nurtured by the prevailing contrarian attitude of his time, with Joyce, Picasso, Stravinsky, Freud being the other greats of his time.
- It's interesting to think about what makes great people go down in history. No doubt, the fact that Einstein was eclectic, irreverent and free-spirited helped him look, outwardly, to be a genius who was also beautifully human—much like Steve Jobs. It may be in your interest to be eccentric if optimizing for going down in history—you're simply more memorable that way.

His Childhood

- Raised by scientist parents, a city of mathematicians, with a genetic contempt for authority. He would be very good at not just wondering deeply about simple things, but actually reconciling and finding unifying answers to those puzzling questions.
- His childhood circumstances sent ripples through his future. He was treated as an outsider growing up because of his religion, which made him come closer to Judaism than ever before. His parents nurtured his strong math skills by get him textbooks and tutors.
- Einstein had no clear cultural and religious identity. He termed himself a citizen of the world, and dropped out of high school at 16 to self-study before university. He left Germany to go to Italy then Switzerland, renouncing his citizenship having always felt like an outsider. He was

bewitched by Italian wit, elegance and beauty—both in culture, upbringing and education—contrasted with the mechanized way Germans thought.

The Polytechnic

- Einstein was taught by, and in intimate contact with, legends of modern science—his lecturers and personal friends include Weber, Siemens, Minkowski, and more. He also collaborated with Riemann, Bohr, Heisenberg, and more. Greatness is often very concentrated in small pockets of society—constantly ask yourself where the people that will be remembered most by history are right now, and how you can work with them.
- Einstein is a real-life Kvothe. An outsider of ill-birth, prodigious at two things (math, music), contempt for authority, sharp wit and sarcasm along with striking looks that make him a womanizer, yet somehow spends lots of time alone, thinking, and has a quietly antisocial streak.

The Lovers

- He really struggled to get a job for years, resorting to tutoring. If he had sold his soul to engineering, he'd have been good, but not legendary. And he easily could have—one extra push here, or pull there, and he'd have become an engineer out of necessity. Small decisions can have important impacts on your life.
- He applied for, and was rejected from, an academic post with almost every physicist in Europe. His job as a patent attorney gave him 1) the close friend group that inspired his philosophy of physics 2) a job that encouraged him to find flaws in the reasoning of people that apply for patents 3) a job that meant he could go deep on certain topics, without being pressured to publish or conform in any way.
- He was an asshole in his personal life. He had multiple affairs, neglected his first child, left his wife feeling lonely, and more. This is not remembered in the annals of history, however.

The Miracle Year

- Einstein was a master at reading across topics (thermodynamics, relativity, quantum theory) and synthesizing insights he had from reading papers by different authors and meshing them into something new and interesting. This is where much of his success in thermo/atomic physics came from—just blending an approach one guy took in thermo to a problem someone else was having in stat mech.

Special Relativity

- Relativity came about because of a deep, intuitive discomfort Einstein had in reconciling Galilian relativity with Maxwell's equations. The equations derived the speed of light, but did not specify *relative to what*. While the rest of the world assumed that meant "the ether", Einstein threw away traditional beliefs and set the invariance of light as a postulate for a new theory for how the speed of light and relativity can be reconciled.
- "Intuition is merely the outcome of earlier intellectual experience"
- It's important to understand how much harder it is to come up with a new theory than to learn it. Einstein had to adventure down misleading dead-ends, spend years in fruitless thought, before he could get the crucial insight while talking to Besso.
- Because humans are so good at internalizing examples, his ability to weave confusing edge cases then reconcile how they worked gave him a very, very deep understanding of topics.
- Philosophy was important insofar as informing his view for how the world *should* be and how you should approach/*think about* physical problems—for example, disregarding anything that cannot be experienced by the senses was a Humian way of thinking, but that's what caused him to feel uncomfortable with the idea of absolute space and time.

