Fallacies - A Short Guide

A short guide of fallacies, adapted from Nassim Taleb (Version: 01 November 2023)

Types of Fallacies

Grouped based on practice and manifestations as opposed to formal and mathematical attributes. Note that this grouping is also a Procrustean bed, these are connected.

Type 1) Misunderstanding of probability (“X” random variable)
- 1a) Misunderstanding randomness (Fooled by Randomness)
- 1b) Misunderstanding distribution (Mediocristan vs Extremistan)

Type 2) Misunderstanding effects (“F(X)” consequences)
- 2a) Misunderstanding consequences of higher orders
- 2b) Misunderstanding nonlinearity
- 2c) Misunderstanding dynamics
- 2d) Misunderstanding dimensionality.

Type 3) Verbalisms, logical errors

List of Fallacies

Fooled By Randomness (Type 1a)

Event-Exposure conflation

Mistaking the Aristotelian (logic, probability X) for the Thalesian (payoff, exposure, F(X)).

Example (simulated annealing): adding noise increases accuracy to improve functioning. Annealing in metallurgy is the controlled heating and cooling of materials to increase the size of crystals and reduce defects.

Non-evidence

Mistaking anecdotes for evidence. Mistaking conspiracy theories for evidence.

Statistics is not a tool for scientism and confirmatory empiricism, but a method to not be fooled by randomness. What Mother Nature does is rigorous until proven otherwise; what humans and science do is flawed until proven otherwise.

Imparting traits to the general based on an incomplete set of particulars. The reverse error of flowing down traits to the particular that only apply to the general.

Examples: sensational anecdote versus strength of evidence. Typically paired up with financial and medical quackery, disinformation and conspiracy theorizing.

Ignoring silent attributes of process

Ignoring silent attributes of a process.

Example (History of Private Life): No historical study or account should be considered without filling-in the gaps of non-events, or events that do not reflect the agency of some top-down ruler or "leader".

Example (boring peace ignored in history) Historical accounts are, by their very structure, biased to overestimate agency in human affairs (such as the role of "leaders" and the "state"), as well as conflicts dealt with from the top, as well as the devaluation of the properties of the system. By their very focus on wars, historians see history as wars punctuated with episodes of peace, not peace punctuated with episodes of war. This mis-focus increase representativeness, exaggerates the role of meetings, decisions, and recorded "events". By their very definition recorded events are not random samples but glorifications of salient happenings.

Example (via positiva leadership) "Leadership" is merely procedural Evolution (hence improvement) never happen from the top via positiva. But degradation takes place from the top via interventionism and side effects of policies. And improvement from the top is necessarily obtained via negativa. This ignores contributions from the collective or the ensemble.

Example (survival bias): ignoring those that did not survive.

Example (opaque heuristics): routines performed by society that does not seem to make sense that has been done for a long time and sticks for unknown reasons.

Incorrect information sampling frequency

High frequency sterile information and sampling that is inappropriate for useful search. This is interventionism.

Ignoring generators and focusing on realisation

Looking at realisations as opposed to the fundamental generator.

Example (ignoring original sources): ignoring original sources and focusing on payoff from consensus thinking as opposed to actually understanding what is going on.

Example (green lumber fallacy): mistaking the source of important or necessary knowledge (greenness of lumber), for another, less visible from the outside, less tractable one. How theoreticians impute wrong weights to what one should know in a certain business or in general, how many things that are "relevant knowledge" are not really relevant knowledge.

Example: if you own something at $1000, ask yourself, would you buy it here if you did not have it. If the answer is not yet, sell. No economic difference between the realised and unrealised.

Example: Messianic Illusion. A single person will save the world. Advances typically come from distributed progressive improvements via negativa from funerals.

Base rate fallacy

Example (independent scholarship): more weight should be given to the independent scholar conditional of having the same rigor.

Example (Snowden): Snowden is dishonest.
Snowden is now in Russian, use Bayesian reasoning

Wittgenstein's Ruler

Not realising that when you using the ruler to measure the table, you are also using the table to measure the ruler.

Misunderstanding distribution (Mediocristan vs Extremistan) (Type 1b)

Mediocristan: a process dominated by the mediocre, with few extreme successes or failures (say, income for a dentist). No single observation can meaningfully affect the aggregate.

Extremistan: a process where the total can be conceivably impacted by a single observation. These include the fractal, power-law or family of distributions.

In general, it is type 1a biases applied to higher order attributes. Discussed in The Black Swan.

Incorrect class of distribution

Example (black swan): black swan event happens, reject Gaussian.

Example (turkey problem and inverse turkey problem): every day a turkey has increased confidence that the butcher who feeds it will never hurt it. The inverse turkey problem: searching for "cures" is not irrational just because you will never find anything.

