



① Probability Judgments

a) The representative heuristic refers to the phenomenon that people show in evaluating probabilities.

It is a bias where the people ~~judgment~~ judge the likelihood of an event (or sth else) based on its similarity to its parent population rather than focusing on the actual base rate. The more similar an event is described to be to a certain category (and the more detailed this description), the more people tend to estimate the likelihood that this event belongs to a certain group ^{to be} larger. Example: the cab-accident problem

However, the actual likelihood of the event is not based on similarity. Therefore, a judgment made under the influence of the representative bias is not following the normative model and, as a result, irrational!

b) The gambler's fallacy occurs in decision situations involving risk. It refers to the phenomenon that people think that ~~the~~ chances are self-correcting to the overall probability. After a series of bad outcomes, they think that it becomes more likely that a positive outcome



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will come with the next trial. When flipping a coin, for example, people will think that it is more likely ~~to~~ that "heads" will come after five "tails" in a row. However, this is irrational, as each trial is totally independent from another. For each trial, the chance of heads is 50%. The coin has no memory!

c) The availability heuristic describes that people judge the probability of an event not based on its actual occurrence in objective numbers (which would be the normative way to do these judgments). Instead, people base their judgments on how easily relevant information comes to mind / can be drawn from their memories or brains. However, this does not represent the actual probability of the event, as some memories can be drawn upon more easily than others. Furthermore, our memories are affected by media, our own experiences, recent events, mood, level of difficulty of the information in question etc. In conclusion, the availability heuristic is a short-cut in ~~the~~ searching for evidence and inference and therefore leads to inaccurate probability judgments. More available events are judged to have a higher probability than unavailable events!



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The bias can be avoided by actively open-minded thinking about other evidence and reference to actual statistics.

examples for this bias are that people judge the number of deaths by a shark as much higher than the number of deaths due to diabetes; or that people judge it more likely to win the lottery than it actually is (due to reports in the media).

d) People overestimate very high frequencies and underestimate very low probabilities. Therefore, they tend to ignore the chance of very rare but highly costly events. As a result, they are not willing to pay for an insurance which will pay off in a reduced risk of liability for several future years. They simply think that nothing will happen to them and that they can just save the money. Examples are missing flood or fire insurances. Therefore, in order to protect the ~~people~~ potential injurers and also the potential victims, a law/regulation makes sense.

People perceive the loss of money (for paying the insurance premium) as greater than the gain (reduced risk), ~~although the probabilities are~~ because the people don't



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judge the likelihood correctly.

② Decisions under certainty

a) Expected utility theory assumes that we are all Econs. We can calculate, are incredibly smart, don't have emotions, etc. It is the normative way to solve problems involving uncertainty situations.

It assumes that the value we can expect from a decision equals the utility we could gain from each possible outcome multiplied by its probability.

$$EV = \sum_i u_i \cdot p_i$$

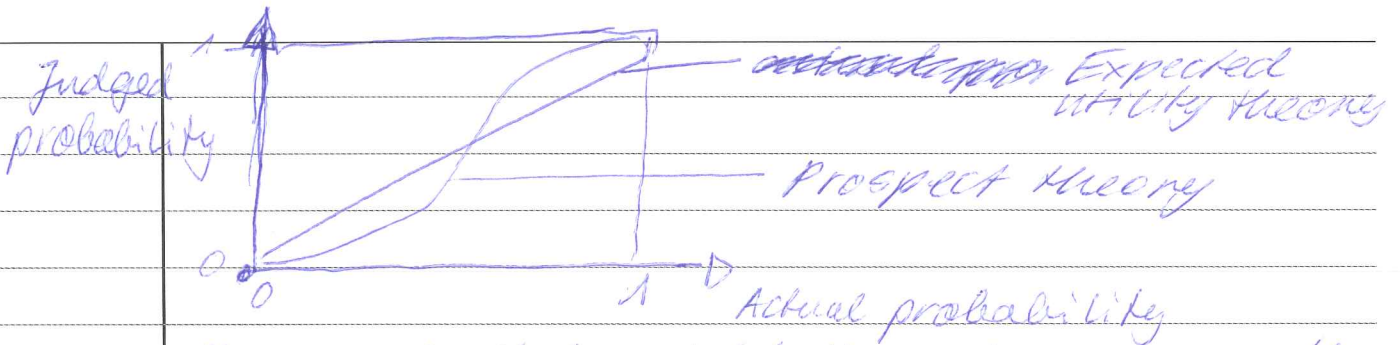
It also assumes that the people are ~~affected~~ "neutral" or "equally" affected by gains or losses. Furthermore, it assumes that people can judge probabilities perfectly correct. ~~However~~