The Happiest Thought

- Einstein had a bunch of close friends who were physicists interested in philosophy, and so spent much of his time drinking coffee while discussing physics and philosophy, playing the violin, sailing and reflecting on physics. A life of true scholarship and beauty.
- Einstein was characteristically bothered by analogous phenomena that are not explained by a general, unifying theory—conductors and coils' relative motion during SR, gravity and falling in an elevator.
- The equivalence principle states how flying in an accelerating rocket ship and being confined to earth in an identical gravitational field cannot be distinguished by the person involved, and therefore should, intuitively, be explained by the same underlying physical phenomenon. He wanted to generalize special relativity to reconcile invariance of the speed of light with accelerating reference frames, and this thought started him on his way.

The Wandering Professor

- The Solvay conference was organized by a chemist of the same name to figure out the “quantum problem”. It brought together over 10 Nobel laureates into the same room to hash ideas out. He really was surrounded by some of the smartest people in history.
- He had a rough, nomadic personal life, having an affair on his wife with his cousin, having his first marriage break down into a business affair then divorce, crying over losing his children, and moving between Germany, the Czech Republic, Austria several times for different academic posts. He escaped emotional turmoil by turning to science.

General Relativity

- The holes in SR included that the speed of light as a speed limit contradicted Newton's formulation of instant gravitational affect, and it applied to constant-velocity frames of reference. The equivalence principle was importance because it hinted that when he reconciled one of those inconsistencies, the other would fix itself. One first leap was realizing that the equivalence principle implied that strong gravitational fields curved light because light entering one side of an accelerating space ship would leave at a lower point because of the intermediate motion of the ship, giving it a curved path.
- This curving of light reminded him of the shortest path through a curved surface, hinting that his theory may need non-Euclidean geometry, so he turned to Grossman, a childhood friend, who taught him Riemannian geometry.
- He approached developing the theory from both a purely mathematically formal, and physically intuitive perspective, with the latter initially leading him astray, and the formal eventually causing him to succeed, after a race with David Hilbert, which led to the most intense, scientifically creative and productive 4 weeks of his life, at age 36.
- He did all this despite the overwhelming anti-Semitism of his time, which caused World War I and made all other German scientists become used in the pro-war effort, like Planck and Haber, his personal friends.
- He cried and mourned the fact that “his children were being turned against him” by his wife and that he didn't get to see or mentor them as they grew up into young men.

The Divorce

- Einstein was an asshole to his “first family” and used his second wife (whose daughter he considered marrying) as an instrument of logistical convenience. Not a loving, considerate, generous or deeply kind person at all—not that history will remember that.
- This man lived, ate, breathed physics, for decades on end. Part of the reason he could contribute so much was because he “worked” so damn much. Literally almost all of every day from late teens to old age was spent reflecting, brooding, intensely grappling with questions of physics, whether that's while having coffee with physicist friends, going on hikes, sailing, or even eating meals with his family.

Einstein's Universe

- GR has profound implications for, and indeed birthed, cosmology, since we now had the mathematical basis for studying the nature of space and time, in extreme conditions. It predicted black holes, and was verified by Eddington's eclipse experiment testing the bending of light. While Einstein was well known in European scientific circles before this, afterwards he became an international celebrity by overthrowing Newton.

Fame

- The reason for his huge success was a combination of his genius, his showmanship, the circumstance in which he succeeded (end of a World War, where everyone wanted good news bringing people together).
- His physics changed the world's intellectual atmosphere, sparking relativism and the populations' philosophy at large, since many people misunderstood what he said. His contributions coincided with the magnum opuses of James Joyce, Stravinsky, Freud, and other intellectual giants of the time, all of whom he came to know and meet due to his fame.

The Wandering Zionist

- In the midst of rising anti-semitism in Germany after WWI, some tried to assimilate, but Einstein was pushed into vocal Zionism, feeling like a Jew, through and through, when shunned as an outsider because of his heritage. Part of his celebrity in the US came from the strong Jewish community who clamored over the opportunity to meet him, almost as if they were Catholics about to meet the Pope, not entirely from his science.