Example (fat tailedness in distribution space): The presence of feedback loops between components and the abrupt switching of states means that random variables in the system can produce multiplicative effects, hence fail to converge to the Gaussian basin.

Incorrect tail properties

Example (Lucretius fallacy): "The fool thinks the tallest mountain there is the tallest mountain he has seen."

Misunderstanding consequences of higher order (Type 2a)

These overlap mathematically with 1b, but in practice it is different. Discussed in Antifragile.

Focusing on expected average without looking at variance/skewness

Ignoring asymmetries

Ignoring situations where someone has more to gain from volatility, randomness, errors, uncertainties, stressors and time.

Example (Hammurabi's rule violation): engineers not punished for killing innocents with poor architecture. Decisions taken by someone who does not exit the pool.

Example (false accusation): in many legal systems, since Hammurabi's article, calumnies and false accusations are punished as if the accuser committed the infractions himself. Nabothizing: Production of false accusation, just as Jezebel did to dispossess Naboth. Nabothizing is asymmetric, false accusation causes irreversible reputation loss despite correction.

Best-map fallacy / best-metric fallacy

Preferring a false map to no map at all. More technically, ignoring the fact that decision making means alterations in f(x) when we do not know anything about random variable x. Explained in the Black Swan. "Give us something better."

Examples: engineers measure only what can be measured reliably.

Example: When people go to the dentist, they judge by results never by intention. However this reverses when it comes to politics. It remains however that for risky decisions naive assessment of results fail to capture the quality of the decision.

Example: judging a policy by intention or reasoning (exception: applying precautionary principle)

Misunderstanding nonlinear effects (Type 2b)

Nonlinearity: there is at least one scale at which functions of averages, at some scale, diverge from averages of sums.

Scale transformations

Specific deterministic and random interactions between components –owing to dependence produce different behaviors from those of the properties seen in isolation, particularly when asymmetric. These cross-dependencies produce different outputs depending on the scale.

Change in size or quantities transforms the problems. No situation should ever be dealt with in more abstract form than required. Life is about a collection or particulars that do not necessarily generalize without scale transformation.

Example: John Ioannidis found out that the odds for an elderly to die on the road exceeds that from Covid-19 (the statistical claim was effectively wrong, but let's ignore). Consider a collective, that is a sum of individuals. Because deaths on the road are independent (hence allow for the workings of CLT, the central limit theorem) and the ones from Covid dependent (hence do not scale by CLT), you witness a reversal of the source of risk. How? The odds of a 100 elderly dying from Covid exceed the odds of the same number dying in car accident, even if one person is individually more likely to die on the road.

Example: partisan's individual opinion is totally invalid. Partisanship is representative collectively.

Example: properties of sum of random variables different from the sum of properties.

Example: a country is not a large village, a city state is not a small empire, a collective is not the a naive sum of individuals.

Example: Note that people live under the illusion that if science works in getting us closer to truth, it is the result of the fact that on balance individual scientists are attempting to get us closer to truth. This is clearly false under scale transformation; it is similar to the aggregative properties of markets: scientists might be just trying to pursue self-interest and it is the rules that allow the truth to progress in spite of the attributes of the individuals.

Example (from physical sciences): mean-field theory, renormalization groups

Example (from statistics): ignoring pre-asymptotics or the slowness of the law of large numbers.

Example (false comparisons of scales): GMO to junk food

Example (nudging): nudging rules on individual does not translate to results on collective.
For instance, nudging people into investing their retirement savings into basket strategies might be beneficial for a single individual taken in isolation, but will not translate into benefits for the collective –it will remove the effects of diversification.

Example (golden rules): Avoid golden rules. Golden rules ("treat others the way you'd like to be treated") invite busybodies to change other people's lives.

Example (invisible minority rules): minority rules undergo scale transformation due to renormalization, they need to be visible due to the outsized effect.

Counterexamples for coercion:
Exceptions in the tails of the distributions:
- seat belts
- taxation (mandatory)
- bioethics (can't sell my own kidney if I wanted)
- education (children coerced to learn even in homeschooling)
- army (in war to defend nation)
- treatments (e.g. drug addicts)
- jury duty (mandatory)

Example: Group morality is not the sum of individual morality. Never make moral inferences about an aggregate or a group from attributes of individual members and vice versa. Under adequate legal and institutional structure, the intentions and morality of individual agents does not aggregate to groups. And the reverse: attributes of groups do not map to those of agents.

A negative measure (assuming it works) is not a positive measure

Example: IQ works for non-intelligence not intelligence. Sigmoidal effects have separate properties.

Dynamics (Type 2c)

Accepting the interactive and local behavior of complex systems doesn't mean raising one's hand and stepping aside completely. It means the following: priority must be first given to the self-organizing attributes that led to the dynamics, which is not exclusive.