Prospect theory in contrast is the descriptive theory for making uncertain decisions. It refers to how humans make their decisions with all their biases and faults.

~~It admitted~~ It acknowledges in the pi-function that we tend to underestimate low probabilities and overestimate high probabilities (\rightarrow see diagram).



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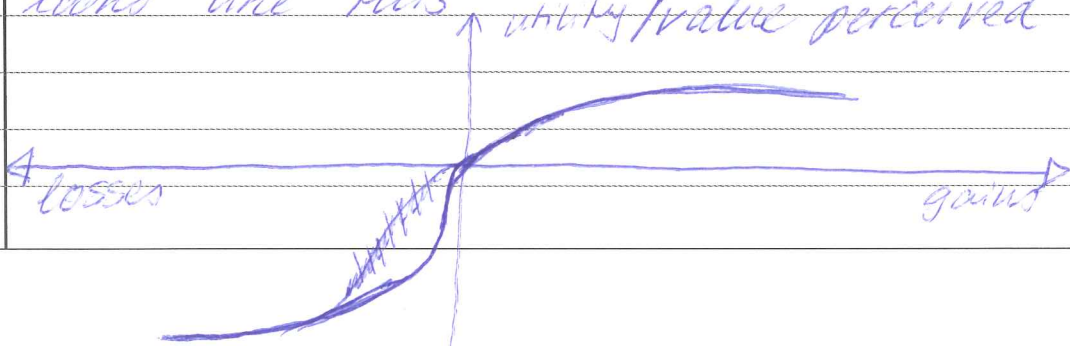


Plus, we tend to avoid the extremes on the scale (close to 0 and 1). And we are more confident for high probabilities.

In addition, prospect theory states that we feel different about losses and gains of equivalent amounts of money.

Prospect theory states that we evaluate the outcomes with regard to a certain reference point. This reference point is highly subjective ~~and~~ and can easily be manipulated by biases. In expected utility theory, this assumption is not included. Here, it ~~does~~ doesn't matter ~~how~~ what your actual situation is when you evaluate rewards.

b) The value function in the prospect theory looks like this, utility/value perceived





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The value function has a S-shape. It is convex for losses and concave for gains. Therefore, people perceive the loss of a certain amount (e.g. 100 NOK) as much worse than they would be happy when gaining the same amount of money. This is irrational as both amount of money should offer the same economic buying power. Because losses "hurt more" (provide a higher level of disutility than an equivalent gain would provide in utility), people want to avoid these losses. They become ~~to~~ loss averse. As a consequence, people are much more willing to take risks/gambles when losses are involved than ~~we~~ when gains are at stake. They want to save the gains instead and choose the safe option.

Example:

When confronted with a choice between:
- A : 50 \$ for sure or
- B : 50% chance to win 100\$ and 50% chance to win nothing
⇒ Most people go for A.

When confronted with a choice between:
- A : loose 50% for sure or
- B : 50% chance of losing 100\$ and 50% chance of losing nothing
⇒ Most people go for B.
⇒ People change their preferences, although the outcome is the same and they should be indifferent about the options!