The Nobel Laureate

- Einstein had a very powerful ability to concentrate deeply, even in chaotic situations.
- The Nobel was for the photoelectric effect because relativity, at the time, was seen as more philosophical than physical, and the committee was comprised of experimentalists.
- Philosophy is important to theoreticians because it determines the beliefs they have about what physical theories are correct and complete, as well as how they approach problems. Einstein reading Mach and Hume made him want to do away with absolute space and time, since they couldn't be physically observed.

Unified Field Theories

- Einstein hated QM because it didn't mesh with his deterministic, local, realist philosophies of how God would have constructed the universe, and spent his whole life trying to poke holes in it and pursue unification in other ways, making no significant headway.
- Einstein's physics lost intuition as he got older, and became a lot more about the mathematical formalism that led him to complete GR.

Turning Fifty

- Throughout his life, indeed continuing until he was older than 60, he was a playboy. Despite being in marriages, he would have "companions"—ranging from secretaries to daughters of women he knew. His wives always suspected, but accepted it as part and parcel of being with a famous genius.
- As he aged, his mission became just as much about activism, political advocacy and philosophy as it did about physics. Part of the reason he was so famous was because he had strong opinions on politics and war that he voiced, making him relatable to millions.
- He strongly advocated pacifism and refusal of military service. If even 2% of the public refuse to conscript, they can't jail them all, and wars will cease to exist. This opinion of his changed when Hitler came to power, where he acknowledged the European need to re-arm, and his opinion on Machian philosophy also changed over time. He was good at adapting his opinions in the face of new evidence.

Einstein's God

- Einstein was critical of atheists' unfounded arrogance, and believed in Spinoza's God—terming the sense of wonder and awe he had about the elegance and complexity of the universe as “religious”, but not believing in any supernatural being concerned with mankind.
- He was a determinist, who didn't believe in free will. “Man can do as he wills, but not as he wills he wills”, he said.

The Refugee

- Einstein thought that Americans were materialistic and lacked depth of thought, but lauded their freedom of expression and individuality, and cherished the revolutionary thinkers who called the country home.
- As the Nazis came to power, Einstein fled, holding visiting professorships at Caltech, Princeton, and Oxford, before settling down at IAS.

America

- He lived unpretentiously, enjoying the quiet of sailing, and entertaining everyone from little girls struggling with math homework to Nobel laureates in his Princeton home. He genuinely didn't need much in life.
- The US took advantage of an intellectual arbitrage opportunity. When Germany shunned the best scientists in the world because of their Jewish nature, American welcomed them (and indeed actively recruited them), working well to their war advantage when Einstein, amongst others, helped build the atom (fission) bomb. Perhaps diversity in tech is a similar arbitrage opportunity?

Entanglement, The Bomb

- Einstein launched the atomic bomb project when Szilard showed him it was possible, worrying that the Germans had moved in that direction already. Funnily, the FBI didn't let him take part because enemies he had made earlier had incorrectly suggested he was a Commie, and the government didn't want to take any risks. He lamented his decision to help launch the project when the bombs were dropped on Japan.

One World

- He strongly advocated for one central, armed and authoritative, world government, perhaps informed by his nomadic lifestyle making him think of himself as an internationalist. Like the LoN, but with much more power than it actually has, and in a position above countries and in a position that has authoritative rather than advisory power.
- The Civil War is a nice structural analogy to how difficult it is to integrate geographically and culturally disparate states under the United States, but equally, the dangers of not doing so and the proof that it is possible at all.

WRESTED = wrestled from, snatched from with great difficulty

CIRCUMSPECT = cautious, wary

Landmark

- Einstein was mainly an individual contributor, not a leader, a landmark, but not a beacon.
- The triplet queen intellectual achievements of the 20th century were all German—Einstein's relativity, Heisenberg's uncertainty, and Gödel's incompleteness, each intensely mathematical, but also deeply philosophical about what they told us about the universe. The first told us that time and distances are relative, the second that there is no underlying reality until we measure it, the third that there is a lot we will never be able to know about the universe.
- Gödel was a close friend of Einstein. The ability to become close to intensely introverted logicians and also be a womanizer is rare, and it has to do with being able to be generous with your time/attention, and understand what people have to give the world.