Ignoring ergodicity

Example: sequential bets (time average) differs from average of a group (ensemble average) when there is an absorbing barrier or compounding.

The General (non-naive) precautionary principle delineates conditions where actions must be taken to

reduce risk of ruin, and traditional cost-benefit analyses must not be used. These are ruin problems where, over time, exposure to tail events leads to a certain eventual extinction.

Example (Lindy effect): a technology or anything nonperishable increases in life expectancy with every day of its life.

Example (neomania): a love of change for its own sake, a form of philistinism that does not comply with the Lindy effect. Ignorance of ergodicity leads to one forecasting the future by adding, not subtracting.

Example: Time expectation is not a state-space one. Ignoring ergodicity.

Example (ethics): journalistic anachronism of Aristotle's opinion of slavery using today's norms. This is retrospective moralising.

Example (hindsight bias): history seen as running backwards.

Example (static inequality): snapshot view of inequality that is static inequality, dynamic inequality looks at entire future and past life.

Example: not putting expiration date.

Ignoring opacity

Focusing on the known and not the unknown.
The reason the state should not act like a Lebanese mother is that often in engineering results are unexpected side effects of the process. "Rational" outcomes do not necessarily flow out of "rational" process (the teleological fallacy).

Example: People have a hard time shedding socialism because it makes a lot of sense and appeals to our deep sense of justice. What makes a lot of sense, historically, doesn't really make a lot of sense; the fact is obvious but hard to remember when swayed by abstract justice arguments. Consider modern Northern European monarchies, particularly the Scandinavian ones – they offer the highest degree of governance.

Ignoring computational irreducibility

Computational irreducibility (Wolfram) cannot be ruled out in navigating successive states, meaning that to evaluate the state of the system between discrete periods t and t + m requires knowing the future state at every step, hence a minimum of m computations.

Teleological fallacy

Example (Greek vs Roman): The difference goes deeper; it has much to do with both teleology and acceptance of opacity. The "Greek" assumes that the fact that I) there is a cause to things immediately

implies that II) such cause is visible to them, without making a link between I and II.
"Greek": puts theory above practice.
"Roman": puts practice above theory.

Dimension truncation (Type 2d)

Procrustean bed/Naive Platonism

Oversimplification of problems to fit into a Platonic ideal or model.

Kantian universalism

Example: scale free liberty. Liberty is fractal; it should be exercised to all collective units at all scales, that is, communities qua communities, all the way from n = 1 to n = ∞, with minimal scale transformation.

The saying if you are friends with everyone, you are nobody's friend. And if you treat all mankind the same, in other words without some preferential treatment to your own children, you will turn out to be an unreliable parent –eventually threatening their own survival. Pure universalism at its ad absurdum limit implies you drop off a kid at school in the morning and randomly pick an- other in the afternoon.

Racism vs. Xenophobia. Racism has
two conditions: 1) imparting population attributes to randomly selected individuals or sub-groups from such a population; that is, in the association of abilities, personality traits, and disposition with ethnicities and classification. It leads to treating a person with presumed population traits rather than the idiosyncratic ones (that is, top down vs bottom up).
2) holding the belief that such presumed population traits and dispositions are inferior to one's own.

Homophily consists in preferring people similar to one-
self for social or cultural purposes, though not political,
economic, or functional ones (where its pathology becomes
nepotism).

Xenophobia consists in pathological homophily, disliking strangers qua strangers.

Example: Giving favorable treatment or inheritance to a relative or a family member cannot be considered racism although the link with that person is primarily genetic, particularly if the person is recently discovered half sibling. On the other hand claiming to be giving such favorable treatment "because of skills" is racist and eugenist. Granting a French citizenship to a newborn issue of French parents in Mongolia while not doing so with other babies in the same hospital is not racist. Claiming to be doing so because of French ethnic superiority is.

Ludic fallacy

Life is not a game. In real life probability is just a kernel inside a complicated pay-off function and are not separable.

Example: conflation of I1 and I2.

Example (Tetlock and Thaler): replicate under games, but does not generalise to real risk. One can overestimate the probability and underestimate the expected payoff.

Example: Dr John vs Fat Tony. Coin with 99 heads 1 tails. Dr John says 50/50, Fat Tony says that coin is rigged.

Missing ecological rationality

Example: misunderstanding the role of religion

Ahistoricity

Why not consider what happens what happens at other periods of time?

Inappropriate dimensionality

The random or deterministic process for a vector, even when predictable, cannot be expressed by a higher dimensional stochastic process, with its snapshots expressed as a multivariate probability distribution. Hence: automata, agent based models.

Type 3 (BS Vending)

In general, a weak argument when used out of context generally become a type 3 fallacy.

Conflating the necessary with the sufficient

Confirmatory empiricism

Absence of evidence is not evidence of absence.

