Towards a More Accurate Description of Human Decision Making: Satisficing Instead of Optimization

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Need for a more accurate description of human decision making. To help people make decisions, we need to know how they make their decisions.

Traditional decision theory assumes that for every two alternatives, a decision maker either prefers the first one, or prefers the second one, or decides that there two alternatives are of the exact same quality. Under this assumption, decisions of a rational decision maker can be described by assigning, to each alternative A, a numerical value $u(A)$ known as its *utility*. For example, we can select a very bad option A_- and a very bad option A_+ and define the utility $u(A)$ of an alternative A as the probability p for which A is equivalent to a lottery in which we get A_+ with probability p and A_- with probability $1-p$. One can show that the utility of a decision in which we get different alternatives A_i with corresponding probabilities p_i is equal to $u(A)=\sum\limits_i p_i\cdot u(A_i)$.

Under this assumption, a decision maker always selects the *optimal* alternative, namely, the alternative whose utility is the largest. In practice, people usually do not exactly optimize, they select an alternative which is good enough – this is called *satisficing*. It is therefore desirable to take this into account when describing how people make decisions.

Proposed approach. In practice, for some pairs of alternatives A and B, the decision maker definitely prefers A – we will denote it be $A\gg B$; for some other pairs, we have $B\gg A$, and for the remaining pairs, the decision maker can select both A or B; we will denote this by $A\approx B$. It is important to mention that $\approx$ is not necessarily transitive: if A is slightly better than B, we can have $A\approx B$; similarly, if B is slightly better than C, we can have $B\approx C$, but the difference between A and C may already be significant, so we can have $A\gg B$.

Based on the relations $\gg$ and $\approx$, we can define an auxiliary relation $A\ge B\Leftrightarrow \forall C\,(B\gg C\Rightarrow A\gg C)$. For example, if $A\gg B$ means $g(A)-g(B)\ge\varepsilon$ for some $\varepsilon>0$, where $g(A)$ is monetary gain, then the new relation is equivalent to $g(A)\ge g(B)$. For this new relation, it is reasonable to assume that we always have either $A>B$ or $B>A$ or A has the exact same quality as B. Thus, the new relation can be described by a utility function $A>B\Leftrightarrow u(A)>u(B)$.

It is also reasonable to assume that if $A_1\gg B_1$ and $A_2\gg B_2$, then a lottery in which we get A_1 with probability p and A_2 with probability $1-p$ is preferable to a lottery in which we get B_1 with probability p and B_2 with probability $1-p$. It is also reasonable to require a similar condition for $\approx$. This implies that the plane of possible pairs $(u(A),u(B))$ is divided into three convex sets corresponding to $A\gg B$, $A\approx B$, and $B\gg A$. The border between two convex sets is a straight line segment, so we arrive at the following conclusion.

Conclusion. We have $A\gg B\Leftrightarrow u(A)-u(B)>\varepsilon$ for some $\varepsilon>0$, and $A\approx B$ means $|u(A)-u(B)|\le\varepsilon$. This is the desired description of satisficing decision making.