- Einstein took on a moral duty to “wastefully” spend time searching for a grand unified theory, as well as making controversial political statements, because a younger, less-established scientist wasn’t afforded this luxury, and so Einstein took it upon himself.
- In short, Einstein was generous, gentle, and charismatic to all those around him, but still silently distant, and would wall off people who tried to get too close, constrict him, or cause him emotional pain, like Mileva and even his own son, Eduard.

Red Scare

- In the midst of the cold war, he took objectively moderate stands calling out for the preservation of intellectual liberty, which made him unpopular amongst the public. He was worried American hatred towards people with socialist beliefs would remember 1932 Germany where there was a witch-hunt for the Jews.

The End

- Einstein was wholly devoted to both his physics and his lovers quite literally, until his last days. He was seeing women at the age of 76 (he was with Konenkova, a USSR spy, after Elsa’s death), and scribbling equations when on his deathbed. He chose and modified his philosophical principles very thoughtfully and rigorously, and then stuck to them stubbornly. He chose not to get an operation that would extend his life because “it is tasteless to prolong life artificially. My time has come, and I will go elegantly”.
- Even in the end, days would be marked by, alongside his mathematical assistant, pursuing certain avenues of theory, hitting a dead end, modifying the approach, trying another approach, hitting a dead end, and repeating.
- He describes how at the end of life, you start to feel less immersed with day-to-day happenings, and at once more reflective about what has been, and are “one” with the universe, where you get a little perspective on the beauty of life, more generally.

Einstein’s Brain and Mind

- We extracted and kept his brain for study, but nothing useful came of it as the doctor distributed extracts poorly, stored it poorly so DNA couldn’t be extracted, and we had no points of comparison age-wise or genius-wise, and also couldn’t tell which parts of the brain were important in cause or effect of his genius.
- In the end, his brilliance came not just from his biological advantage, but from his ability to recognize the wonder all around us, and to relentlessly persist at grappling with problems until he understood it. Most of us walk around everything hiding behind abstractions, knowing that ideas break down if you push them too hard, whereas he wanted to figure out why, and what the real truth was, abstractions aside. In short, curiosity, nonconformity, and humility were the cornerstones of his intellectual approach. Poincare and Lorentz came close to SR before him, and Hilbert with GR, but none of them had the audacity to overthrow Newtonian physics easily like Einstein.

Churchill: Walking With Destiny

Steve Jobs

Overall Insights: The Anatomy of Greatness.

- Passionate curiosity: the act of questioning simple, “obvious” things deeply, but perhaps even more importantly, having the patience and grit to stick with these confusing questions and dead ends until you deeply understand the answers to the initial curiosities you had. Da Vinci, Einstein. Newton, too.
- Deep excellence across disciplines and skills, and making links across them: Einstein was heavily philosophical and mastered the violin despite his spike in math and physics. Da Vinci was the quintessential polymath. Jobs fused calligraphy and design with circuitry, Franklin was equal parts diplomat, writer, and scientist, inventor. Newton, too in theology and alchemy as much mathematics and physics.