Counterfactual Games

Cherry-picking and nitpicking

One sided argument even if correct except to declare plain advocacy.

Example (narrative disciplines): use statistics to fish out good stories due to cherry picking instead of using controlled experiments. This is also related to the narrative fallacy to fit a story to connected and

disconnected facts.

Examples: U.N. reports (perhaps to justify their funds) present environmental situations as dire without counterpoint or global statistical representation. They will show “deforestation over [span years] without longer periods (say past 25 years), this fitting a window or noise variations to their story rather than the true trend.

Strawman

Carpenter fallacy

Example: to understand roulette risk, know probability not carpentry.

Genetic fallacy

Rejecting or accepting an argument based on its origin rather than its content.

Logical Errors, Non-Sequitur

Typically hidden in convoluted chains of reasoning.

Affirming the Consequent

If P then Q. Since Q is true, therefore P is true.

Denying the Antecedent

If P then Q. Since P is not true, therefore Q is not true.

RECAP: modus ponens and modus tollens.

Modus Ponens (affirming the antecedent). If P then Q. Since P is true, therefore Q is true.

Modus Tollens (denying the consequent). If P then Q. Since Q is not true, therefore P is not true.

Hand-waving

Skipping critical steps in reasoning, not necessarily in exposition.

Verbalism

Verbalism is the use of terms important to arguments where their meaning can change with context of circumstances and does not lend themselves to explicit definitions.

Note that scholars do not need to produce codification to expressions used, but must be able to back-up every single term used.

The problem is not using labels as shortcuts. The problem is thinking in terms of labels.

Verbalisms do not have rigidity of meaning. The criterion of rigidity of meaning is sufficient to spot verbalism. Some examples include:

(1) Ill-defined terms: “freedom of speech”, “globalist”, “”conservative”, “progressive”, “liberal”, “modern”, “populist”, “sectarian”
(1.1) Terms that require **scale and degree**: rate of change meant by “progressive”, rate of autarky in “globalist”. Especially in discussions where there is normalisation mechanics. Example: taken over by intolerant asymmetric minority (kosher foods)
Example: “conservative” means backward resisting all progress. Hayek’s separation from verbalistic notion of conservatism.

(2) Well-defined and rigid terms that does not correspond with their meaning. Examples include “correlation”, “volatility”, “regression”

(3) Terms stretched outside their original meaning: “nazi””, “fascist”, “racist”

(4) Expressions without statistical significance: “evidence”, “causal”. This is scientism.

(5) Circular terms: ones that are explained by other terms that loop back to the same source. Example: “rationality” without mapping to the proper axiomatic framework of rationality.

(6) Words that do not have a robust mapping because they can have an arbitrary gerrymandered (boundaries of definition is manipulated and picked to work) definition that, not being, robust, changes according to periods. Examples include: “Western civilization”, “East-West divide”

(7) Substitution of one term for another. Examples: “democracy” with implication of “governance”, or “legal” for “ethical”

(8) Distinctions without a difference but presented as a matter of substance are verbalistic if the terms do not have rigidity of meaning. Note: distinctions can be with and without differences depending on contexts and uses.

(9) Euphemisms and exaggeration in rigorous thought.

(10) Ambiguous labels that can fool people.

Example: “Holy Roman Empire” was not a continuation of the Roman Empire (Byzantium was) but the name is potent enough to confuse people to believing the original (mostly) Franco-German European union that was the continuation of ancient Rome.

Example: “Arab” as a designation that could mean a Westerner (i.e. Mediterranean) or “foreigner” for Arabians and Peninsular people, while understood as “nomad” by some. Confuses people into political theories such as “Arab nationalism”

Examples: bigoteering in general calling someone racist, chauvinist when not warranted. Exploiting verbalisms. Second order siding with bigoteers is also as bad. Also, retrospective bigoteering.

Examples: pedophrastry or using children to prop up arguments.

Disclaimed Fallacies

Ad Hominem/Appeal to Authority (IN PRACTICE)

Sometimes you focus on the person, sometimes you focus on the argument. For example, medical degrees being doctors, expert witnesses. Sometimes you require empirical or mathematical proofs, then you focus on the arguments.

Note that there is a legitimate version: “Because you are an idiot, your statement is wrong.” which is Ad Hominem, but in practice it usually is “Because your statement is wrong, you are an idiot.”

Dunning-Kruger

Not proven.

Sunk Cost

Sunk cost fallacy may not be the case in decisions that respect path dependence.

Conclusion

Almost all those caught making a logical fallacy interpret it as a “disagreement”.

Good References

Nassim Taleb’s twitter feed.
Incerto
Fallacies
Principia Politica
Essays on Religion
Covid Forecasting PAper

Russian War (Empire vs NATO)