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c) People are much more willing to spend money on preventing involuntary risks than voluntary risks. Example: people want to forbid smoking in public to save the non-smokers rather than forbidding cigarettes all together. People think that smokers pay for the additional joy of smoking with their health, so they "get what they asked for" when they get lung cancer. In contrast, non-smokers receive no payoff of the smoking and therefore need protection.

People are much more willing to spend money on preventing individual risks than statistical risks. Everyday, people get shot in the cities of America, for example. That doesn't get much attention and not much money is spent to avoid this. However, when several people get shot at once (\rightarrow individual risk), then everybody is alarmed and ~~wishes~~ wishes for the government to prevent these events (eg. avoid shootings in schools).

In addition, we are more willing to reduce risks caused by omission than by commission. We feel like it should not be risky to "do nothing". We feel like a person doing something "asks" for the risk and if something happens, it's his own fault.



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However, from an economic perspective, these differentiations in types of risks shouldn't matter. The money should be spent where it is most effective, where the costs for a reduction of 1% in risk is cheapest. Emotions should not play a role. Overall risk reduction should be in the focus

③ Decisions about the future

a) ~~Ex~~ The discounted utility model is used to give less weight to future outcomes and more weight to current outcomes. It is used to make outcomes that occur at different points of time comparable.

→ Future rewards are discounted to the present time by using a subjective discount rate which represents the decision maker's willingness to delay rewards.

$$Utility_{t=0} = Reward_0 + \frac{Reward_1}{\text{discount rate}^1} + \frac{Reward_2}{\text{discount rate}^2} + \frac{Reward_3}{\text{discount rate}^3} + \dots$$

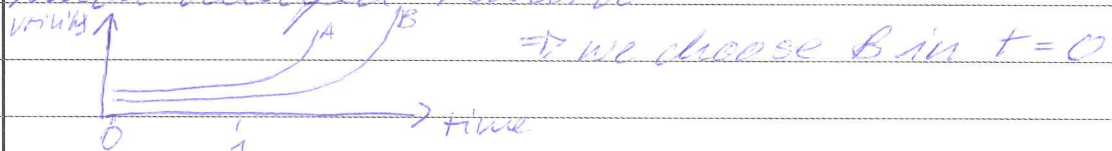
The utility in the current moment is the current reward plus the discounted rewards of all future periods, where the discount rates is equal to: $1 + \text{K}(subjective)$ required rate of return



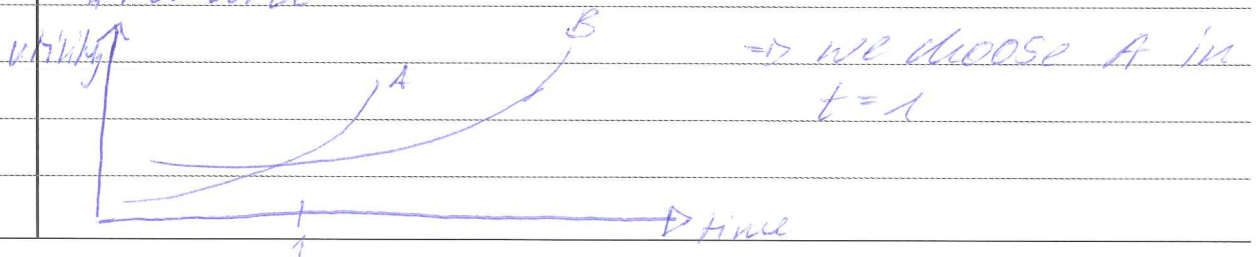
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The subjective discount rates can vary significantly between people and can be manipulated by biases. Furthermore, the discounted utility model assumes that the discount rate is constant for all future periods. However, in reality, people change their ~~the~~ discount rates and are dynamically inconsistent and myopic.

b) When making a decision about two options that are in the far future, we tend to (rationally) choose the larger, but more delayed reward over the smaller, but not quite as much delayed reward.