- Visceral humility, even if they might not show it: Einstein, da Vinci were in love with the wonders of the cosmos, and they suffused this love for nature's harmony into their work. Newton, too. Many were arrogant, but none were conceited.
- Contempt for authority and suspicion of dogma: da Vinci had no formal education and had to teach himself everything in a way that made logical sense—epitome of anti-mimetic thinking. Einstein dropped out of high school at 16 to teach himself physics.
- A lot of success, measured by money, intellectual productivity, or anything else, comes down to circumstance, to some unknown but reasonably large, degree. Da Vinci's father knowing Verocchio and him being illegitimate, etc.
- Twenties: this was when many greats did some of their greatest work, but often weren't recognized for it. They often ended their 20s feeling like failures, when really they done great work that would bear fruits in the years to come and establish their notoriety.
- By scaling education, it necessarily loses beauty to the individual, because it's bland, monotonous, work. A teacher with a class of 40 cannot go on a field trip and get all 40 to feel curious and amazed about nature, but he certainly can with a class of 4. Both Einstein and da Vinci did not have formal schooling until much later than usual—near 9 or 10, and so grew up as people who didn't have that curiosity beaten out of them.
- At their peak productivity, they weren't seen as greats that would go down in history, only towards the ends of their lives did people start to realize and appreciate these peoples' greatness.
- Michelangelo was a craggy, ugly, asshole who preferred to work alone than collaborate. Gos to show that genius comes in all shapes and forms—you don't need to be charismatic or collaborative. Michelangelo was also religious while Leonardo was scientific, and Leonardo is greater only perhaps because of the Mona Lisa hysteria. It shows that greatness is often a social construct out of the hands of the great, and great people have wide-ranging personalities.
- Great rivalries that make for compelling stories often forge history. Newton/Leibniz, Gates/ Jobs, Michelangelo/da Vinci, Einstein/Hilbert, these also push history forward by leaps and bounds by forcing these 10x innovators to outdo each other and push each other to their physical limits.
- Leonardo never quite figures out the mechanics of how the heart and circulation works, because he was too blinded by book learning. He had read too much about the topic and couldn't overthrow conventional wisdom. This harks back to how the Stanford art professor had a math background and how Cory's friend has no background in entertainment but is surrounding himself with smart people in the industry and has a strong general tech entrepreneurship background. Learning a little bit about a topic and thinking actively about it can generate revolutionary ideas—I need to do more of this.
- There are a few times and places in history where the great people aggregate, and they know each other well. Einstein in Berlin, Leonardo in Florence, Caesar in Rome. These places tend to produce great people and ideas in spades, and in a high density per unit time—and the people always know each other. This was not true of Newton, whose contemporaries were scattered around Europe.
- Caesar grew up in a rough neighborhood with common men, unlike other noble families, in a time where there was enormous bloodshed and civil violence as politicians grappled for power. He had a very unusual childhood, and was forged through fire, almost as if bound for greatness. You'd think there are themes in great peoples' childhood, but there don't seem to be—Einstein, Jobs and Leonardo had relatively ordinary childhoods and did not, at 18, seem destined for greatness, whereas, say, Caesar, might have been.

- All great men, whether outwardly alpha or quietly confident, stood up to bullies. They knew their worth and didn't take shit from anyone. When Sulla, incumbent Roman general, told Caesar to divorce his wife or die (which everyone else did without question), Caesar flipped him off, as a teenager. Even though Newton was profoundly introverted, when bullied at school, he beat the shit out of the bullies, then trampled them academically, too. They have gumption, and are willing to stand up for that which they believe in, even at great cost.
- No great people are fakes in terms of output and productivity. They truly were all masterful at their craft, and not afraid to get their hands dirty. Caesar, for example, fought on the front line with his soldiers and risked getting killed as they did. They talked the talk well, but also were able to back it up with a smile on their face. Newton, when confused while reading Descartes' *Geometry*, would go back to the beginning until he understood his sticking point, and repeated until he mastered the whole textbook. This is substance.
- A corollary to this is obsession, particularly in the thinkers. When they were reflecting on something they would forget to eat, to sleep, and more. Newton would sit at the lunch table thinking with papers with his food by his side as it swept into dinnertime. You need to find a few interesting, profitable and important problems, then mediate obsessively on them for months and years on end without resurfacing.
- Great people do stuff that is wacky and memorable. Einstein was a womanizer and outspoken pacifist, Leonardo a homosexual bastard who wore bright pink, Caesar laughed at his captors then returned to crucify them. As well as doing great work, you need to have an alpha personality and do outrageous things that get people talking with their jaws dropping, either in amazement or shock—doesn't matter.
- Many of these greats are 'men of the people'. Sure, they can come off as brash and arrogant at times, and certainly even assholes to those close to them, but they never believe they are *above* anyone. They are not conceited with their image or fame or status—Einstein welcomed little girls into his home, da Vinci invited random people into his home to practice drawing them, Caesar was known as a populist that lived on the streets with the people. This relates to my ability to make people below me feel important and singularly valued, as if they are no different to me at all.
- Whether or not history remembers you as the single greatest—as opposed to merely 'one of' the great people of history—is out of your control. The reason Caesar is remembered more than Cicero, Pompey, Cato, or any other equally conniving and visionary leaders of antiquity is largely down to circumstance—both in battles he edged out and the direction popular culture evolved in the future. The same is for why da Vinci is remembered more than Michelangelo, Botticelli, Alberti—all equally skilled artisans. But being remembered as *one of* the greats is fully within our control, and it all comes down to how we spend our time every day. The Roman visionaries and Italian masters considered every second a drop of liquid gold, but modern tools of distraction make it easy for us to forget that reality. I'm obstinate that the age we've been born into will be remembered for millennia to come but we don't realize it, the same way as the Romans would never expect to be deified as much as they are today. The Roman Empire was famous because it was the *first*—the *first* to publish large amounts of philosophy of the type we believe in today, to advocate Republican rule and overthrow tyrants like Caesar, the first to face challenges that we continue to face today, and will forever. In a similar way, the Renaissance is remembered because the complex institutions (like banking) that arose led to major changes in the way we live. Today, equally, we are undergoing a major change in the way we live, one that will resonate through the annals of history, though we may not be fully aware of it now. Jobs, Zuckerberg and other leaders in this new gilded age, the leaders that make us confront difficult ideas about the way we live and organize our societies—will be remembered for doing so and catapulting us into the computational age.

This is an age championing values and tools that will remain with us into eternity, much like Roman values of republicanism remained with Washington as he watched *Cato*, with Shakespeare as he toyed with the idea of a great king, and with us today as we think about the great leaders of antiquity. We may not realize it, but we are characters dancing across what will become some of the most sacrosanct and richly vivid pages of human history. More importantly, we hold unprecedented access to social mobility, where kids of unceremonious birth like us, equipped only with immense ambition, can choose our legacies like never before. We must act accordingly.

- A corollary to the fact that these men valued their time very highly—Newton would write in his diary of sins that he spent times chatting idly with other people in the college from time to time—use of time in a non-studious way was, for him, tantamount to heresy. For them, it's not even discipline, but an obligation they have to the opportunity they have at hand.
- All the great men have a close circle of friends with whom they spend most of their time. There are very few that form deep friendships with lots and lots of people, though certainly many are amiable and charismatic. It is not unreasonable to think that since they didn't have to juggle a lot of people and whittled down their peers to the 5% that gave them 95% of the value, they freed up a lot of time for being actually productive, a necessary but not sufficient requirement for greatness.
- Repeating trait is that they were friends with other great, powerful people *before those people became great and powerful*. For example, Newton was friends with Gregory and Halley before they took up the major mathematics/physics professorships at Oxbridge.
- Despite popular conception, they make sure to get credit where due. When racing with Leibniz, Newton made it abundantly clear, both in his own publications and letters to friends, that he came up with it first, referencing letters he had sent decades earlier, and putting the issue of priority to rest before it even came up. You are forgotten if you don't stamp your name forcefully to get credit for the great work you've done.
- It's interesting to note that almost all of these people lived through some war or major conflict, from da Vinci following Borgia to Newton in the British-Franco War to Einstein in WW1 and 2. Is this more telling about the perennial nature of conflict, or about how these people were intimately, somehow, affected by the horrors of war? More likely, I think, is that given the position these thinkers were in the war affected their lives in a positive way by chance (and others, whom I don't read about because they are forgotten, in a negative way).
- Interesting to note Newton cared about his legacy. Obsessively, he had many portraits of him made at many times by many different painters. He also became very charitable to quell his reputation as an argumentative and insecure scientist. He even planned his own death so he could clearly refuse the sacrament of the church to make his beliefs clearer and craft a more vivid image of a wacky scientist that would leave an image in history. Same with Caesar, da Vinci, Jobs, Churchill, and all the rest. Posterity is not an accident.
- He was recognized as great at the time, too, Newton. Same with the rest—they don't give up current greatness and fame in their lifetimes for posterity, indeed, the world knows and feels the loss as much at the time as throughout history.