However, as time goes by, we become impatient and our tendency to favor the immediate reward takes over. We have problems of self-control, ~~because~~ because we want the experience / reward now. As a result, our preferences reverse and we prefer the smaller, but immediate reward over the larger, but delayed reward.





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example: I ~~now~~ now decide to invest 100€ each month in an savings account starting in ~~the~~ January. (preferring the larger outcome of saving over immediate consumption). In January, however, I decide to not save the money, but to use it for shopping instead. I switched my preferences!

c) We can try to remove the decision or use extraphysical devices.

We can also try to:

- decrease our exposure to the temptation by doing something else / getting distraction
- focusing on personal rules and active open-minded thinking about our actual goals
- Thinking about ^{the consequences of} giving in to the temptation → regret and other bad feelings will give disutility
- join clubs or make contracts with other ~~the~~ people to get an incentive not to give in to the temptation
- make plans (→ take decisions in advanced when you are still in ~~an~~ a cold state of arousal), e.g.: make a shopping list before you go shopping in order to buy only what you really need!



④ choice architecture

a) A nudge is only a nudge if it

- changes ~~the~~ people's behavior
- in a predictable way
- without changing the economic incentives of the person being nudged
- must be cheap and easy to avoid
- does not take away any options or choices for the person being nudged
- it is not a mandate \rightarrow people are not being forced.

b) Incentives: align the incentives of the people in a way that makes it easy for them to choose the better option. This incentive must be cheap and easy to avoid. To find optimal incentives, a choice architect should think about: who chooses? who uses? ~~the~~ who pays? and who profits?

Understand mappings: As it is difficult for people to map their decisions to ~~the~~ future outcomes and consequences, choice architects should provide measures for more easy mapping. By using pictures, numbers, or similar information, it can be much more easy to understand which options are best.
example: Show different \times pictures of small,



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medium and big houses next to the contribution percentage numbers in a 401(k) savings plan.

Defaults: As defaults are inevitable, choice architectures should include them wisely in their ~~design~~ systems. Furthermore, defaults can be assigned in an intelligent way to let people make the best choices for themselves.

Give feedback: A good system tells the decision maker when he is doing something good, but also when he is doing something bad/wrong. Only when we get immediate feedback about what the mistake was and how to avoid it, we can learn and improve our decisions the next time!

Expect errors: As everybody makes mistakes, choice architects should design their systems in a way that expects these errors and prevents them from being made. Furthermore, the system should be as forgiving as possible so that people can correct their mistakes.

Structure complex choice: By choosing a smart-choice structure, choice architects can help people to make better choices. It's for example helpful to start with the



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easy choices and then proceed to the more difficult/detailed choices. Also, the sensible use of non-compensatory decision strategies can help

c) It is so important because people tend to stick to whatever default is given, even if this is the worst choice of all (default bias). This is due to the status quo bias, the endowment bias, the "yeah, whatever heuristic" and simply laziness. People think it's too complicated or too much of a hassle to do a change. Therefore, choice architects have much influence on the final decisions by setting the default.

Organ donations can be increased significantly by changing the default from "opt in if you want to be a donor" (default = non-enrollment) to "opt out if you don't want to be a donor" (default = enrollment).

In the first situation, the rule is not to ^{standard} be a donor. People will perceive it as too much work and a risk to ~~fill~~ fill in and send the application form. Therefore, overall participation in the system will be low. Also, the general values in the society will be less open to organ donations.



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In the second situation, the standard rule is to be a donor. Here, the inertia and the default bias is used to create something good, namely an almost full-coverage donation system. Statistics of various countries show that the participation is almost 100% in all countries that changed the default to this setting. However, the freedom of choice is still preserved, as everyone is free to opt out. However, as organ donation is a sensitive and highly personal issue that also involves an ethnic perspective, it can be quite difficult to change the standard by a political process. There are many emotions involved.